VSD

Tuesday, February 7, 2023 at 1:00 PM
Valley Sanitary District Board Room
45500 Van Buren St., Indio, CA 92201

OPERATIONS
COMMITTEE MEETING
AGENDA

Valley Sanitary District is open to the public and board meetings will be conducted in person. In addition to attending in person, members of the public may view and participate in meeting via the following:

Zoom link: https://us06web.zoom.us/j/82237499039

Meeting ID: 822 3749 9039

To address the Board of Directors during the virtual live session via zoom, please email the Clerk of the Board at hgould@valley-sanitary.org or, alternatively, during the specific agenda item or general comment period (i.e. non-agenda items), please use the "raise your hand" function in zoom in order to be recognized by the Clerk of the Board in order to provide comments in real time.

The Clerk of the Board will facilitate to the extent possible any email requests to provide oral testimony that are sent during the live meeting. Members of the public may provide Oral testimony in person or during the virtual live session and are limited to three minutes each. To address the Board in person please complete speaker request card located at in the Board Room and give it to the Clerk of the Board.

If you are unable to provide comments during the meeting, written public comments on agenda or non-agenda items may be submitted by email to the Clerk of the Board at hgould@valley-sanitary.org. Written comments must be received by the Clerk of the Board no later than 11:00 a.m. on the day of the meeting.

1. **CALL TO ORDER**
2. **ROLL CALL**
3. **PLEDGE OF ALLEGIANCE**
4. **PUBLIC COMMENT**
5. **DISCUSSION / ACTION ITEMS**

5.1 Select Committee Chairperson

Recommendation: Approve

5.2 Approve Minutes for the December 6, 2022, Operations Committee
Recommendation: Approve

5.3 Recycled Water Project - Phase 1 Energy Conservation Measure (ECM) #3 - Waste Activated Sludge Thickening Guaranteed Maximum Price (GMP)
Recommendation: Discussion

5.4 Discuss Possible Process Control Modifications to Remove Ammonia and Total Nitrogen if Required by a California State Water Resources Control Board NPDES Permit Revision
Recommendation: Discussion

6. ADJOURNMENT

POSTED February 2, 2023
Holly Gould, Clerk of the Board
Valley Sanitary District

PUBLIC NOTICE

In compliance with the Americans with Disabilities Act, access to the Board Room and Public Restrooms has been made. If you need special assistance to participate in this meeting, please contact Valley Sanitary District (760) 235-5400. Notification 48 hours prior to the meeting will enable the District to make reasonable arrangements to ensure accessibility to this meeting (28 CFR 35.102-35.104 ADA TITLE II). All public records related to open session items contained on this Agenda are available upon request at the Administrative Office of Valley Sanitary District located at 45-500 Van Buren Street, Indio, CA 92201. Copies of public records are subject to fees and charges for reproduction.

ITEM 5.1
ACTION

Valley Sanitary District

DATE: **February 7, 2023**

TO: **Operations Committee**

FROM: **Ron Buchwald, P.E.**

SUBJECT: **Select Committee Chairperson**

Suggested Action
Approve

Strategic Plan Compliance
GOAL 6: Improve Planning, Administration and Governance

Fiscal Impact
There is no fiscal impact.

Environmental Review
This item does not qualify as a project for the purposes of CEQA.

Background
Each year the Board President appoints directors to serve on the various committees. Each committee then selects which director shall serve as chairperson.

Recommendation
Staff recommends that the Committee members select a chairperson.

ITEM 5.2
ACTION

Valley Sanitary District

DATE: **February 7, 2023**

TO: **Operations Committee**

FROM: **Beverli A. Marshall, General Manager**

SUBJECT: **Approve Minutes for the December 6, 2022, Operations Committee**

Suggested Action
Approve

Strategic Plan Compliance
GOAL 6: Improve Planning, Administration and Governance

Fiscal Impact
There is no fiscal impact from this item.

Environmental Review
This item does not qualify as a project for the purposes of CEQA.

Background
The minutes from the December 6, 2022, Operations Committee meeting are presented for review and approval.

Recommendation
Approve the minutes from the December 6, 2022, Operations Committee meeting.

Attachments
06 Dec 2022 Meeting Minutes.pdf

VALLEY SANITARY DISTRICT
OPERATIONS COMMITTEE MEETING MINUTES
December 6, 2022

A regular meeting of the Valley Sanitary District (VSD) Operations Committee was held at Valley Sanitary District, 45-500 Van Buren St, Indio, CA, on Tuesday, December 6, 2022.

1. CALL TO ORDER

Ron Buchwald called the meeting to order at 1:02 p.m.

2. ROLL CALL

Committee Members Present:
Chairperson William Teague
Committee Member Mike Duran

Staff Present:
Holly Gould, Ron Buchwald, and Dave Commons

3. PLEDGE OF ALLEGIANCE

4. PUBLIC COMMENT

This is the time set aside for public comment on any item not appearing on the agenda. Please notify the Secretary in advance of the meeting if you wish to speak on a non-hearing item.

None.

5. DISCUSSION / ACTION ITEMS

5.1 Approve Minutes for October 4, 2022, Regular Committee Meeting

Committee member Mike Duran motioned to approve the minutes of the October 4, 2022, Operations Committee Regular Meeting. Chair William Teague seconded the motion. Motion carried unanimously.

5.2 Discuss Update on Capital Improvement Projects and Schedule

Ron Buchwald, District Engineer, gave project updates on the Influent Pump Station, Collection System Rehabilitation and Replacement Indio Downtown project, Recycled Water Project – Phase 1, and Westward Ho Sewer Siphon Replacement. The sewer main bypass of the influent pump station is in operation and is set to operate through the end of March 2023. Work within the pump station began on November 15, 2022. Pump station clean-up and piping demolition are in progress. Liner repairs are set to start the week of December 12, followed by installing new slide gates. Influent pump station rehabilitation work will continue through March 2023. The Collection System Rehabilitation and Replacement Indio Downtown project has been awarded to GRBCON Construction. The contract has been signed, and the bonds and insurance have been received. Staff and the contractor met with the City of Indio to discuss acquiring the necessary permits. This work is in process. Construction is anticipated to begin in January 2023. The Recycled Water Project - Phase 1 has begun mobilization of office trailers and equipment in anticipation of beginning construction work in March/April 2023. 100% design plans for five (5)

of the six (6) components have been submitted for staff review. 60% design plans for the 6th component and the rotary screw thickeners, have also been submitted for staff review. Once the plans for the rotary screw thickeners have been approved by staff, Schneider Electric, along with their contractors and subcontractors, will begin establishing the Guaranteed Maximum Price (GMP). The GMP will be presented to the Board for approval in February 2023. The Westward Ho Sewer Siphon Replacement project is going through the CEQA process. A public hearing is scheduled for December 13, 2022, for the Board to adopt the Mitigated Negative Declaration. Staff is still waiting for final review from the Federal Emergency Management Agency (FEMA), including their environmental review of this project. FEMA review is expected by January 2023, according to CalOES.

6. ADJOURNMENT

There being no further business to discuss, the meeting adjourned at 1:28 p.m. The next regular committee meeting will be held on February 7, 2023.

Respectfully submitted,
Holly Gould, Clerk of the Board
Valley Sanitary District

ITEM 5.3
DISCUSSION

Valley Sanitary District

DATE:	**February 7, 2023**
TO:	**Operations Committee**
FROM:	**Ron Buchwald, District Engineer**
SUBJECT:	**Recycled Water Project - Phase 1 Energy Conservation Measure (ECM) #3 - Waste Activated Sludge Thickening Guaranteed Maximum Price (GMP)**

Suggested Action
Discussion

Strategic Plan Compliance
GOAL 2: Increase Recycling, Reuse, and Sustainability

Fiscal Impact
The GMP for ECM #3 is $10,374,394. This is not included in the FY 2022/23 Capital Improvement Program (CIP) budget. In order to pay for this project, Staff is requesting to seek financing options to present to the Board for approval, which would require a sewer rate increase above what was previously adopted in order to meet the debt coverage requirements.

With no guarantee that a proposed rate increase will be approved and adopted, and the need to include this ECM as part of the overall Recycled Water Project - Phase I, the backup plan proposed by staff would be to delay other CIP projects (specifically the Collection System Rehabilitation and Replacement Project) unless and until a rate increase is adopted.

Environmental Review
This project was reviewed as part of the California Environmental Quality Act (CEQA) as part of the 2015 Water Reclamation Facility Master Plan. The Notice of Determination was filed and recorded with the State Office of Planning and Research on January 28, 2016.

Background
The Recycled Water Project - Phase 1 is a Capital Improvement Project of high priority for the District. This project will replace aging and capacity-restricting equipment, provide redundancy and improve efficiency and is necessary to meet anticipated regulatory requirements, tertiary treatment, and recycled water production.

The Recycled Water Project - Phase 1 consists of 6 parts or Energy Conservation Measures (ECM). The 60% design plans for ECMs #1 (Bar Screens), #2 (Grit Chamber), #4 (Digester, Flare & Boiler), #5 (Main Switchboard), and #6 (Subnatant and Filtrate Return) were approved in February 2022 and the GMP was approved in May 2022.

ECM #3 (Waste Activated Sludge thickener) was delayed due to the request from VSD staff to change the type of thickening device to ensure that a modern and efficient device be used instead of the one that was previously selected. At the February 8, 2022, meeting, the Board authorized staff to proceed with the waste activated sludge thickener alternative. ECM #3 reached the 60% design in November 2022.

Staff reviewed and approved the 60% design plans in December 2022. The Design Build Team then put together the GMP for ECM #3 in January, which is being presented for review and discussion. Schneider Electric created a PowerPoint presentation to provide information on ECM #3 to explain why it is a necessary part of the overall project and should not be considered a separate project.

Recommendation
Staff recommends that the Committee discuss the importance of this item in connection to the overall project as well as the need for financing in order to pay for this project.

Attachments
Operations Meeting_February 7.pptx

Operations Committee
ECM-3 Waste Activated Sludge Thickening

Recycled Water Project- Phase 1

February 7, 2023

Agenda

1	Quick Recap
2	ECM-3 Waste Activated Sludge Thickening (60% design)
3	Financial Considerations
4	Timeline and What's Next

Quick Recap: Recycled Water Project – Phase 1 Improvements

There are 6 scopes of Work in the Phase 1 Project

ECM 1 – Mechanical Bar Screen

ECM 2 – Grit Chamber

ECM 3 – Waste Activated Sludge (WAS) Thickening

ECM 4 – 2nd Digester and related systems, including pumps including secondary flare

ECM 5 – SWBD MS Replacement (electrical switchgear)

ECM 6 – Subnatant and Filtrate Return

ECM= Energy Conservation Measure

Quick Recap: Recycled Water Project – Phase 1 Improvements

Amendment #1- Approved by VSD in May 2022 ~$71M

ECM 1 – Mechanical Bar Screen

ECM 2 – Grit Chamber

ECM 4 – 2nd Digester and related systems, including pumps including secondary flare

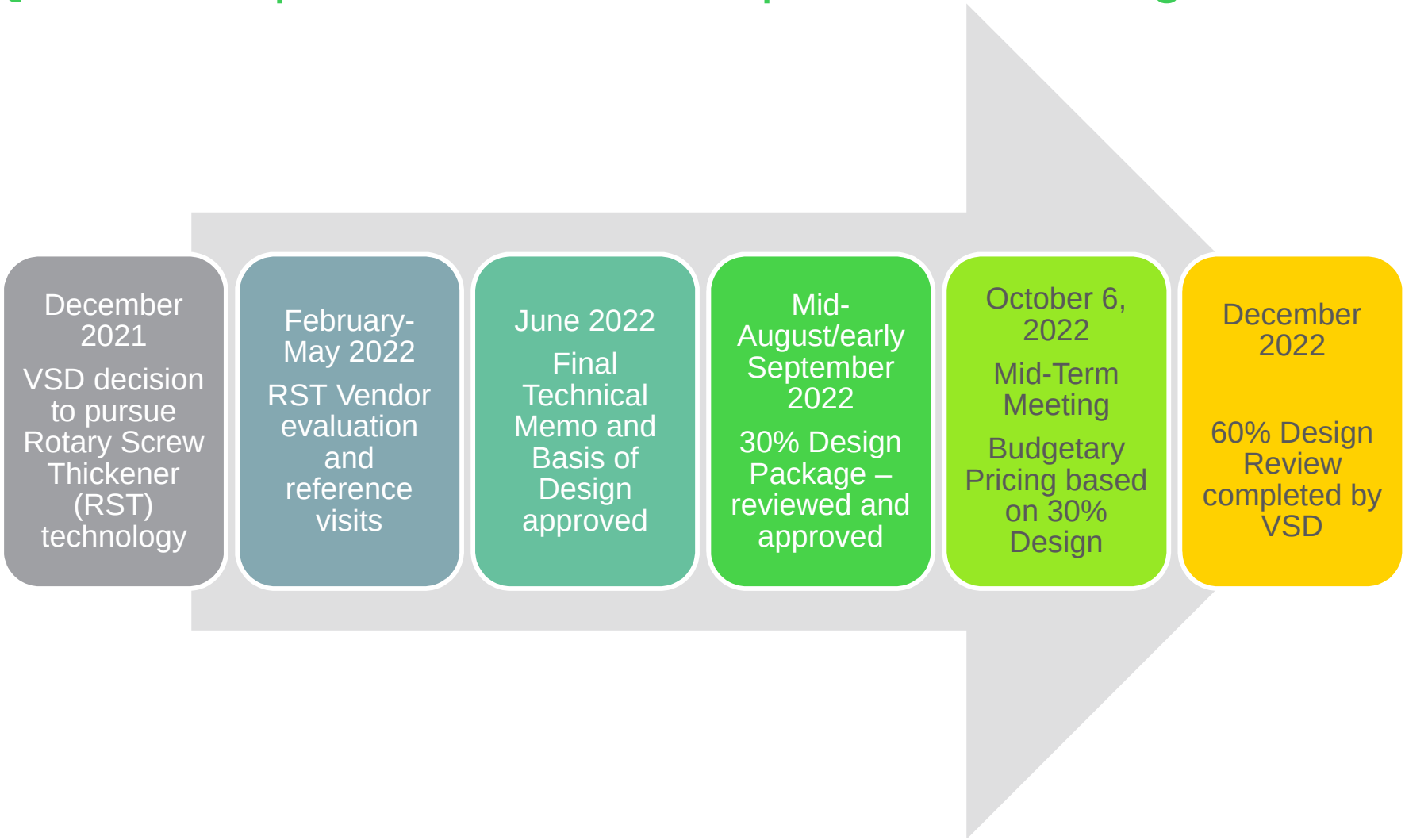
ECM 5 – SWBD MS Replacement (electrical switchgear)

ECM 6 – Subnatant and Filtrate Return

Amendment #2- Targeting Approval at February 14, 2023 Board Meeting $10.375M

ECM 3 - Waste Activated Sludge (WAS) Thickening

Quick Recap: of ECM-3 Development and Design



ECM 3: Waste Activated Sludge Thickening

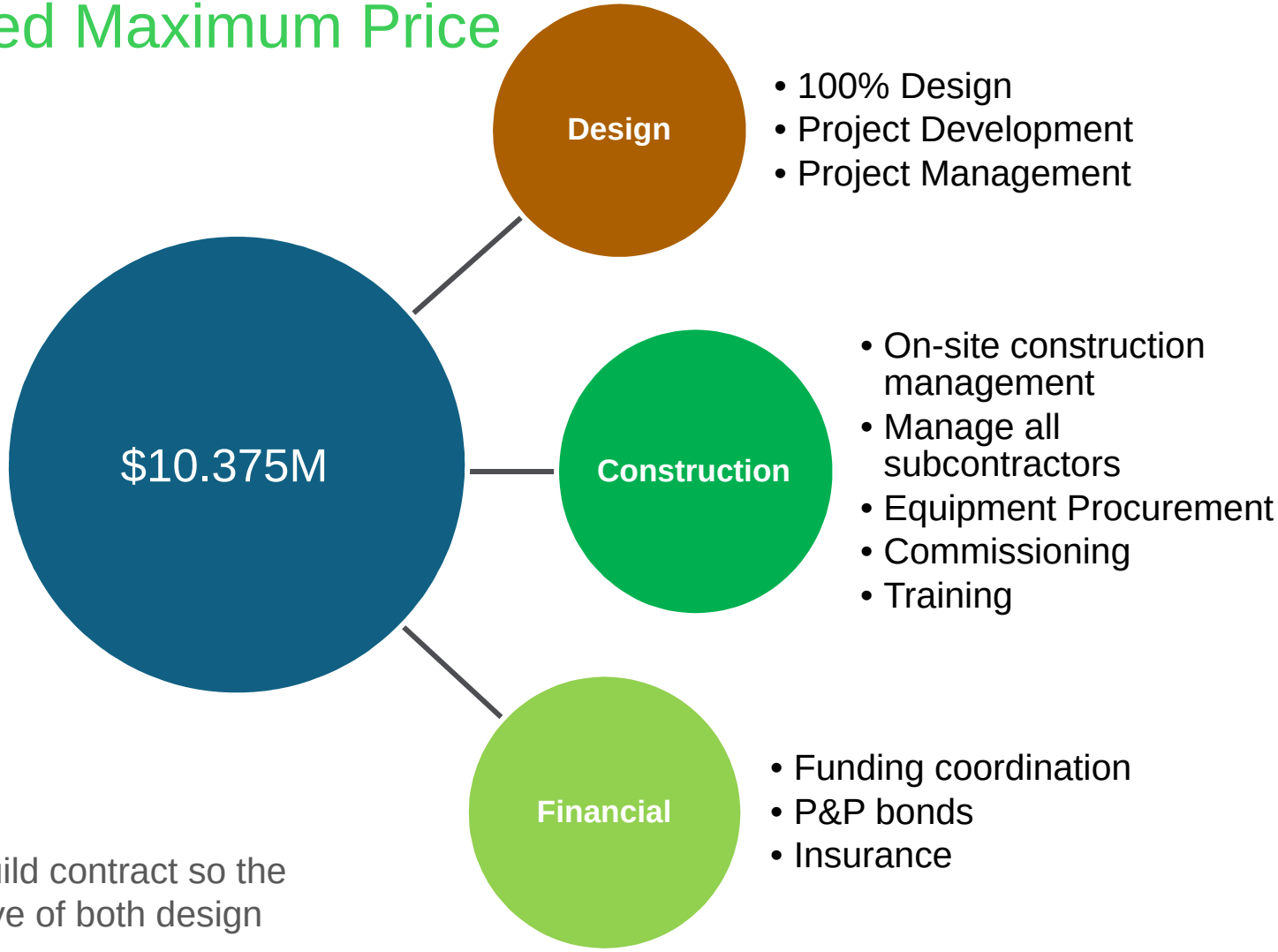
Installation proposed at VSD:

- Two (2) Huber rotary screw thickener units
- Each of the two installed thickener units will have a dedicated:
  - polymer blending and feed unit
  - flocculation tank
  - wash water pump
  - TWAS pump
  - WAS Pumps 2+1
  - Piping, valves and instrumentation
  - Control Panels
- The equipment will be mounted on a concrete pad under a canopy.

Photos of similar RST- Goleta Sanitary District

Financial Considerations

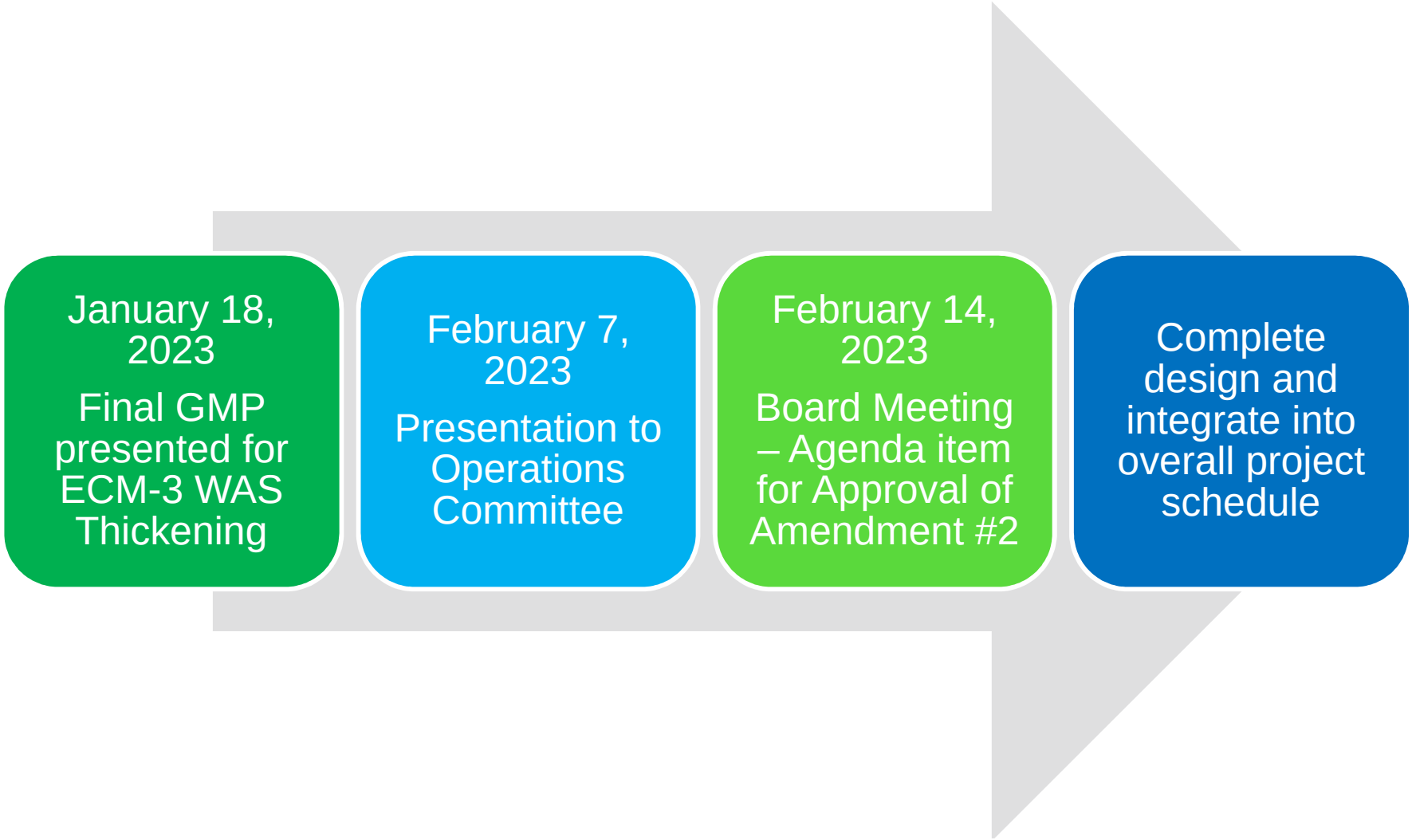
Guaranteed Maximum Price



This is design-build contract so the costs are inclusive of both design and construction.

Timeline and What’s Next

Timeline and What's Next



Thank you!

ITEM 5.4
DISCUSSION

Valley Sanitary District

DATE:	**February 7, 2023**
TO:	**Operations Committee**
FROM:	**Dave N Commons, Chief Operating Office**
SUBJECT:	**Discuss Possible Process Control Modifications to Remove Ammonia and Total Nitrogen if Required by a California State Water Resources Control Board NPDES Permit Revision**

Suggested Action
Discussion

Strategic Plan Compliance
GOAL 3: Excellent Facilities

Fiscal Impact
There is no cost from this discussion.

Environmental Review
Responds to NPDES permit Board Order R7-2020-007 revision.

Background
On April 1, 2020, the State of California Colorado River Basin Regional Water Quality Control Board as part of the plant's NPDES permit Board Order R7-2020-007 required Valley Sanitary District (VSD) to complete within 18-months of the order being finalized an Ammonia Technical Study. The purpose of this technical study was to evaluate the ability of VSD's wastewater treatment facility to reduce ammonia discharges into the Coachella Valley Whitewater Storm Water Channel. Normally when a Regional Board requires such a technical study, a pending or potential effluent discharge requirement modifications to the plant's NPDES permit is looming.

The results of the 18-month technical study demonstrated that there was a reduction in the ammonia concentration in the plant effluent discharge to the receiving waters. The ammonia trends data averages from the study indicated that the plant's influent flow entering the treatment facility averaged 56 mg/L of ammonia. After primary and secondary treatment, the effluent ammonia concentration averaged 3.9 mg/L.

In November 2021, staff evaluated additional treatment modifications that could be made with a minimum of cost that would provide consistent, reliable, nitrification/ denitrification with effluent ammonia concentrations averaging levels below 2.0 mg/L or less.

Phase 1 of the pilot study required one of the plant's four aeration basins to be modified into different process control treatment processes. Basin No. 4 was chosen as the test basin for the pilot study. This allowed different process modifications to be made without impacting the entire activated sludge process. The first process modification to be
evaluated was to use the Step Feed process control configuration. This was the simplest modification to be made which only required diverting the influent flow to different anoxic and aerobic zones in the aeration basin.

Phase 1 did not significantly lower the effluent ammonia concentration limits to 2.0 mg/L or below and most likely failed because baffles were not installed between the various anoxic and aerobic zones in the aeration basins.

Phase 2 changed the process control process to the Single Sludge, Pre-Anoxic process configuration (Modified Ludzak-Ettinger configuration). This required constructing a temporary internal high nitrate pipeline from the backend of the aeration basin to the front of the anoxic selector of Basin No. 4. This was done by repurposing facility surplus equipment and using temporary plastic pipe to do this job. During this phase, Basin No. 3 was also set up to serve as the test control for the pilot study.

Phase 2 was successful in developing consistent, reliable, nitrification/ denitrification with effluent ammonia levels averaging below 2.0 mg/L.

The final phase evaluated was the Membrane Bioreactor (MBR) configuration. This would work excellently but was not physically evaluated because the cost of the MBR modules would be considerable. Evaluation of other facilities using MBRs was used to make this recommendation.

Recommendation

Staff recommends that the Committee discuss plant modifications that could be used if the RWQCB places effluent ammonia limitations in the VDS's facility next NPDES permit renewal.

Attachments

Attachment A 4877_001.pdf
Attachment B Ammonia Technical Study 20211213 4666_001.pdf
Attachment C VSD Selective Plant Process Evaluation.docx
Attachment D VSD Selective Plant Process Evaluation Phase 2.docx

VALLEY SANITARY DISTRICT
VSD INDIO, CALIFORNIA

Facility Process Control Modifications to Consistently Remove Ammonia and Total Nitrogen Pilot Study Final Report

To: Dr. Beverli Marshall

From: Dave N Commons, VSD Chief Operating Officer

February 7, 2023

Abstract

This report provides the results of the Temporary Process Control Ammonia Removal Modifications Pilot Study. The purpose of this pilot study was to determine the capability of the current Valley Sanitary District (VSD) activated sludge treatment process, with only minor modifications, to increase the plant's capability for nitrification and denitrification removal and to be able to produce a plant effluent ammonia discharge of an average of 2.0 mg/L or less consistently.

Background

On April 1, 2020, the State of California Colorado River Basin Regional Water Quality Control Board as part of renewal of NPDES permit Board Order R7-2020-007 required the VSD to complete within 18-months of the Order being finalized an Ammonia Technical Study. The purpose of this technical study was to evaluate the ability of VSD's wastewater treatment facility to reduce ammonia discharges into the Coachella Valley Whitewater Storm Water Channel. Normally when a Regional Board requires such a technical study, a pending or potential effluent discharge requirement modifications to the plant's NPDES permit is looming.

The results of the 18-month ammonia technical study demonstrated that even though there was a reduction in the ammonia concentration in the plant effluent discharge to the receiving waters it would not be enough to meet possible proposed NPDES permit ammonia requirements. The ammonia trends data averages from the technical study indicated that the plant's influent flow averaged 56 mg/L of ammonia. After primary and secondary treatment, the effluent ammonia concentration averaged 3.9 mg/L (Attachment 1, Valley Sanitary District Ammonia Study Technical Report, 12/09/2021).

After I became the new Chief Plant Operator for VSD in November of 2021, I wanted to farther evaluate additional treatment modifications that could, with a minimum of cost, provide effluent ammonia concentrations levels averaging below 2.0 mg/L. This is the range that I assumed might be listed for the new NPDES permit ammonia limit for the VSD activated sludge treatment facility.

Pilot Project Plan of Study

A pilot study would require one of the plant's four aeration basins to be modified into different process control treatment processes to test each processes' ability to remove ammonia from the plant effluent. Basin No. 4 was chosen as the test basin for the pilot study (Attachment 2, Aerial View of VSD facility). This allowed the different process modifications to be made without impacting the entire activated sludge process.

Phase 1 of the pilot study was to modify the current plant to determine what the lowest discharge results we could obtain with no physical modifications to the treatment process. The first process modification to be evaluated was to use the Step Feed process control configuration. This was the simplest modification to be made because it only required diverting the influent flow to different anoxic and aerobic zones in the aeration basin using already installed gate valves (Attachment 3, Diagram of Phase 1 treatment modification).

Phase 1 did not significantly lower the effluent ammonia concentration limits to 2.0 mg/L or below. Phase 1 probably failed because baffles were not installed between the various anoxic and aerobic zones in the aeration basins. Baffles between the anoxic – aerobic zones with surface or subsurface mixers would have increased the nitrification – denitrification but how much was not known (Attachment 4, Facility Process Control Modification to Consistently Remove Ammonia and Total Nitrogen, 02/01/2022).

Phase 2 changed the process control process to the Single Sludge, Pre-Anoxic Zone process configuration (Modified Ludzak-Ettinger [MLE] configuration) (Attachment 5, Diagram of Phase 2 treatment modification). This required constructing a temporary internal high nitrate pipeline from the backend of the aeration basin to the front of the anoxic selector of Basin No. 4. This was done by repurposing facility equipment and pumps and using temporary plastic pipe to do this job. During this phase, Basin No. 3 was also set up to serve as the control for the pilot study. After Basin No. 4 treatment process was stabilized, this phase was successful in developing consistent, reliable, nitrification/ denitrification with effluent ammonia levels averaging below 2.0 mg/L or less. (Attachment 6, Facility Process Control Modification to Consistently Remove Ammonia and Total Nitrogen – Phase 2).

The final phase evaluated the Membrane Bioreactor (MBR) configuration. This would have worked excellently but was not physically evaluated because the cost of the MBR modules would have been considerable and did not fit into the scope of this project. This phase was evaluated by considering other facilities that used MBRs to remove ammonia and total nitrogen level to very low levels.

Results

The pilot study lasted from 02/07/2022 until 10/31/2022. There were three specific periods to the pilot study. The first period lasted from 02/07/2022 until 08/10/2022. During this period we ran the Aeration Basin No.4 in the Step Feed process configuration and began transitioning to the MLE process. During this time the plant

ammonia concentration from Aeration Basin No. 4 was between 15.4 mg/L to 0.3 mg/L for an average of 11.6 mg/L. The cause for this difference was the failure of the Step Feed to provide the level of treatment results we expected. This was probably caused by the inconsistent separation of the anoxic and aerobic zones because of a lack of baffles between the zones.

The second period was the upset period in which we had two significant treatment plant upsets both caused by operator error. Both were caused by a plant problem which was responded to incorrectly by the plant operation staff which caused the plant to waste too much sludge which caused the process to lose all treatment nitrification. This is supported by the Alkalinity Graphs (Attachment 7, Graphs) that show the alkalinity level coming into Basin No. 4 and the alkalinity level going out of Basin No. 4 were basely the same. There was no drop in alkalinity which you would expect in a fully nitrify basin.

The final period is the fully nitrify period. This lasted from 08/12/2022 until 10/31/2022. During this time the average effluent ammonia concentration averaged 2.3 mg/L. Adequate nitrification – denitrification was taking please which was demonstrated by the reduction in alkalinity taking place across the aeration basin.

Recommendations

Staff recommends that the Committee discuss the possibility of what kind of plant modifications could be used if the RWQCB places effluent ammonia limitations in the VDS's facility next NPDES permit. Lower cost process modifications could be made to the current treatment plant configuration that will result in effluent ammonia reductions to 2.0 mg/L or less on a consistent and reliable basis, but these would only temporarily fix the problem. A complete design and modification would be needed to permanently resolve the problem.

Attachments

Attachment 1:	Valley Sanitary District Ammonia Study Technical Report, 12/09/2021
Attachment 2:	Aerial View of VSD facility
Attachment 3:	Diagram of Phase 1 treatment modification
Attachment 4:	Facility Process Control Modification to Consistently Remove Ammonia and Total Nitrogen, 02/01/2022
Attachment 5:	Diagram of Phase 2 treatment modification
Attachment 6:	Facility Process Control Modification to Consistently Remove Ammonia and Total Nitrogen – Phase 2
Attachment 7:	Graphs

Cc: Jose Figueroa-Acevedo, Ph.D., P.E. WRC Engineer, State of California Colorado River Basin Regional Water Quality Control Board.

James Mills, VSD Operations Supervisor

Augustine Tijerina, VSD Facility Maintenance Supervisor

Anna Bell, VSD Laboratory and Compliance Supervisor

VSD

December 9, 2021

Kai Dunn, Ph.D., P.E.
Senior WRC Engineer – NPDES/Stormwater/401 WQC Unit Chief
State of California Colorado River Basin Regional Water Quality Control Board
73720 Fred Waring Drive, Suite 100
Palm Desert, CA 92260

Dear Dr. Dunn:

SUBJECT: VALLEY SANITARY DISTRICT AMMONIA STUDY TECHNICAL REPORT

Attached you will find Valley Sanitary District's (VSD) Board required Ammonia Study Technical Report to evaluate the potential actions to reduce ammonia discharges into the Coachella Valley Whitewater River Storm Water Channel. This study was required by Board Order R7-2020-0007 and had to be completed within 18-months of the effective date of the Ammonia Work Plan approval. The Board Order R7-2020-0007 became effective on April 1, 2020, and the work plan was approved in June 2020. Based upon my inquiry of those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I am the new Facility Operations Manager and Chief Plant Operator for the District. My SWRCB Grade V Wastewater Operator certification number is 9778 and it expires on 07/02/2023. If you have any questions concerning this report, please let me know.

Sincerely yours,

Dave M. Commons

Dave Commons
Facility Operations Manager
Valley Sanitary District
45500 Van Buren Street
Indio, CA 92201

Attachment

VSD

December 01, 2021

Kai Dunn, Ph.D., P.E.
Senior WRC Engineer – NPDES/Stormwater/401 WQC Unit Chief
California Regional Water Quality Control Board
Colorado River Basin Region
73-720 Fred Waring Drive, Suite 100
Palm Desert, CA 92260

Dear Mr. Kai Dunn:

SUBJECT: VALLEY SANITARY DISTRICT AMMONIA STUDY TECHNICAL REPORT

In accordance with Board Order R7-2020-0007, within 18-months of the effective date of the Ammonia Work Plan approval, Valley Sanitary District (VSD), is to submit an ammonia study technical report. Order R7-2020-0007 became effective on April 1, 2020, and the work plan was approved June 2020. The study was to evaluate the potential actions to reduce ammonia discharges into the Coachella Valley Storm Water Channel.

VSD Wastewater Treatment Plant

Referring to Figure 1 and Figure 2, the wastewater treatment plant consists of two separate treatment systems: an activated sludge treatment system with a design capacity of 10 mgd and an oxidation pond treatment system with a design capacity of 2.5 mgd. Plant influent flow is directed to primary clarifiers after going through mechanical bar screens and the grit chamber. After the primary clarifiers, flow is apportioned between the activated sludge treatment system and the oxidation pond treatment system.

The activated sludge treatment system consists of anoxic selectors, aeration basins, secondary clarifiers, and a dedicated chlorine contact chamber. Former primary clarifiers are used for the anoxic selectors.

The oxidation pond system consists of two oxidation ponds (Ponds 2 and 3), and two smaller cells (North and South). The flow pattern through the pond system usually begins in a series starting with Pond 2 then into the two cells then into Pond 3. When the two cells are being

used for collection and treatment of waste activated sludge, the two cells commonly are isolated and flow from Pond 2 goes directly to Pond 3. Pond 3 effluent flows to a dedicated chlorine contact chamber.

Chlorinated effluent from each chlorine contact chamber is combined and dechlorinated prior to discharge to the Coachella Valley Storm Water Channel. For the period from June 2015 through March 2020, the average flow from the activated sludge treatment system was 4.40 mgd. The average flow from the oxidation pond treatment system was 1.39 mgd. On average, the pond effluent comprises 24% of the combined outfall effluent discharge.

In April of 2021, the oxidation pond treatment system was discontinued and no longer contributes to the final discharge. All flow from the primary clarifiers is directed through the activated sludge treatment system. Only waste streams contribute to the pond system.

There is often no flow upstream of the VSD outfall in the Coachella Valley Storm Water Channel. Therefore, the effluent flow is often the only flow present in the channel at the downstream receiving water monitoring location.

Work Plan

The current permit requires VSD to analyze a grab sample once per month for ammonia, as N (NH_3-N), at sample location EFF-001C. These compliance samples are sent to a contract laboratory for analysis.

Per the approved ammonia study, VSD has been utilizing the following sampling plan to monitor the performance of the process changes that began in mid-2019 and to continue to make adjustments as needed. VSD staff have been analyzing 24-hour composite samples weekly for ammonia, as N, taken at the following locations (see Figure 2 and Table 1):

- INF-001 (treatment plant influent)
- Primary clarifier effluent (activated sludge and pond system influent)
- EFF-001A (activated sludge treatment process effluent)
- EFF-001B (oxidation pond treatment process effluent) – offline as of April 2020
- EFF-001C (combined final effluent after dechlorination)

At a minimum, samples were collected from the above locations for ammonia. The intent of sampling the was to accumulate a robust data set and to identify seasonal variability in ammonia concentrations and/or changes in operational strategies that may be needed to offset variability. Samples were analyzed in-house, in VSD's wastewater treatment plant laboratory.

Sample results from these locations enabled VSD staff to observe and trend ammonia concentrations and removals throughout the treatment processes. Supporting samples of process data were collected to more closely evaluate processes as needed.

Examples of process data at the activated sludge plant are mixed liquor suspended solids (MLSS) and dissolved oxygen (DO). A MCRT, of no less than seven (7) days, was used to calculate wasting values to maintain a healthy population of organisms capable of nitrifying ammonia in the activated sludge process. DO probes receive real time data from a single point in each of the four (4) aeration tanks in operation. This real time data is used to automatically adjust airflow to the aeration tanks based on an assigned DO setpoint. The DO setpoint has been assigned no less than 2.0 mg/L to ensure that there is adequate DO for nitrification. VSD staff collect DO values from multiple points of the aeration tanks with the use of a handheld field probe, as needed, to assess variability of DO levels within the tanks.

To ensure enough air is being provided in the treatment ponds, the handheld field probe will also be used to collect DO values at the effluent end of each pond in series. Values will be collected daily. The D.O. value leaving the final pond should be maintained above 2 mg/L. After April 2021, VSD staff collect D.O. values on the final pond to ensure enough air to maintain stability of pond conditions even though no discharge is occurring from the pond system.

In addition to the monitoring described above, during the study VSD has conducted additional monitoring and observations to assess other changes that may result from the process modifications. Examples of the monitoring included plant energy usage, secondary sludge settleability, alkalinity, activated sludge microbiology (e.g., evidence of filamentous or foam producing organisms) and final effluent quality, assessed primarily in terms BOD, TSS, and NH_3-N)

Table 1. Ammonia Study Sampling Plan

Sample Location	Sample Type	Frequency	Duration
INF-001 – treatment plant influent	24-hr composite	Weekly	12 months
Primary clarifier effluent - activated sludge and pond system influent	24-hr composite	Weekly	12 months
EFF-001A - activated sludge treatment process effluent	24-hr composite	Weekly	12 months
EFF-001B - oxidation pond treatment process effluent (discontinued April 2021)	24-hr composite	Weekly	12 months
EFF-001C - final effluent after dechlorination	Grab	Monthly	12 months
INF-001 – treatment plant influent	Grab	Monthly	12 months

Figure 1. VSD Wastewater Treatment Plant Ammonia Study Sampling Locations

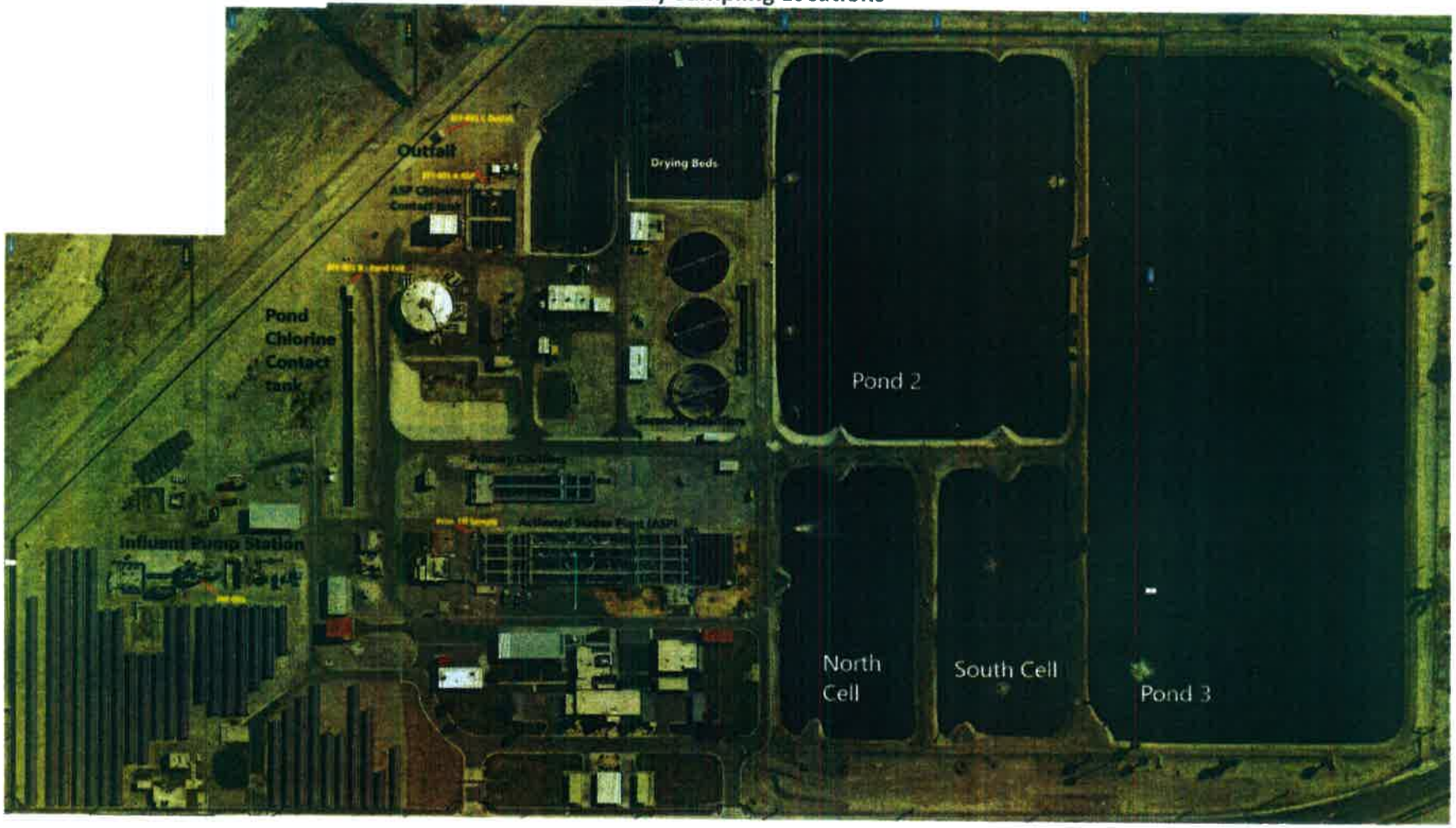
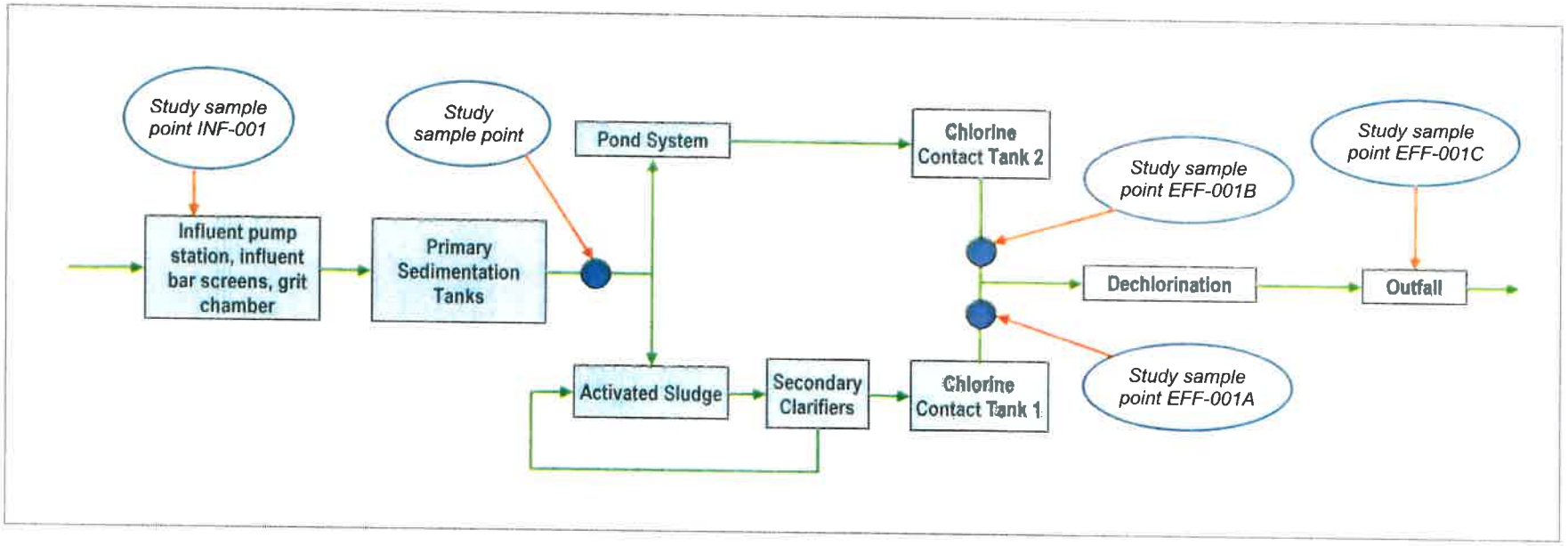


Figure 2. VSD Wastewater Treatment Plant Process Flow Diagram with Ammonia Study Sampling Locations



Conclusion

VSD has been able to demonstrate a reduction in the ammonia concentration in the Effluent discharged to the receiving waters. Table 1 demonstrates the raw data from the permit required monthly sampling of the influent and effluent locations. Figure 3 is a graphic representation of the content in Table 1. Figure 4 is the ammonia reduction trends from the effluent only. Data averages indicate that the Influent location has 56 mg/L of ammonia entering the treatment facility. After biological and chemical treatment, the effluent ammonia is 3.9 mg/L on average.

Table 1: Raw data from Monthly sampling of Influent (INF-001) and Effluent (EFF-001C) for Ammonia, as N and Total Nitrogen, as N.

	Influent (INF-001)		Effluent (EFF-001C)	
	Ammonia (as N)	Total Nitrogen (as N)	Ammonia (as N)	Total Nitrogen (as N)
Apr-20	65	110	2.7	21
May-20	58	85	8	21
Jun-20	61	91	1.8	17
Jul-20	53	75	1.7	21
Aug-20	44	160	1.4	12
Sep-20	51	67	7.5	18
Oct-20	49	69	14	21
Nov-20	56	78	4.4	18
Dec-20	67	85	1.3	14
Jan-21	59	79	4.1	15
Feb-21	57	75	4.9	19
Mar-21	58	82	0.72	14
Apr-21	58	80	0.33	11
May-21	56	77	2.1	13
Jun-21	51	76	4.4	15
Jul-21	75	68	5.3	16
Aug-21	51	72	1.2	11
Sep-21	44	64	0.65	7.6
Oct-21	54	77	8.4	18
Average	56.2	82.6	3.9	15.9

Figure 3: Trend of Ammonia and Total Nitrogen concentrations in the Influent vs Effluent

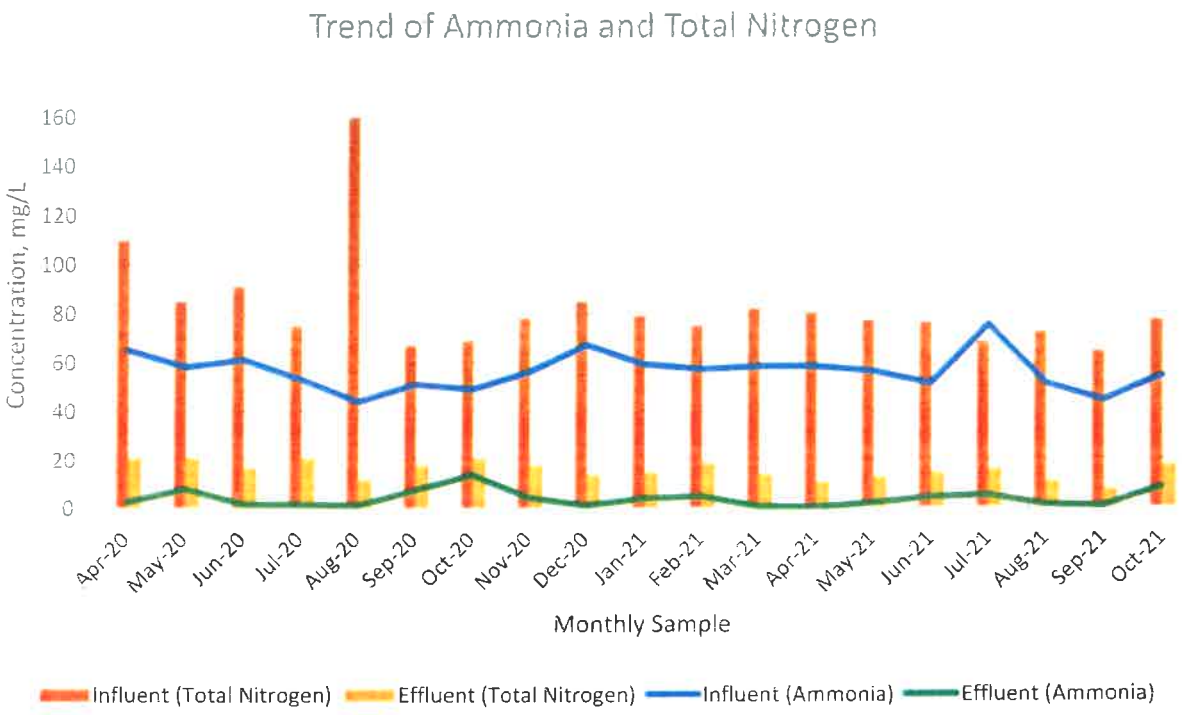
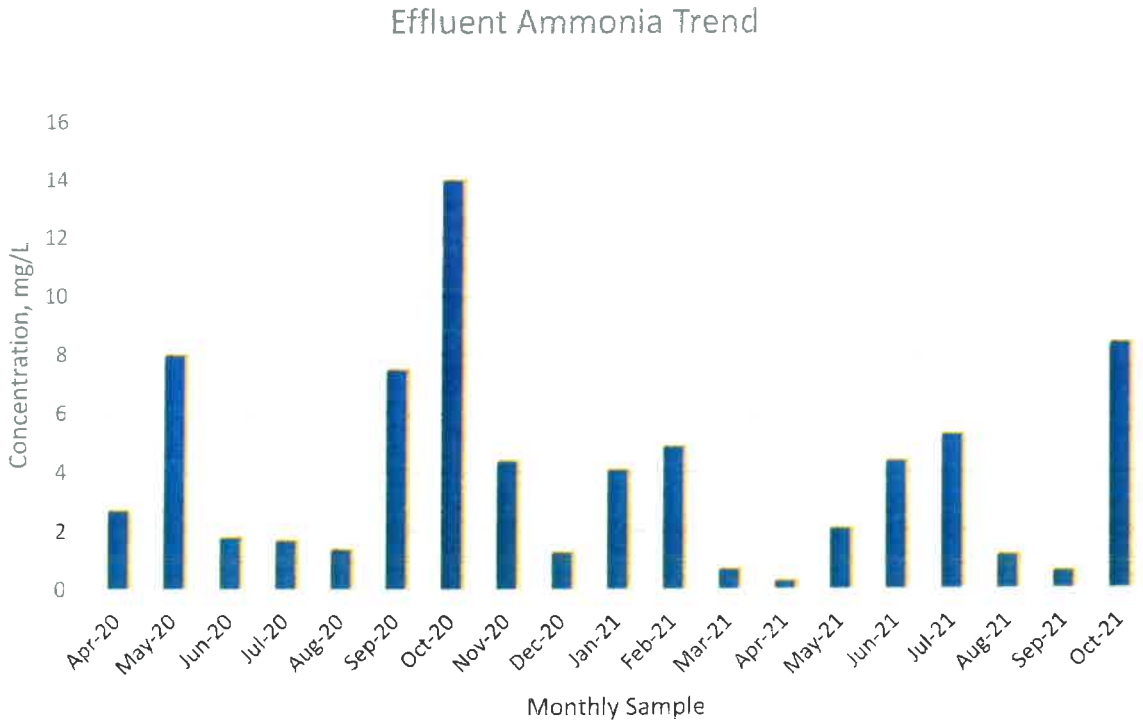


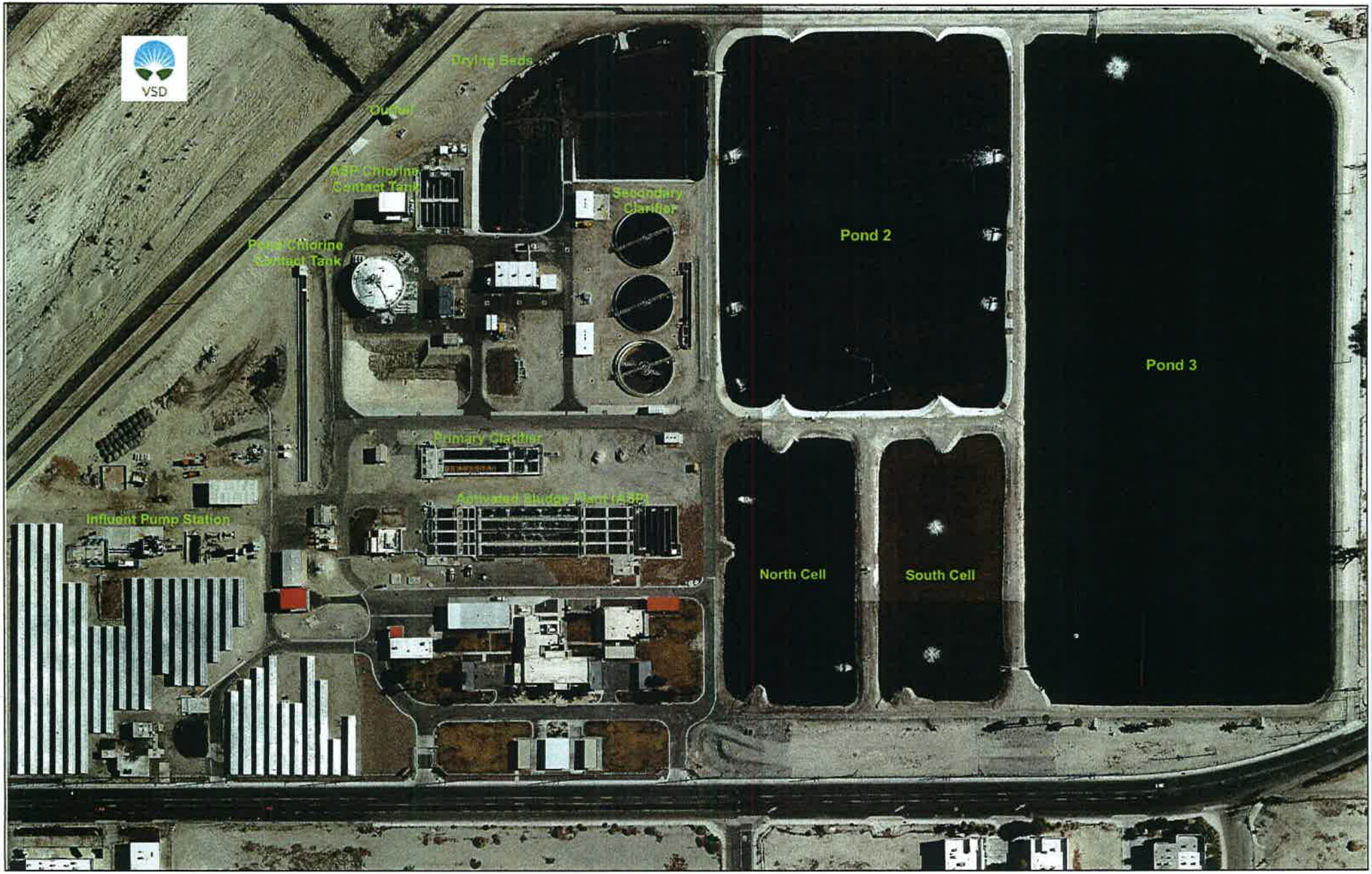
Figure 4: Effluent Ammonia concentrations since implementation of new Permit



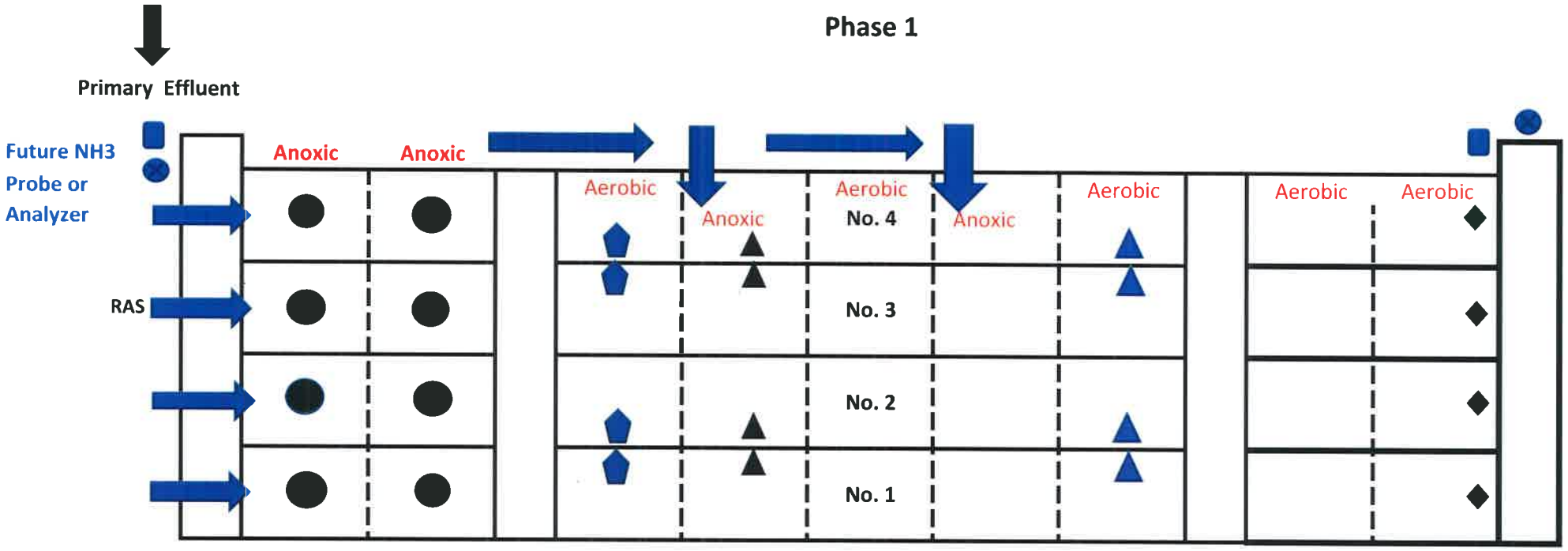
Certification Statement:
I certify under penalty of law that this document and all attachments were prepared under the direction of supervision in accordance with a system designed to assure qualified personnel properly gathered and evaluated the information submitted based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations.

Regards,

Anna Bell
Laboratory & Compliance Supervisor
Valley Sanitary District
45-500 Van Buren St
Indio, CA 92201


VSD
Drying Beds
Outfall
ASP Chlorine Contact Tank
Secondary Clarifier
Pond Chlorine Contact Tank
Pond 2
Pond 3
Primary Clarifier
Activated Sludge Plant (ASP)
Influent Pump Station
North Cell
South Cell

Phase 1



SYMBOLS KEY:

Current Anoxic Mixers	●
Current DO Probes	▲
Current ANISE Probes	◆
Future NH3 Probe or Analyzer	▮ (Possible PO4 Analyzer if must remove Phosphorous)
Future NISE Probe (On RAS Pipeline)	⬮
Future DO Probes	▲
Future SS Probes	⬟

VSD

Valley Sanitary District
Operations Committee
February 1, 2022

TO: Operations Committee

FROM: Dave N. Commons, Facility Operations Manager

SUBJECT: Facility Process Control Modification to Consistently Remove Ammonia and Total Nitrogen

☐Board Action	☐New Budget Approval	☐Contract Award
☒Board Information	☐Existing FY Approved Budget	☐Closed Session

Executive Summary
The purpose of this report is to provide information regarding VSD's Temporary Process Control Modifications Pilot to access the capability of the current activated sludge treatment process to remove ammonia and total nitrogen with only minor modification to enhance the plant's nitrification and denitrification.

Strategic Plan Compliance
This item complies with VSD Strategic Plan Objective 3: Excellent Facilities.

Fiscal Impact
There is no current fiscal impact of this pilot project.

Background
On April 1, 2020, the State of California Colorado River Basin Regional Water Quality Control Board as part of Board Order R7-2020-007 required the VSD to complete an Ammonia technical study within 18-months to evaluate the ability of VSD's treatment facility to reduce ammonia discharges into the Coachella Valley Whitewater Storm Water Channel. Normally when the Regional Board requires such a technical study, a pending or potential effluent discharge requirement modifications to the plant's NPDES permit is looming. Since the complete of the Ammonia Study, the VSD wanted to evaluation potential process modifications that could be implemented with a minimum of cost that would enhance the ability of the current activated sludge facility to remove ammonia and total nitrogen from the effluent. One the facility's four aeration basin's has been modified into a process pilot project, Process modification will be made to that one basin to determine which process modifications will achieve to most nutrient removal for the minimum cost. This will allow process modifications to be made without impacting the entire plant.

Recommendation

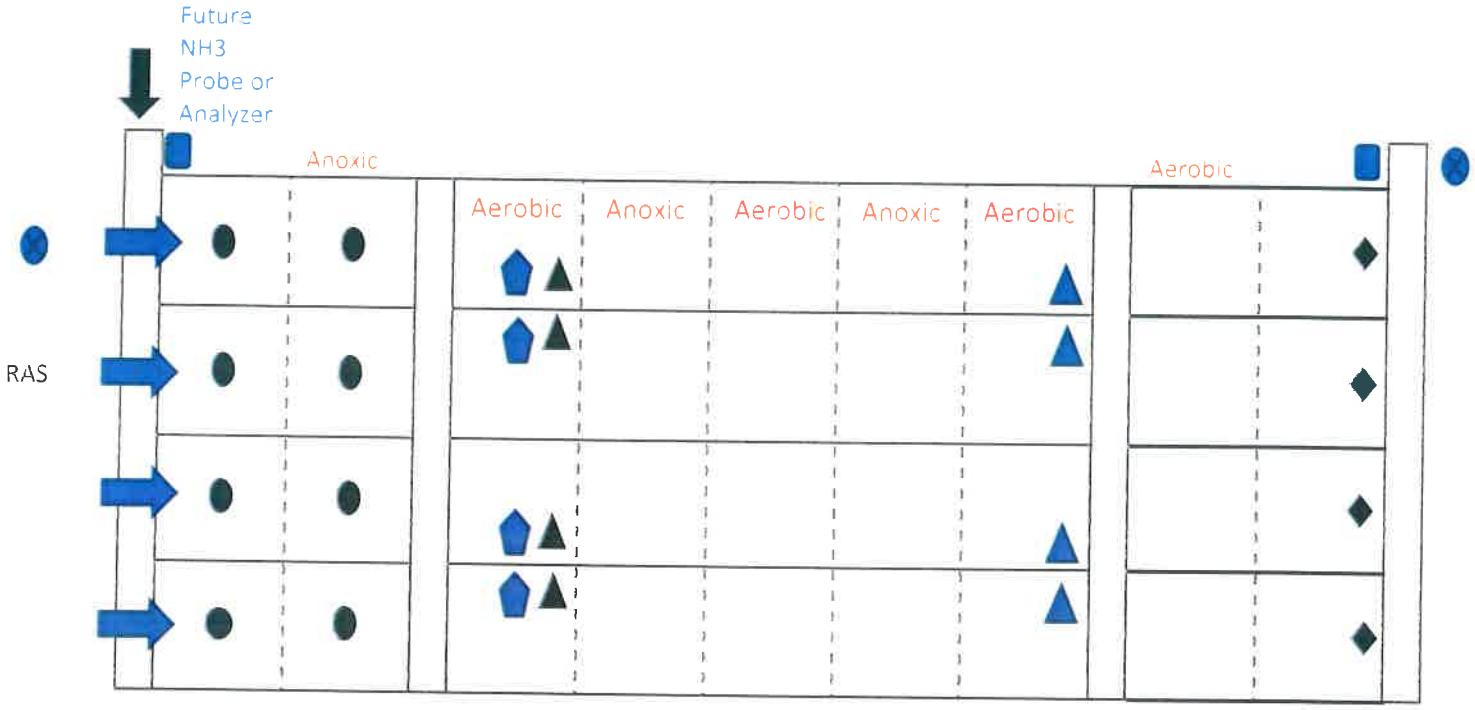
No recommendation. Information only.

Attachments
Attachment A – Pilot Explanation sheet.

Selective Plant Process Evaluation

I have chosen this plan to evaluate the major process changes and plant modification that will take place to our facility over the next several years. Know that this will be a multiyear project that will be dependent on funding, I have chosen to evaluate the entire current plant and predict the areas that will need evaluation. Starting with the major modifications and changes that will take place to the Headworks (Influent Pump Station, Screening, and Grit Removal) have already been evaluated and are planned for as part of the Phase 1 upgrades to the plant. After evaluating these plans and specifications, I saw no major modifications that need to be done to this area. As part of this upgrade, the Digester and Thickener systems have also been evaluated. I saw no major modifications that were need to the digesters, but I did give my concerns to the modifications to the thickener system. As part of finalizing these plans I recommended replacing the proposed DAFT system with a RDT system. I know the rest of the plant process control systems are be looked at as part of the Phase 3 Plant upgrades which will take the plant from secondary treatment to full tertiary treatment. With this upgrade I know the entire process of the plant will be evaluated. This will take additional funding to complete these modifications, so I know that this is a several year plan. To be complete in my evaluation I have evaluated the other plant processes to see if I think we may need to make modifications before the main plant modifications. I have evaluated the disinfection system and see no changes that are necessary at this time except maybe changing a chlorine residual probe and maybe adding some additional effluent instrumentation. The one issue that could be pending in the short term before the major plant expansion is the fact that the SWRCB may require us to remove ammonia from our plant effluent before the plant goes through the major upgrade from secondary to tertiary treatment. We may need to make temporary modification to the current plant to treat for complete ammonia removal and denitrification. This plan before you is my plan to test the current plant aeration process to see what could be done to make that change to complete nitrification/ denitrification with the least cost and the most rapid modification if the SWRCB places in our NPDES permit this requirement.

Primary Effluent



SYMBOLS KEY:

Current Anoxic Mixers

Current DO Probes

Current ANISE Probes

Future NH3 Probe or Analyzer (Possible PO4 Analyzer if must remove Phosphorous)

Future NISE Probe (On RAS Pipeline)

Future DO Probes

Future SS Probes

Study Plan

1.) Evaluate current data and run background information. Need NH3, NO3, pH, Alkalinity, Dissolved Oxygen data. Need the following:
   a.) Aeration basin influent – NH3, NO3, pH/Alkalinity, PO4; RAS Influent – NO3
   b.) Influent to First Aerobic Zone – TSS (MLSS); Effluent – DO, Microscopic examination
   c.) Second Anoxic Zone Effluent (First Anoxic zone after the Selectors) – pH/Alkalinity
   d.) Third Anoxic Zone Effluent – NO3, pH/Alkalinity
   e.) Final Aerobic Zone Effluent (Before final aerobic zones) – NH3, NO3, PO4
   f.) Plant Influent flow
   g.) Return and Waste Activated Sludge flow

h.) SVI data
i.) MCRT
j.) Sludge blanket levels in secondary clarifiers

Approximately one month (December 2021)

2.) Change Aeration Basin No. 4 to Step feed process configuration. Continue same test data gathering. Increase MCRT to approximately 12 days.
Approximately one month (January 2022)

3.) If not satisfied with the first results, divert some of the primary effluent around anoxic selectors to the entrance to the Step feed channel by first aerobic zone. Continue same test data gathering.
Approximately one month (February to March 2022)

Test other process changes to test if the above does not resolve NH3 problem:

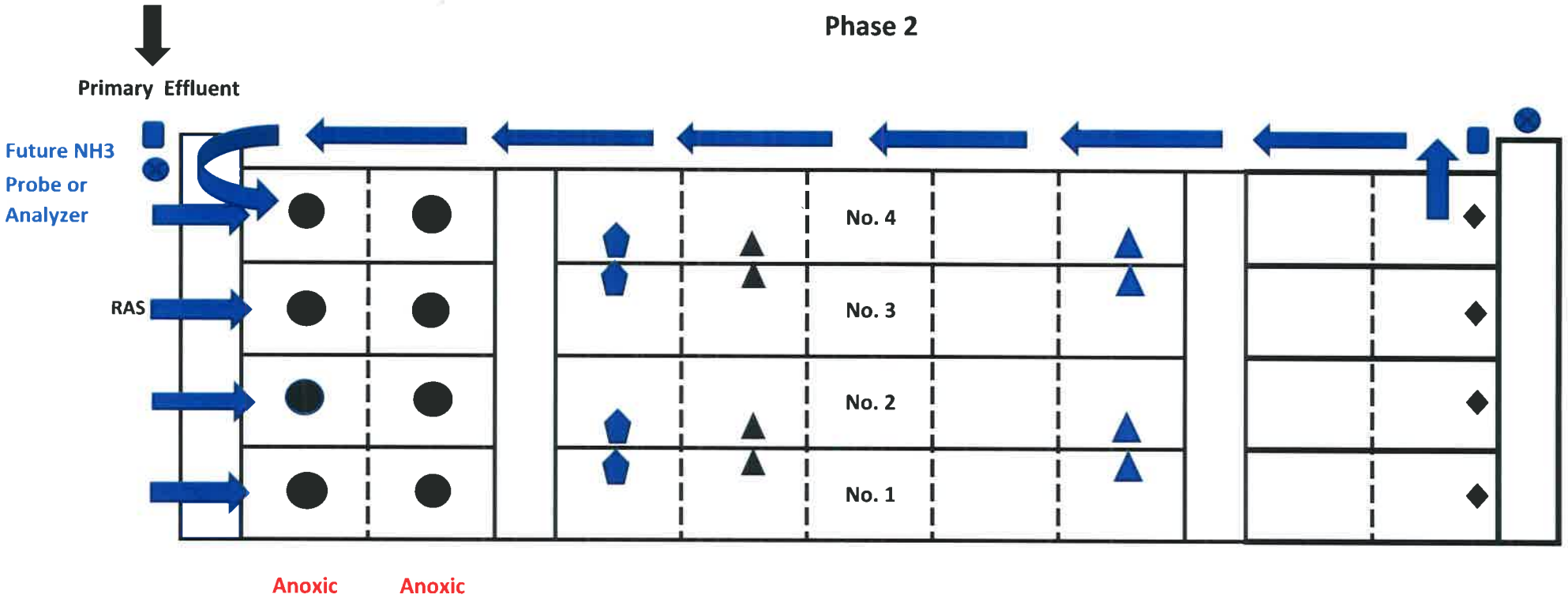
Internal High rate Recycle flow from back of aeration basin to the front of the selectors.

Install baffles between zones with mixers in the anoxic zones.

Check nutrient balance in aeration basin between nitrogen, phosphorous, and potassium to determine if correct.

Do a DO cross section of the aeration basins to determine the optimum locations to install the DO probes.

Phase 2



SYMBOLS KEY:

Current Anoxic Mixers	●
Current DO Probes	▲
Current ANISE Probes	◆
Future NH3 Probe or Analyzer	▮ (Possible PO4 Analyzer if must remove Phosphorous)
Future NISE Probe (On RAS Pipeline)	●
Future DO Probes	▲
Future SS Probes	⬟

VSD

Valley Sanitary District
Operations Committee
June 7, 2022

TO: Operations Committee

FROM: Dave N. Commons, Facility Operations Manager

SUBJECT: Facility Process Control Modification to Consistently Remove Ammonia and Total Nitrogen – Phase 2

☐Board Action	☐New Budget Approval	☐Contract Award
☒Board Information	☐Existing FY Approved Budget	☐Closed Session

Executive Summary
The purpose of this report is to provide additional information regarding VSD's Temporary Process Control Modifications Pilot Study to determine the capability of the current activated sludge treatment process, with only minor modification, to enhance the plant's capability to nitrification and denitrification. This is an explanation of Phase 2 of this study.

Strategic Plan Compliance
This item complies with VSD Strategic Plan Objective 3: Excellent Facilities.

Fiscal Impact
There is no current fiscal impact of this pilot project.

Background
On April 1, 2020, the State of California Colorado River Basin Regional Water Quality Control Board as part of Board Order R7-2020-007 required the VSD to complete within 18-months an Ammonia Technical Study to evaluate the ability of VSD's treatment facility to reduce ammonia discharges into the Coachella Valley Whitewater Storm Water Channel. Normally when the Regional Board requires such a technical study, a pending or potential effluent discharge requirement modifications to the plant's NPDES permit is looming. Phase 1 demonstrated that the current plant could be modified to removal ammonia from the plant effluent. We were able to achieve plant effluent ammonia requirements below 2.0 mg/L most of the time. Since the complete of Phase 1 of the Ammonia Pilot Study, the VSD wanted to evaluation additional process modifications that would provide consistent, reliable, nitrification/ denitrification with effluent ammonia levels below 2.0 mg/l or less. During this phase of the project, Aeration Basin No. 4 will be modified into a Single Sludge, Pre-Anoxic process configuration (Modified Ludzak-Ettinger configuration). This requires constructing a temporary internal Nitrate recycle pipeline from the backend end of the aeration basin to

the front of the anoxic selector in Basin No. 4. This is being done by repurposing facility equipment and using temporary plastic pipe to do this job. This phase is committed to developing consistent, reliable, nitrification/ denitrification with effluent ammonia levels below 2.0 mg/l or less.

Recommendation
No recommendation. Information only.

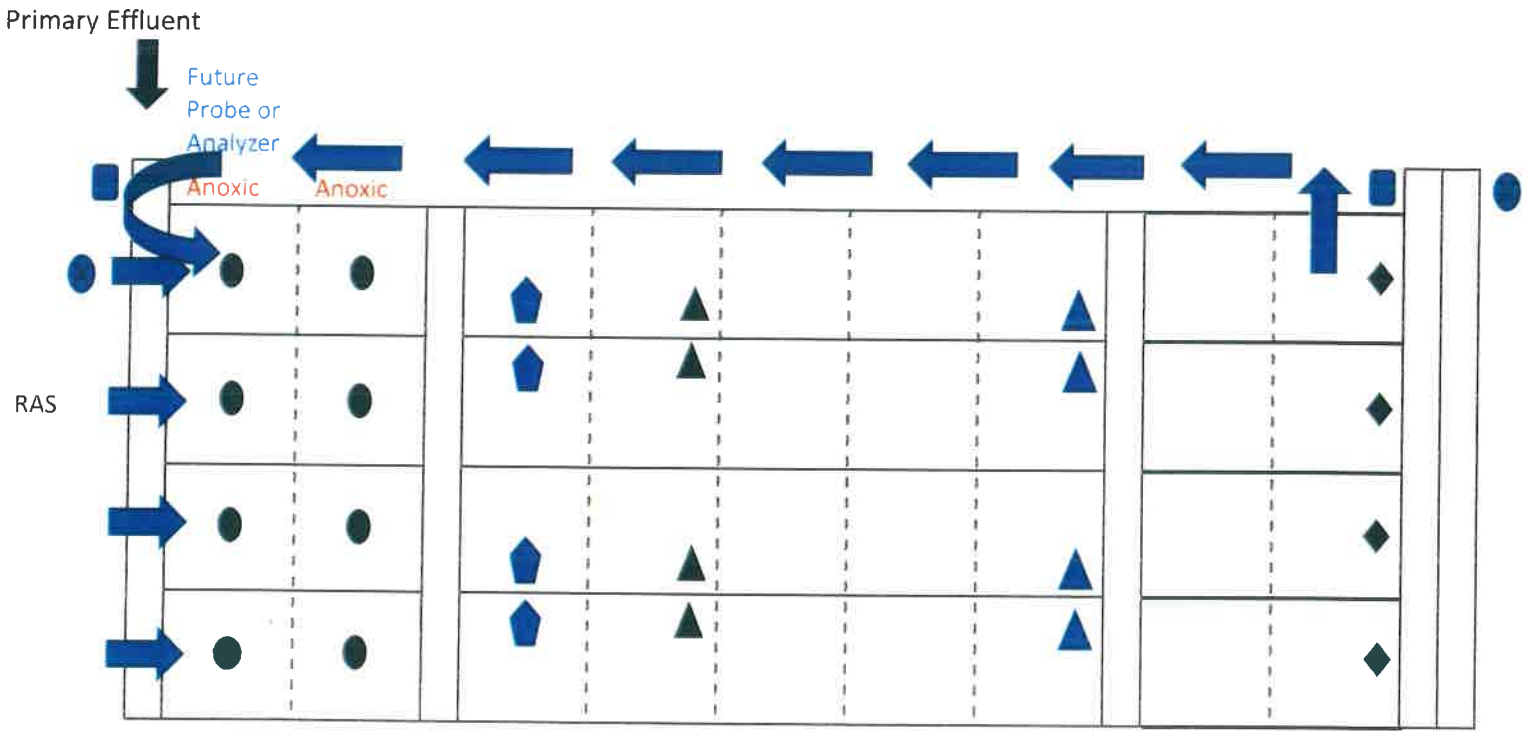
Attachments
Attachment A – Pilot Phase 2 Explanation sheet.

05/24/2022

Selective Plant Process Evaluation – Phase 2

We have run the first phase of our pilot project for approximately 5 months. As stated before, our plan was to test the current plant aeration process to see what modifications could be quickly done to move the plant to complete nitrification/ denitrification with the least cost and the most rapid modification if the SWRCB placed in our NPDES permit the requirement to remove ammonia from our plant effluent. We have determined that modifications can be made to the plant aeration systems to bring about ammonia reductions. We have seen ammonia limits averaging below 2.0 mg/L. Now we must determine what modification will bring about the most consistent and stable operations.

In this phase, we are going to modify Aeration Basin No. 4 to a Single Sludge Pre-Anoxic Zone configuration. We will run a temporary Nitrate recycle pipeline from the last aerobic zone in Aeration Basin No. 4 outside the tank around to the front anoxic selector close to the discharge of the RAS into the tank. This will return the highly nitrate laden water to the anoxic zones in the front of the basin for greater denitrification to take place. From phase 1 testing we know nitrification/ denitrification is taken place in the aeration basin but not as extensively or consistently as we need it. This modification should improve the facility nitrification/ denitrification. We will increase the SRT to greater than 10 – 12 days, set the RAS rate to greater than 100%, and then set the internal recycle rate to between 200 – 400%. While making these process modifications, we will increase the aeration basin dissolved oxygen to >2.0 mg/L base load to improve the nitrification taking place in the aerobic zones of the Aeration Basin No. 4.



SYMBOLS KEY:

Current Anoxic Mixers 

Current DO Probes 

Current ANISE Probes 

Future NH3 Probe  (Possible PO4 Analyzer if must remove Phosphorous)

or Analyzer

Future NISE Probe 

(On RAS Pipeline)

Future DO Probes 

Future SS Probes 

Study Plan

1.) Evaluate current data and run background information. Continue monitoring NH3, NO3, pH, Alkalinity, Dissolved Oxygen data. Continue the following:
   a.) Aeration Basins No. 3 and 4 Influent – NH3, NO3, pH/Alkalinity, PO4; RAS Influent – NO3
   b.) Influent to First Aerobic Zone – TSS (MLSS)pH/Alkalinity; Effluent – DO, Microscopic examination
   c.) Final Aerobic Zone Effluent (Before final aerobic zones) – NH3, NO3, PO4
   d.) Plant Influent flow in MGD
   e.) Return and Waste Activated Sludge flow in MGD
   f.) SVI data
   g.) MCRT, days
   h.) Sludge blanket levels in secondary clarifiers

2.) Test other process changes if the above does not resolve NH3 problem:

   Install baffles between zones with mixers in the anoxic zones.

   Check nutrient balance in aeration basin between nitrogen, phosphorous, and potassium to determine if correct.

   Do a DO cross section analyze of the aeration basins to determine the optimum locations to install the DO probes.

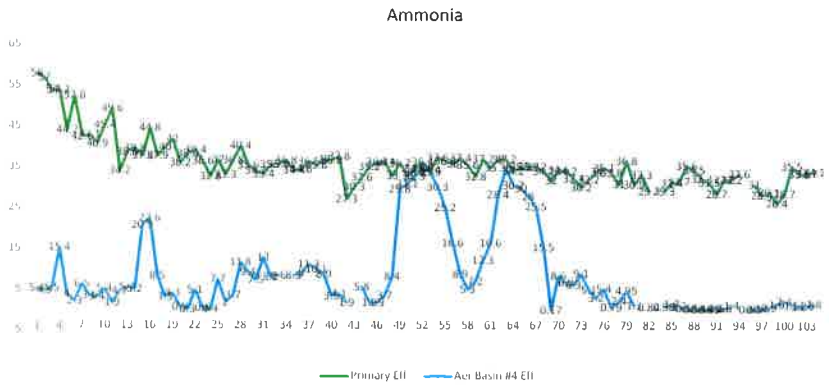
3.) Complete a report itemizing any additional instrumentation that is need and any additional process modification that might be needed to develop complete, consistent, and reliable nitrification/ denitrification.

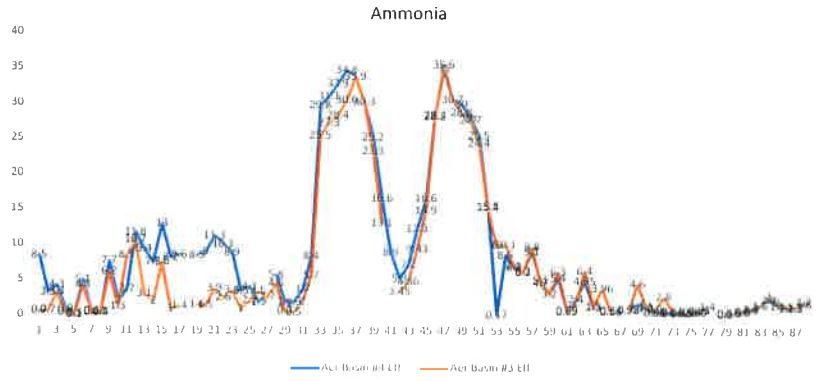
Dave Commons

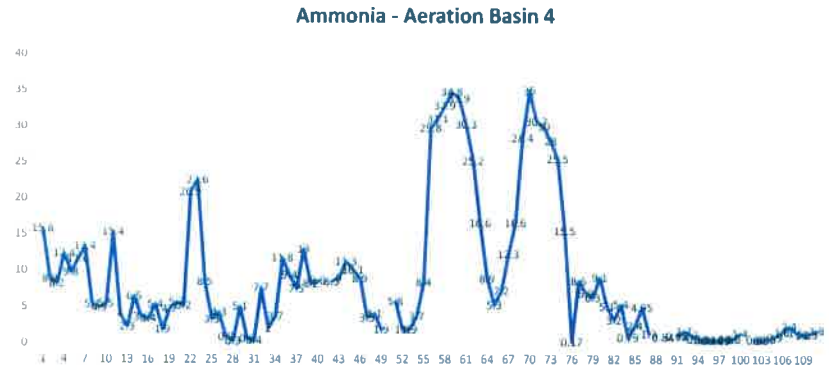
	TSS,MLSS Primary	TSS,MLSS AB 4 Eff.	TSS,MLSS AB 3 Eff.	Alkalinity Primary	Alkalinity AB 4 Eff.	Alkalinity AB 3 Eff.	Ammonia Primary	Ammonia AB 4 Eff.	Ammonia AB 3 Eff.	Nitrate Primary	Nitrate RAS	Nitrate AB 4 Eff.	Nitrate AB 3 Eff.	Nitrite Final
2/7/2022	51	2352		280	168		54.4	15.8		1.2		7.7		1.87
2/9/2022	64	2480		292	138		62.4	8.9		1.5		6.7		
2/11/2022	74	2400		287	123		57	8.2		1.4		12		2.66
2/14/2022	59	2404		285	149		58.4	12.4		1.4		9.5		2.92
2/16/2022	60	2460		282	151		53.5	9.8				13.8		1.59
2/18/2022	76	2444		288	149		57.3	11.6		7.4		13.3		1.51
2/22/2022	87	2460		302	165		57	13.4		0.6		5.8		1.32
2/25/2022	68	2410		284	136		58	5.4		0.6		9.7		0.83
3/2/2022	78	2530		293	129		57	4.9		0.5		7.4		0.8
3/4/2022	86	2490		281	134		54	5.5		0.5		7.8		0.89
3/7/2022	64	2576		290	150		54.1	15.4		0.6		5.9		0.95
3/9/2022	69	2488		271	138		44.2	4		2.9		5.8		0.55
3/11/2022	76	2536		306	121		52.8	2.3		0.5		9.5		0.99
3/14/2022	77	2600		284	154		42.6	6.5		0.5		5.5		1.12
3/16/2022	71	2504		297	143		43.1	3.6		0.5		6.5		1.54
3/18/2022	71	2660		299	123		40.9	3.4		0.4		9.3		1.18
3/21/2022	91	2580		312	139		45.4	5.4		0.5		5.8		1.29
3/23/2022	80	2520		301	126		49.6	1.9		0.5		8.6		1.27
3/25/2022	80	2356		292	157		34.2	4.7		0.4		7.5		1.13
3/28/2022	93	2340		302	161		38.8	5.7		0.4		6.4		1.03
3/30/2022	75	2360		317	174		39.8	5.2		0.5		9		0.53
4/1/2022	69	2388		302	234		37.8	20.9		0.5		3.4		0.07
4/4/2022	65	2532		322	229		44.8	22.6		0.5		3.4		0.28
4/6/2022	75	2564	2632	305	168	166	37.9	8.5	0.7	0.5	4.5	7.9	8.2	0.27
4/8/2022	86	1908	1180	302	148	126	40	3.3	0.7	0.4	4.1	8.1	9.4	0.2
4/11/2022	77	1468	2632	305	181	149	42	4.3	3.3	0.5	6.7	6.7	5.1	0.29
4/13/2022	71	2524	708	303	130	152	36.2	0.9	0.4	0.4	8.7	9.8	9.6	0.22
4/15/2022	83	2464	1236	293	135	139	38.4	0.3	0.1	0.4	8.4	9.9	9.4	0.19
4/18/2022	91	2584	3188	291	151	165	39.4	5.1	4.3	0.4	2.5	6.5	0.3	0.51
4/20/2022	86	2620	2868	301	141	149	36.6	0.6	0.4	0.45	3.1	7	4.4	0.23
4/22/2022	77	2492	2860	280	165	141	32.8	0.4	0.5	0.4	5.7	8.3	5.9	0.29
4/25/2022	87	2450	2750	288	156	180	37	7.7	6.2	0.4	5.4	4.8	5.8	0.52
4/27/2022	82	2376	2632	291	132	126	33.3	2	1.3	0.2	0.3	4.8	3.1	
4/29/2022	76	2448	2648	298	135	139	36.8	3.7	8.5	0.4	5.8	7.6	8.5	
5/2/2022	79	2368	2732	240	171	163	40.4	11.8	10.7	0.6	4.6	4.3	4.2	0.96
5/4/2022	85	2640	2860	280	183	199	35.6	9.4	3.1	0.5	3.7	3.2	5.9	0.78
5/6/2022	85	2548	3068	282	174	136	34.2	7.5	2	0.5	2.9	3.8	4	0.73
5/9/2022	86	2464	2868	306	185	175	33.4	13	7.6	0.5	4.1	4	6.6	0.68
5/11/2022	87	2616	2748	287	199	129	35.7	8.2	1	0.4	4.8	3.4	7.2	0.45
5/13/2022	85	2556	2716	291	172	133	35.8	8.6	1.4	0.5	6.1	4.4	8.5	0.51
5/16/2022	92			319			36.8			0.8	3			0.61
5/18/2022	81	2464	2568	282	179	147	34.4	8.5	1.6	0.4	3.8	4.3	8	0.32
5/20/2022	93	2508	2648	300	157	138	34.6	9	1.5	0.5	4	3.9	6.1	0.42
5/23/2022	78	2484	2480	289	187	143	36.5	11.3	3.9	0.5	4.2	2.9	7.5	0.36
5/25/2022	76	2292	2432	290	194	148	35.6	10.1	2.6	0.4	2.6	3.6	7.1	0.4
5/27/2022	84	2300	2252	287	172	130	37	8.9	3.6	0.5	4.1	3.8	7.4	0.57
6/3/2022	77	2508	2812	287	129	124	36.8	3.5	1	0.4	6.8	8.8	9.2	0.15
6/6/2022	75	2504	2792	280	135	146	37.8	4.1	2.2	0.45	7.8	7.6	7.3	0.11
6/8/2022	86	2884	3128	284	140	146	27.3	1.9	3.5	0.44	3.4	7.2	4.7	0.125
6/10/2022	84		2512	299		127	30.3		2.7	0.4	6.6		8.1	0.11
6/13/2022	74	2380	2616	289	133	137	32.6	5.8	4.6	0.5	2.5	7.8	6.3	0.35
6/15/2022	72	2456	2660	279	140	123	35.2	1.9	0.7	0.5	2.9	7.8	8	0.21
6/17/2022	77	2388	2676	291	116	118	36.4	1.9	0.5	0.6	2	9.4	9.8	0.11
6/21/2022	81	2132	2500	299	125	129	36.4	3.7	2	0.6	0.8	8	6.4	0.025
6/24/2022	72	2400	2652	281	169	147	33	8.4	5.7	0.8	4.4	5.4	6.2	0.023
6/27/2022	67	2230	2580	291	258	231	36.2	29.8	25.5	0.5	0.6	0.6	1.4	0.007
6/29/2022	75	1860	2184	296	259	253	33	31.1	27.3	0.4	0.3	0.4	0.9	0.006
7/1/2022	71	2036	2352	279	270	256	34.8	32.9	28.4	0.4	0.3	0.5	0.95	0.008
7/5/2022	93	2960	3204	312	282	256	36.4	34.8	30.6	0.5	0.3	0.55	1.6	0.004
7/8/2022	84	2752	3352	274	271	269	34.4	33.9	33.9	0.5	0.3	0.3	0.4	0.003
7/11/2022	86	2784	2924	276	246	247	37.6	30.3	30.3	0.5	0.5	0.35	0.34	0.059
7/13/2022	83	2728	2796	274	238	232	36.6	25.2	23.3	0.5	0.35	0.3	0.36	0.058
7/15/2022	89	2496	2600	265	202	186	36	16.6	13.1	0.5	0.45	0.4	1.2	2.11
7/18/2022	91	2328		280	168		37.4	8.9		0.4	2.8	1.6		0.93
7/20/2022	86	2484	2880	274	156	157	35.6	5.3	3.45	0.5	0.7	1.6	1.3	0.74
7/22/2022	98	2624	2844	278	163	155	32.8	7.2	4.86	0.5	0.7	1.6	1.95	0.36
7/25/2022	90	1710	1770	279	179	160	37.2	12.3	9.43	0.5	2.7	2.7	4.2	0.14

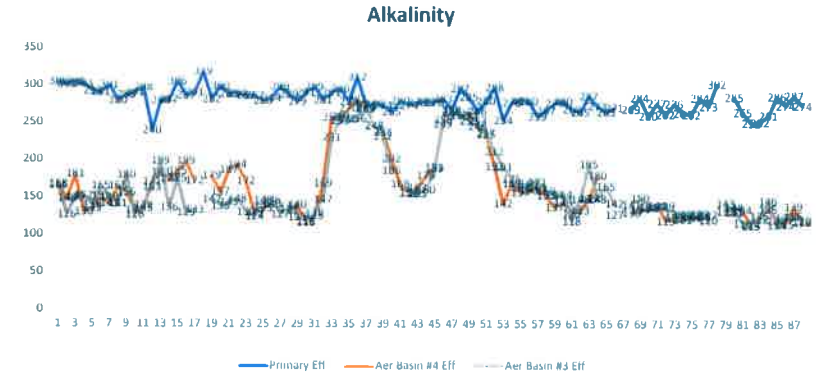
7/27/2022	82	1876	2336	278	191	189	35	16.6	14.9	0.4	1.9	2.6	2.2	0.07
7/29/2022	94	2400	2820	283	249	255	37	28.4	28.2	0.4	0.3	0.8	0.6	0.05
8/1/2022	81	3368	3680	268	266	264	37.2	35	35.6	0.5	0.3	0.4	0.3	0.02
8/3/2022	94	3304	3176	297	260	260	34.2	30.7	30.7	0.4	0.25	0.4	0.4	0.01
8/4/2022				285	264	253	35.2	30	28.8	0.4	1.16	1.1	0.9	0.01
8/5/2022	91	3552	3756	266	246	253	35.4	28	27.7	0.4	0.3	0.7	0.4	0.02
8/8/2022	86	3068	4320	280	235	237	35.2	25.5	24.4	0.4	0.5	0.6	0.3	0.04
8/10/2022	82	2528	3036	298	192	212	34.2	15.5	15.4	0.4	1.75	2.25	0.8	0.5
8/12/2022	106	2808	3204	254	142	191	32	0.17	10	0.4	2.3	3.2	0.2	0.3
8/15/2022	96	2252	2216	278	169	175	34.6	8.6	10.1	0.5	0.7	1.1	0.6	0.6
8/17/2022	92	2316	2460	281	157	163	34.2	6.9	7.1	0.4	2.3	2.5	1.3	0.25
8/19/2022	90	2180	2820	280	160	169	32.4	6.3	6.2	0.6	4.6	3.1	1	0.2
8/22/2022	97	2224	2304	259	163	171	30.2	9.1	9.8	0.4	2.8	3.4	1.6	0.3
8/24/2022	95	2556	3156	267	153	159	32.2	5.1	4.7	0.4	1.8	4.6	1.5	0.3
8/26/2022	117	2412	3180	277	137	154	34	3.2	3.2	0.4	4	6.8	1.5	0.6
8/29/2022	95	2710	2880	280	143	154	35.1	5.4	6.3	0.5	0.25	5.7	3.1	0.6
8/31/2022	98	2480	2740	269	129	118	33.8	0.79	0.69	0.4	0.83	7.6	5.3	0.5
9/2/2022	101	2524	2876	265	133	148	31	2.4	2	0.4	2.1	7.2	3.6	0.5
9/6/2022	96	2752	2920	287	149	195	36.8	4.95	6.4	0.5	2.4	5.7	4.1	0.5
9/9/2022	90	3160	3772	273	180	148	30.9	1.3	1.5	0.4	2.9	6.3	3.6	0.6
9/12/2022	97		6760	265		165	33.3		3.96	0.4	1		0.3	0.6
9/13/2022	86	3652	3652	271	127	142	29.3	0.84	0.66	0.4		7	6.5	
9/14/2022											2.7			0.4
9/16/2022	93	3240	3224	269	130	141	29.3	0.98	0.92	0.4	2.3	6.8	6.7	0.2
9/19/2022	89	3356	3524	284	134	150	31.4	1.7	4.6	0.4	1	5.3	2.9	0.2
9/21/2022	107	3612	3648	260	137	138	31.7	1.2	1.5	0.3	2	5.5	4.9	0.2
9/23/2022	99	3576	3964	277	140	137	35.6	0.58	0.9	0.5	6	10.5	6.7	0.2
9/26/2022	85	3360	3120	262	119	139	34.5	0.54	2.8	0.4	0.3	8.9	7.6	0.1
9/28/2022	87	2936	3320	276	123	128	32.3	0.46	0.81	0.4	1.02	8.1	7	0.09
9/30/2022	101	3016	2892	264	121	128	31.5	0.45	0.46	0.4	2.4	7.5	8.3	0.15
10/3/2022	112	3008	2872	262	124	127	28.7	0.6	0.66	0.4	0.69	7.6	7.95	0.34
10/5/2022	98	3052	3000	284	124	129	32.2	0.6	0.86	0.4	2.1	7	8.8	0.15
10/7/2022	106	2980	2904	273	127	120	32.2	1.4	1	0.4	4.4	5.8	7.6	0.21
10/10/2022	83			302			33.6			0.47	0.7			0.3
10/11/2022		2756	2772		132	143		0.5	0.3			10.1	11.4	
10/12/2022	94	2740	2708	285	138	131	31	0.5	0.5	0.38	4.15	9.6	11.1	0.3
10/14/2022	91	2660	2648	265	134	116	28.4	0.6	0.9	0.49	9.5	9.6	10.3	0.4
10/17/2022	96	2612	2736	251	113	114	29.1	0.9	1.2	0.37	5.6	10.3	10.5	0.5
10/19/2022	95	2704	2724	252	126	122	26.4	1.6	1.6	0.31	5.1	9.1	10.6	0.4
10/21/2022	100	2728	2676	261	135	146	28.7	2.4	3	0.46	5.6	8.25	8	0.6
10/24/2022	100	3032	3096	286	120	114	35.5	1.5	2	0.39	5.5	8.6	10.8	0.3
10/26/2022	81	3120	3208	274	115	124	33.6	1.2	1.5	0.4	7.7	8.8	9.8	0.2
10/28/2022	92	3228	3320	287	139	126	33.7	1.3	1.2	0.5	8.6	9.1	10.5	0.1
10/31/2022	101	3040	3080	274	118	120	34.1	1.8	2.2	0.4	6.65	10.2	10.7	0.3

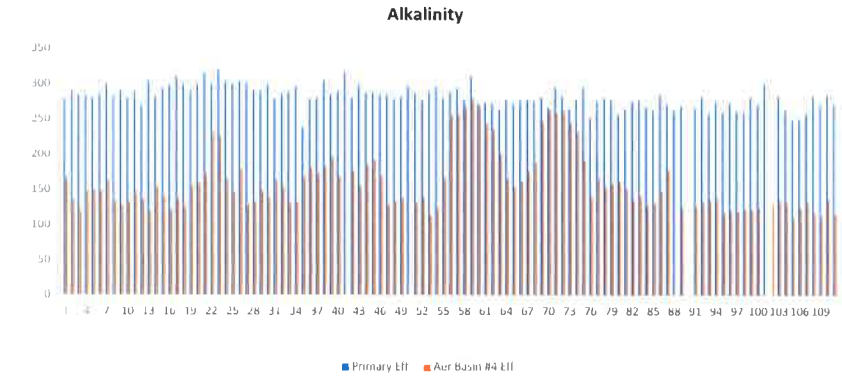
	TSS,MLSS Primary	TSS,MLSS AB 4 Eff.	TSS,MLSS AB 3 Eff.	Alkalinity Primary	Alkalinity AB 4 Eff.	Alkalinity AB 3 Eff.	Ammonia Primary	Ammonia AB 4 Eff.	Ammonia AB 3 Eff.	Nitrate Primary	Nitrate RAS	Nitrate AB 4 Eff.	Nitrate AB 3 Eff.	Nitrite Final
Average	84.24	2605.048	2867.952	283.99	163.01	162.38	37.50	8.73	7.45	0.58	3.13	5.81	5.18	0.51
Median	86.00	2524.00	2820.00	284.00	149.50	147.50	35.60	5.40	3.05	0.46	2.7	6.35	5.85	0.33
Minimum	9.00	1468.00	708.00	240.00	113.00	114.00	26.40	0.17	0.10	0.20	0.25	0.30	0.20	0.00
Maximum	117.00	3652.00	6760.00	322.00	282.00	269.00	62.40	35.00	35.60	7.40	9.50	13.80	11.40	2.92

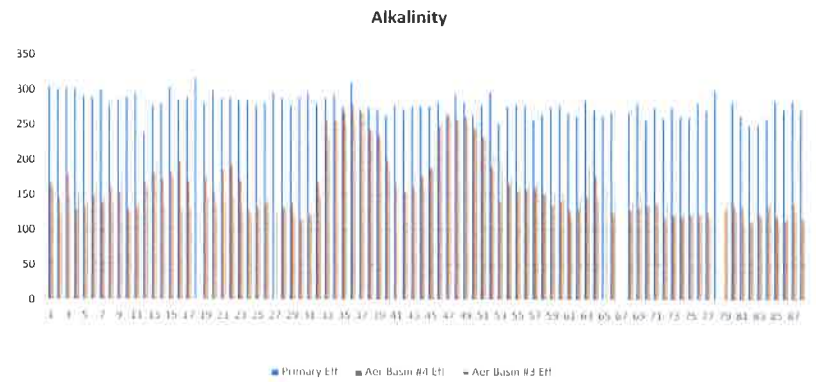

Ammonia
Primary Eff
Aer Basin #4 Eff


Ammonia
Aer Basin #4 Eff
Aer Basin #3 Eff

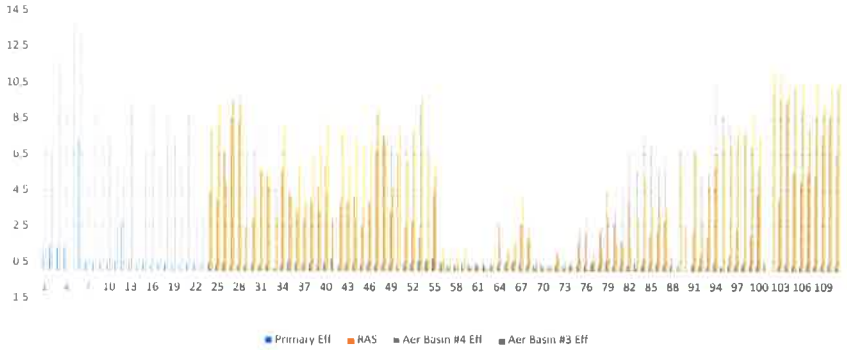

Ammonia - Aeration Basin 4


Alkalinity
Primary Eff
Aer Basin #4 Eff
Aer Basin #3 Eff

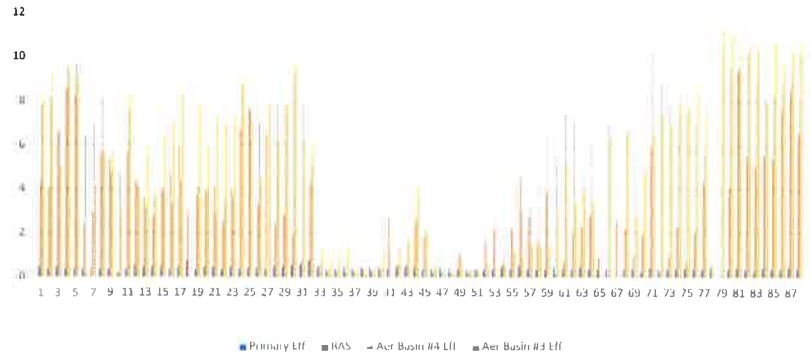

Alkalinity
Primary Eff
Aer Basin #4 Eff


Alkalinity
Primary Eff
Aer Basin #4 Eff
Aer Basin #3 Eff

Nitrate



Nitrate



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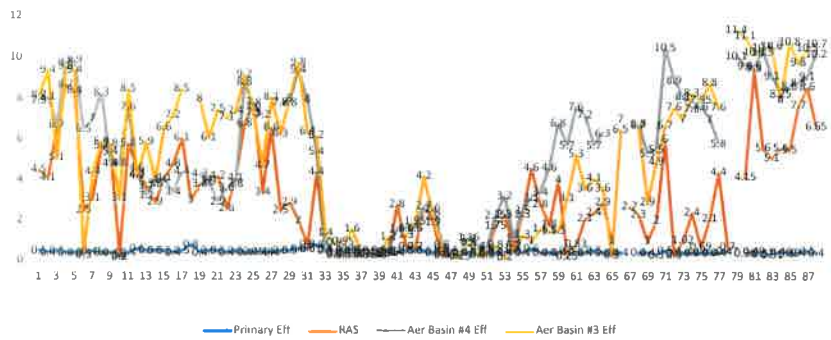
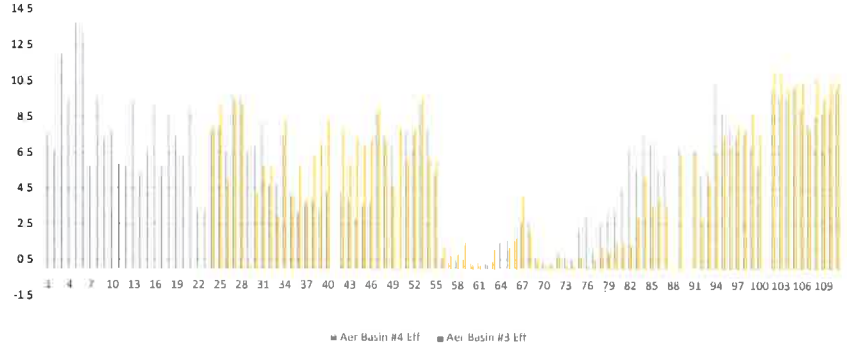


Nitrate



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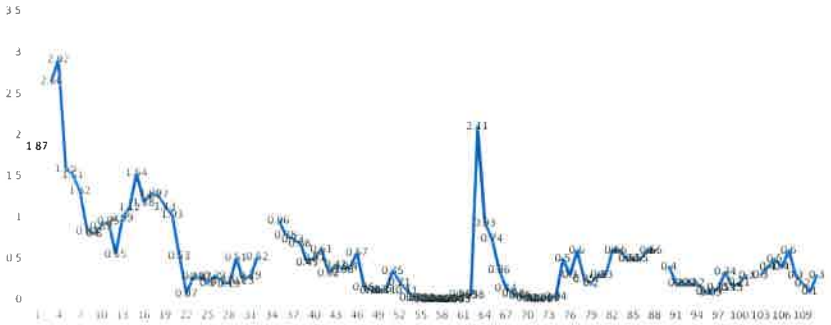

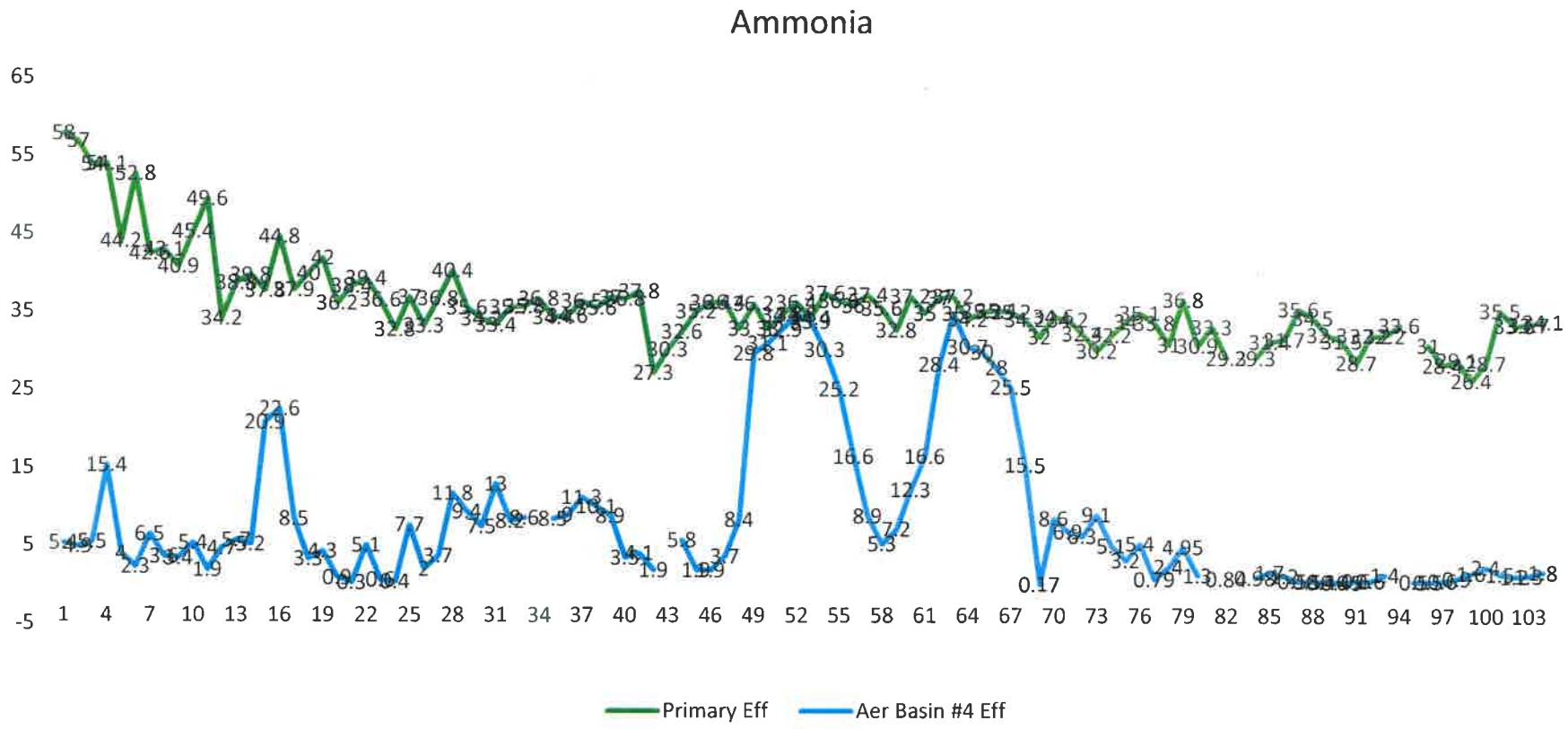
Ammonia
65
55
45
35
25
15
5
-5
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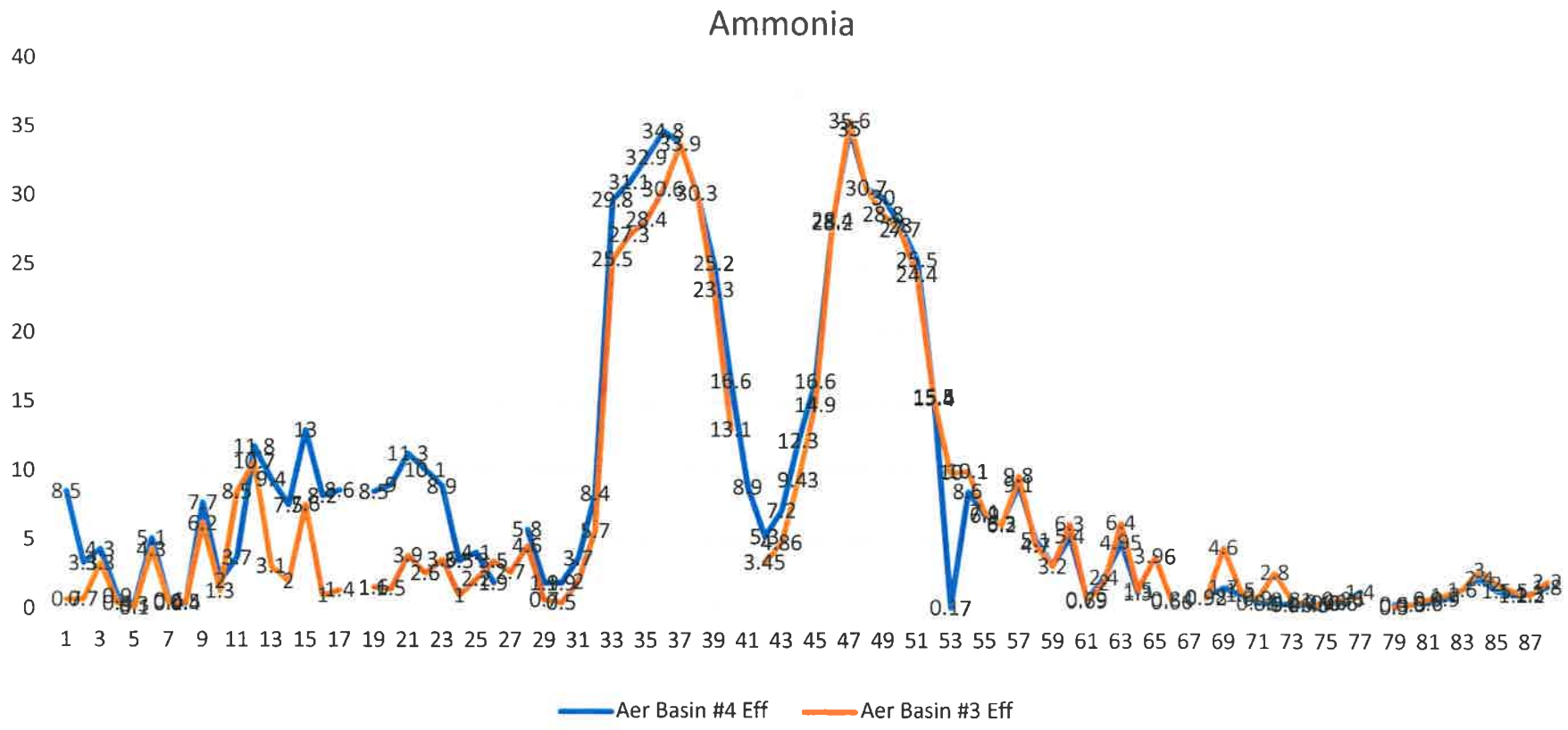
Primary Eff
Aer Basin #4 Eff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30
25
20
15
10
5
0
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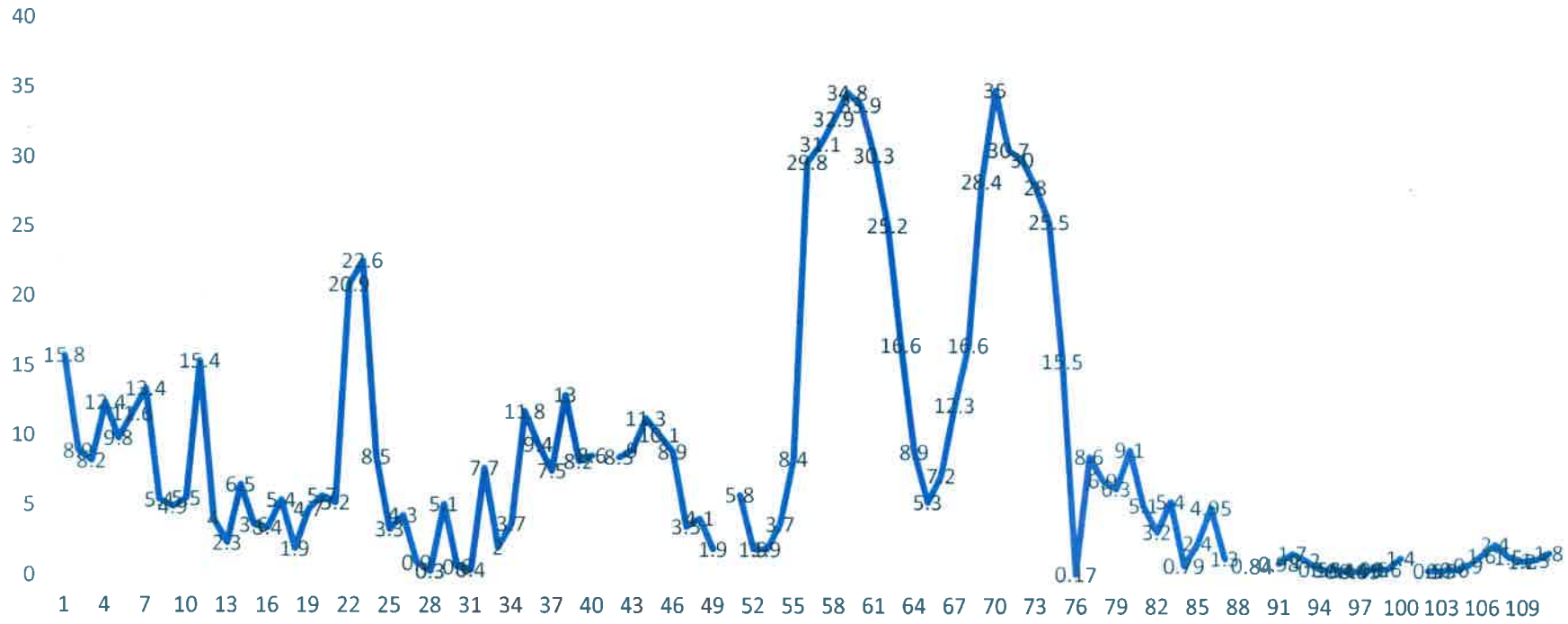
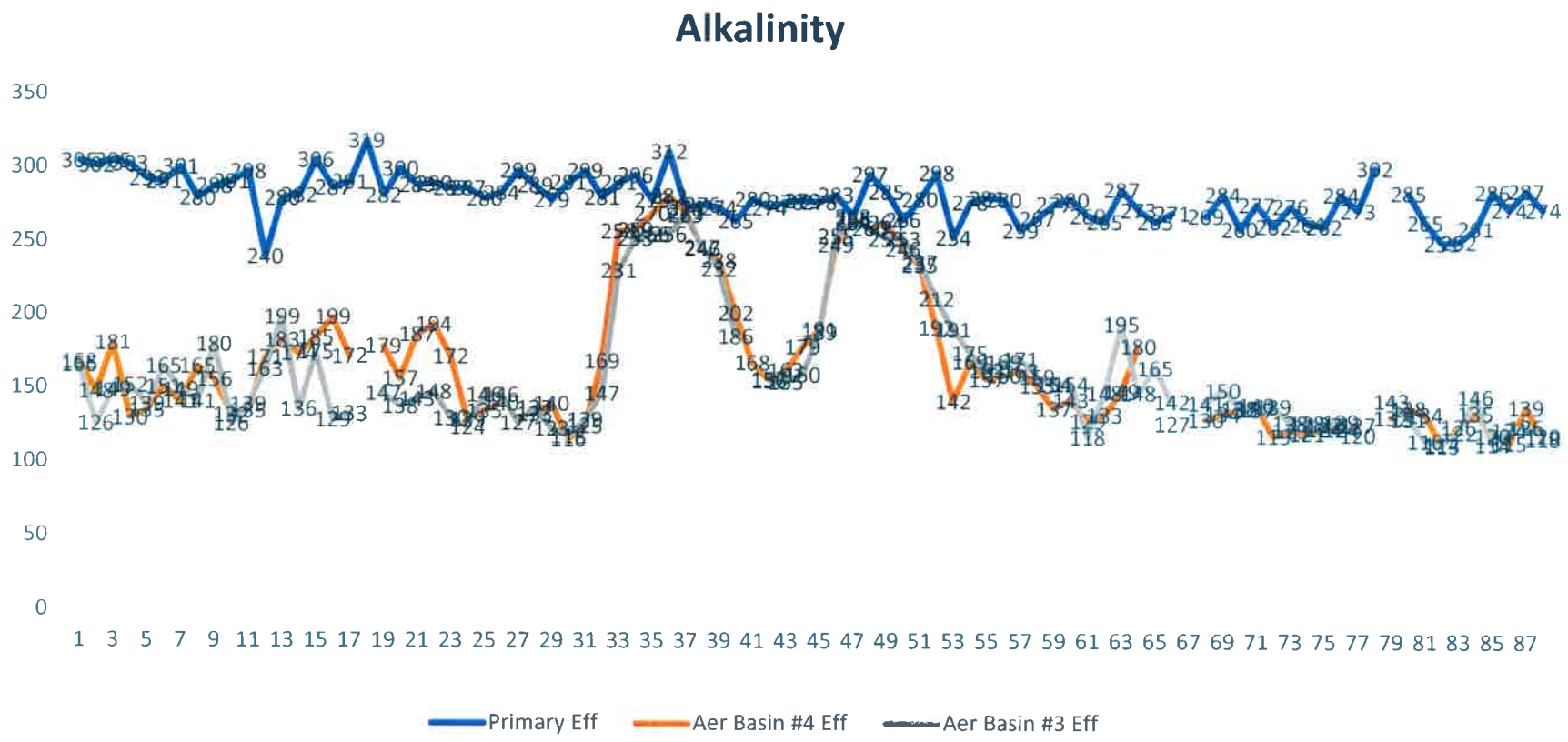
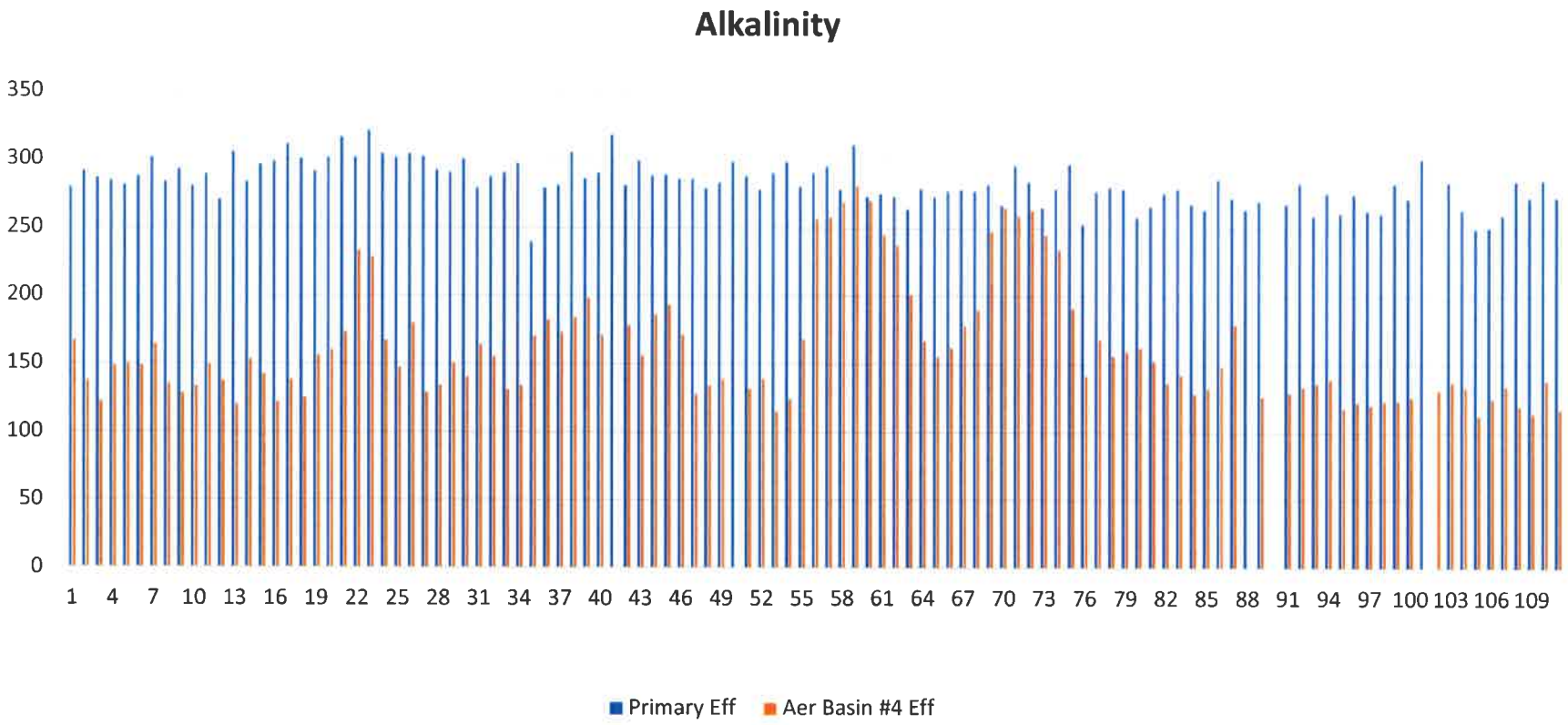
Aer Basin #4 Eff
Aer Basin #3 Eff

Ammonia - Aeration Basin 4




Alkalinity
350
300
250
200
150
100
50
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87
Primary Eff
Aer Basin #4 Eff
Aer Basin #3 Eff


Alkalinity
350
300
250
200
150
100
50
0
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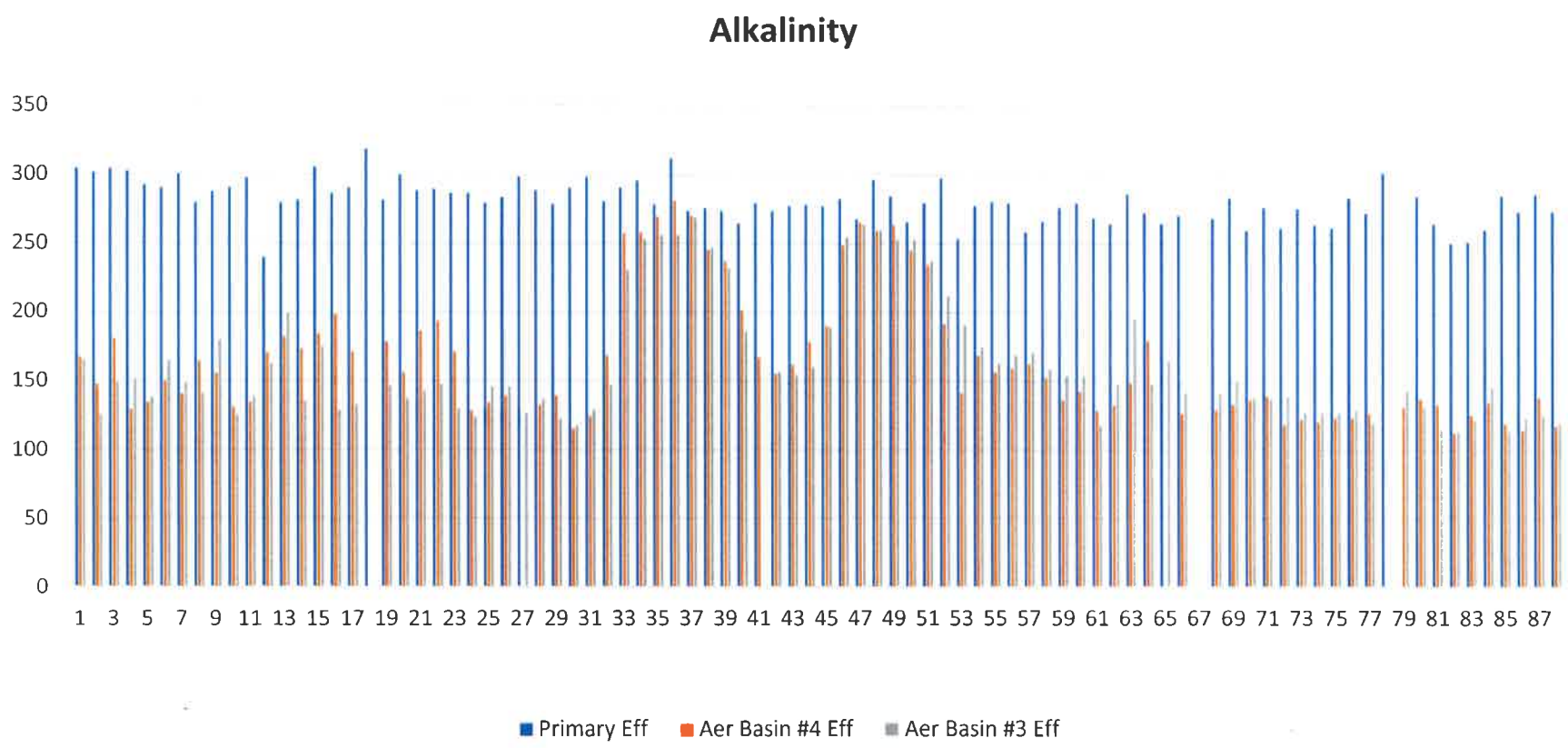
Primary Eff
Aer Basin #4 Eff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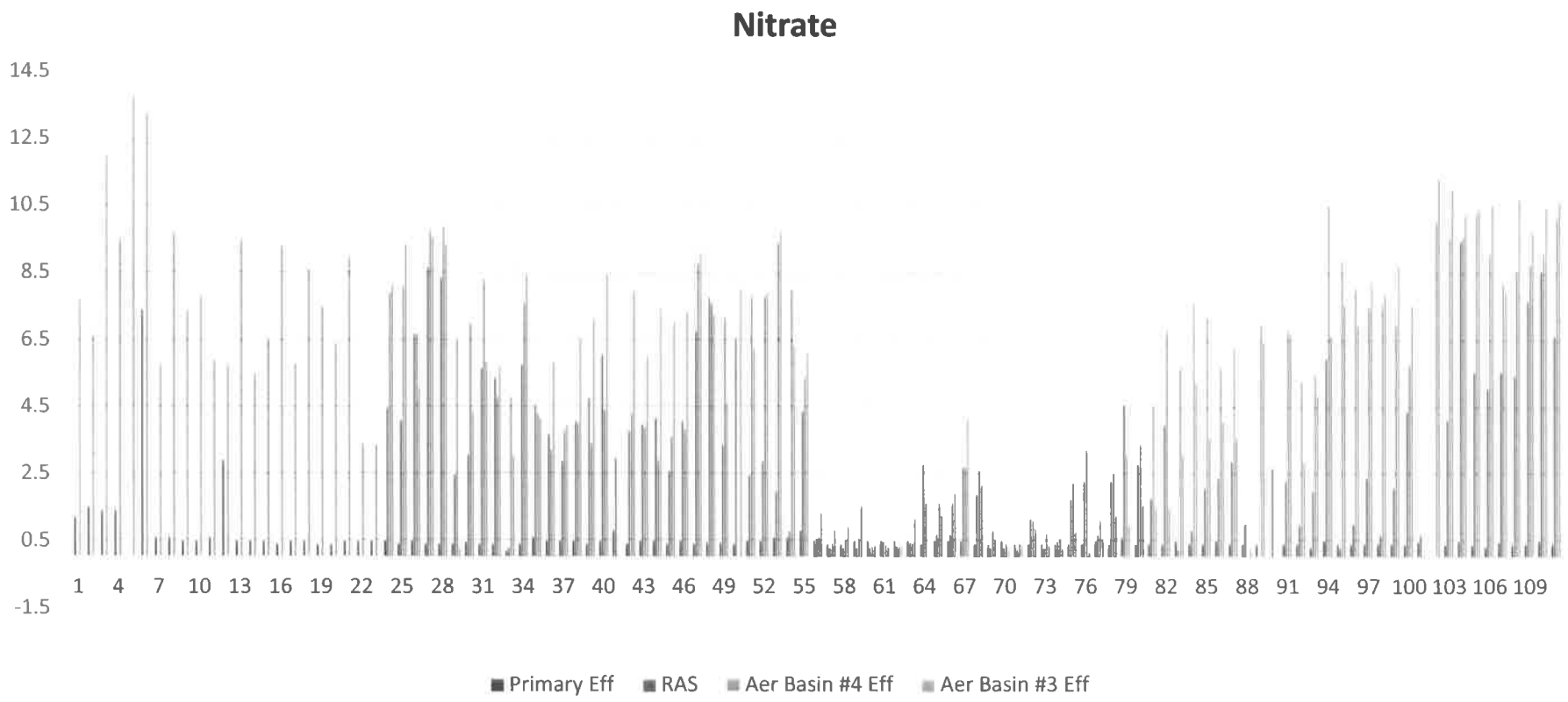
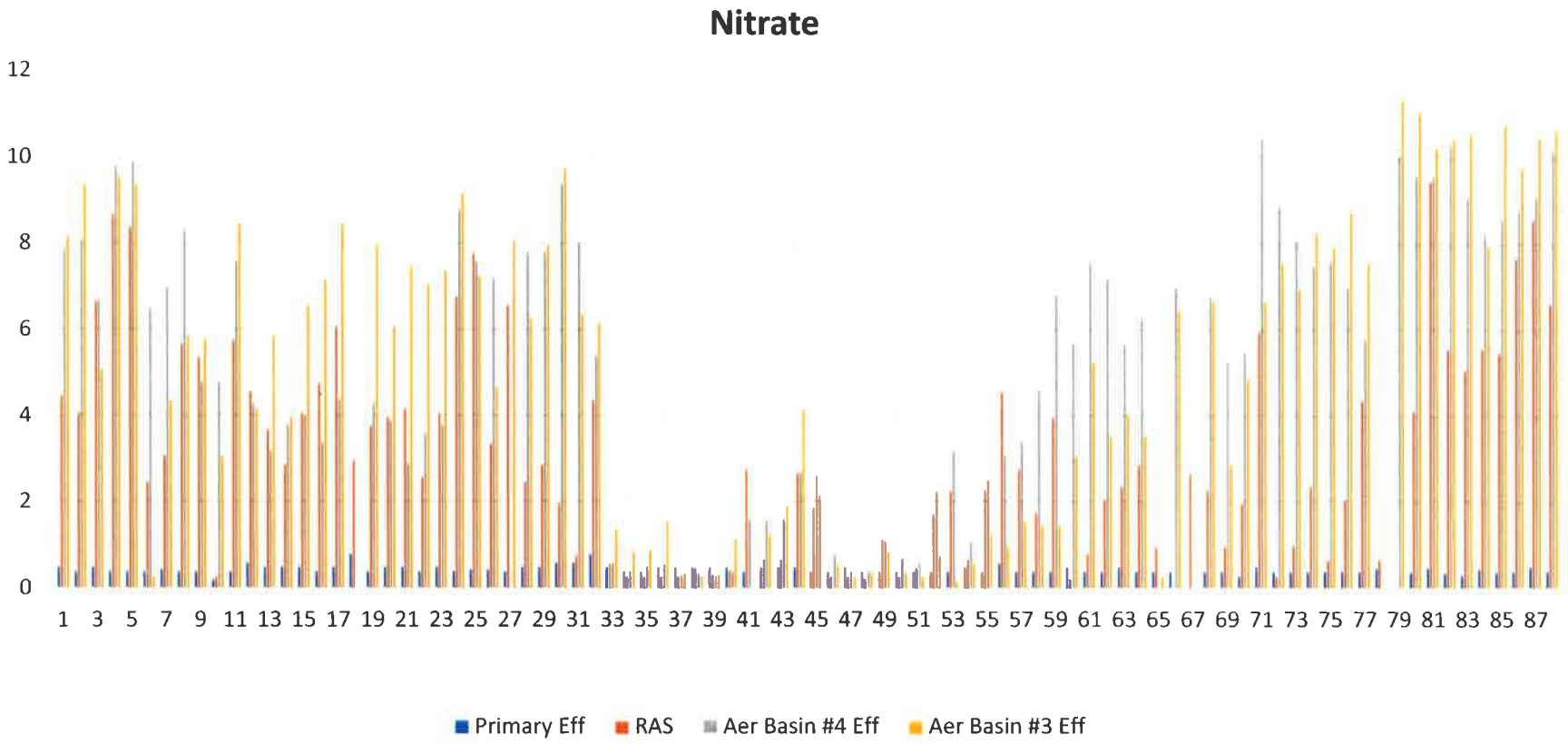
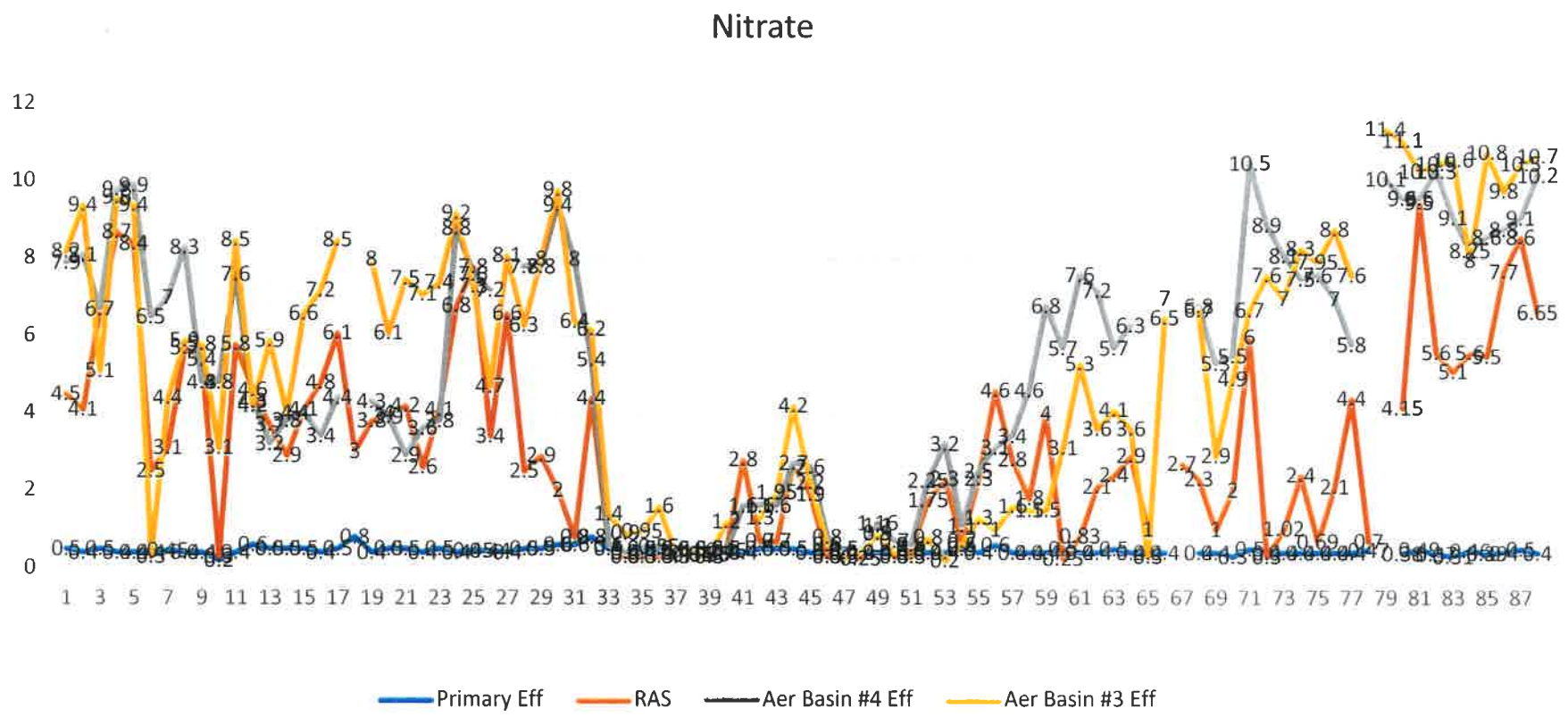
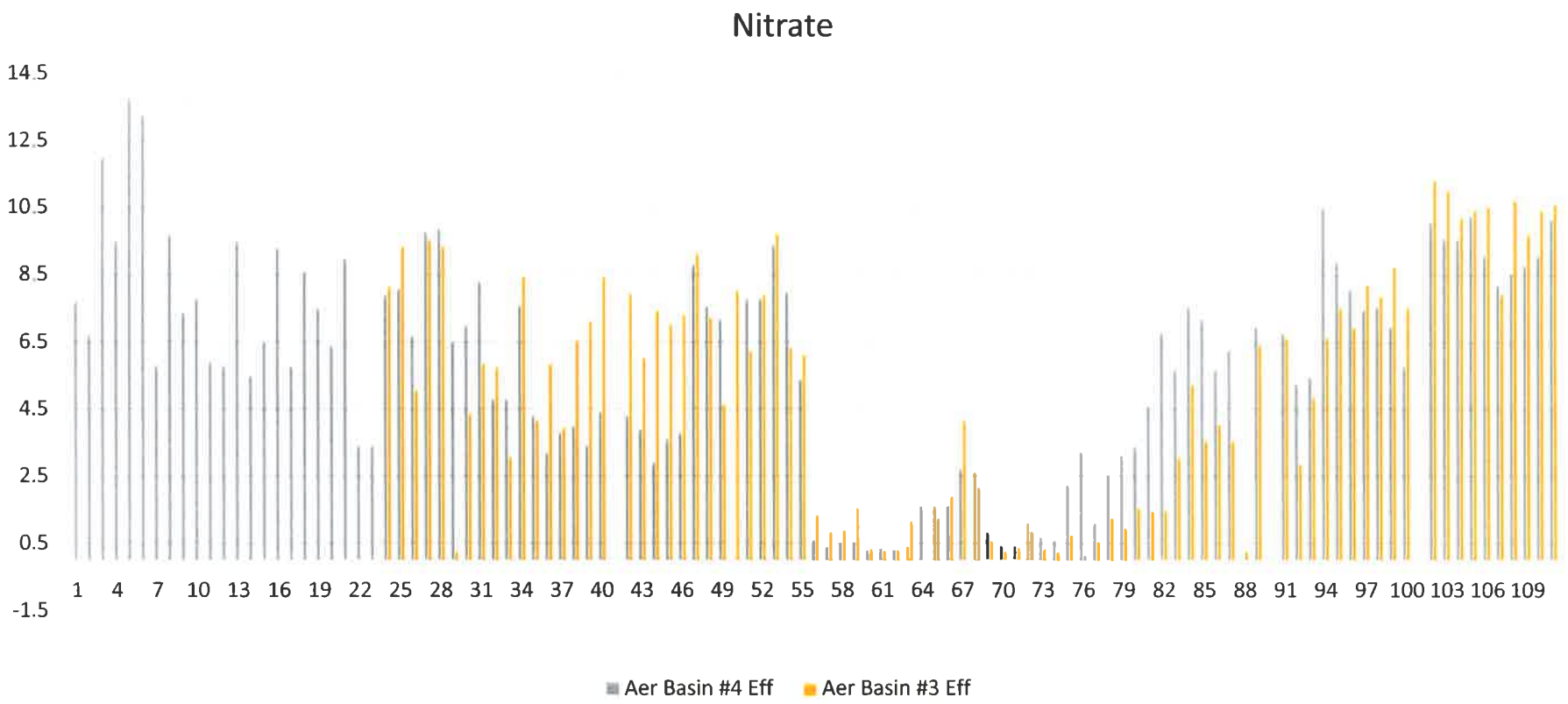
Primary Eff
Aer Basin #4 Eff
Aer Basin #3 Eff


Nitrate
14.5
12.5
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 97 100 103 106 109
Primary Eff
RAS
Aer Basin #4 Eff
Aer Basin #3 Eff


Nitrate
12
10
8
6
4
2
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87
Primary Eff
RAS
Aer Basin #4 Eff
Aer Basin #3 Eff


Nitrate
12
10
8
6
4
2
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87
Primary Eff
RAS
Aer Basin #4 Eff
Aer Basin #3 Eff


Nitrate
14.5
12.5
10.5
8.5
6.5
4.5
2.5
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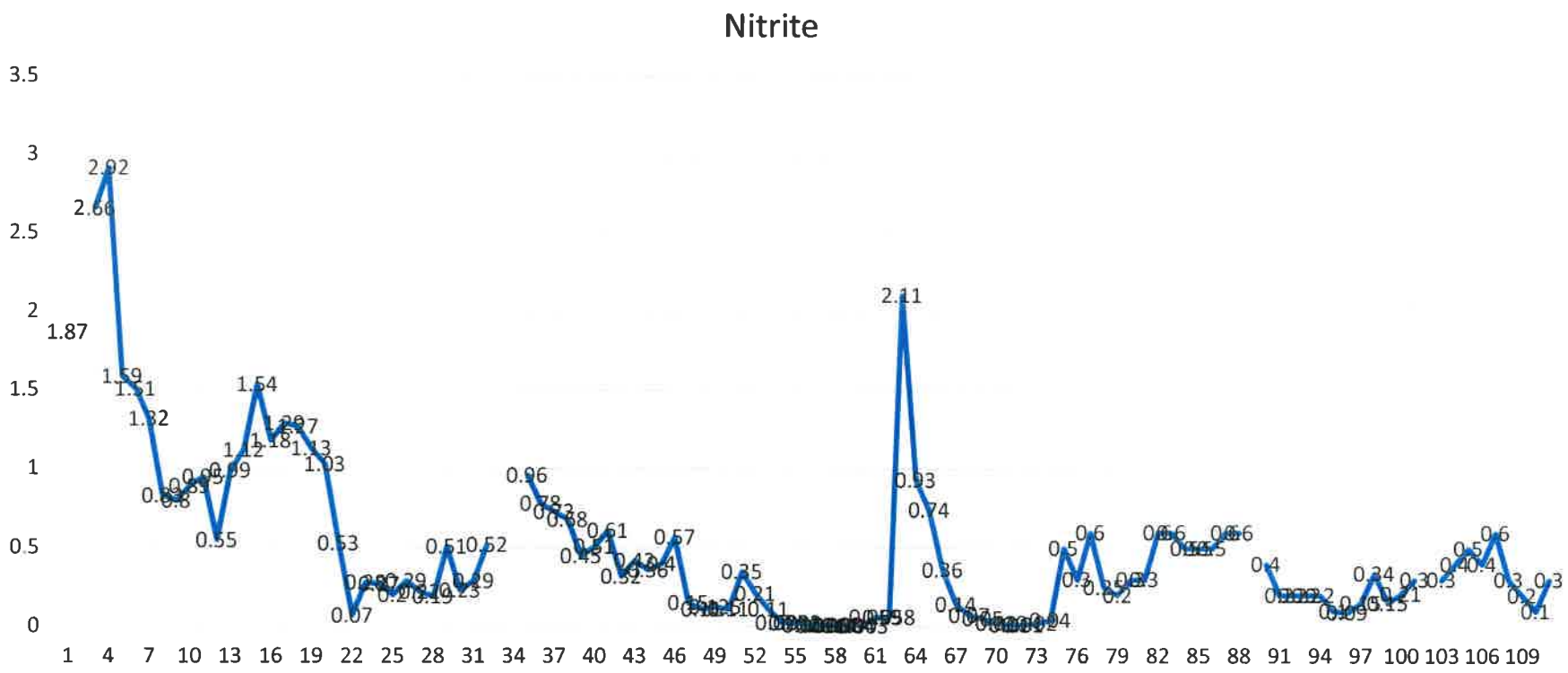
Aer Basin #4 Eff
Aer Basin #3 Eff


Nitrite
3.5
3
2.5
2
1.5
1
0.5
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 97 100 103 106 109

VSD

December 9, 2021

Kai Dunn, Ph.D., P.E.
Senior WRC Engineer – NPDES/Stormwater/401 WQC Unit Chief
State of California Colorado River Basin Regional Water Quality Control Board
73720 Fred Waring Drive, Suite 100
Palm Desert, CA 92260

Dear Dr. Dunn:

SUBJECT: VALLEY SANITARY DISTRICT AMMONIA STUDY TECHNICAL REPORT

Attached you will find Valley Sanitary District's (VSD) Board required Ammonia Study Technical Report to evaluate the potential actions to reduce ammonia discharges into the Coachella Valley Whitewater River Storm Water Channel. This study was required by Board Order R7-2020-0007 and had to be completed within 18-months of the effective date of the Ammonia Work Plan approval. The Board Order R7-2020-0007 became effective on April 1, 2020, and the work plan was approved in June 2020. Based upon my inquiry of those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

I am the new Facility Operations Manager and Chief Plant Operator for the District. My SWRCB Grade V Wastewater Operator certification number is 9778 and it expires on 07/02/2023. If you have any questions concerning this report, please let me know.

Sincerely yours,

Dave N. Commons

Dave Commons
Facility Operations Manager
Valley Sanitary District
45500 Van Buren Street
Indio, CA 92201

Attachment

VSD

December 01, 2021

Kai Dunn, Ph.D., P.E.
Senior WRC Engineer – NPDES/Stormwater/401 WQC Unit Chief
California Regional Water Quality Control Board
Colorado River Basin Region
73-720 Fred Waring Drive, Suite 100
Palm Desert, CA 92260

Dear Mr. Kai Dunn:

SUBJECT: VALLEY SANITARY DISTRICT AMMONIA STUDY TECHNICAL REPORT

In accordance with Board Order R7-2020-0007, within 18-months of the effective date of the Ammonia Work Plan approval, Valley Sanitary District (VSD), is to submit an ammonia study technical report. Order R7-2020-0007 became effective on April 1, 2020, and the work plan was approved June 2020. The study was to evaluate the potential actions to reduce ammonia discharges into the Coachella Valley Storm Water Channel.

VSD Wastewater Treatment Plant
Referring to Figure 1 and Figure 2, the wastewater treatment plant consists of two separate treatment systems: an activated sludge treatment system with a design capacity of 10 mgd and an oxidation pond treatment system with a design capacity of 2.5 mgd. Plant influent flow is directed to primary clarifiers after going through mechanical bar screens and the grit chamber. After the primary clarifiers, flow is apportioned between the activated sludge treatment system and the oxidation pond treatment system.

The activated sludge treatment system consists of anoxic selectors, aeration basins, secondary clarifiers, and a dedicated chlorine contact chamber. Former primary clarifiers are used for the anoxic selectors.

The oxidation pond system consists of two oxidation ponds (Ponds 2 and 3), and two smaller cells (North and South). The flow pattern through the pond system usually begins in a series starting with Pond 2 then into the two cells then into Pond 3. When the two cells are being

used for collection and treatment of waste activated sludge, the two cells commonly are isolated and flow from Pond 2 goes directly to Pond 3. Pond 3 effluent flows to a dedicated chlorine contact chamber.

Chlorinated effluent from each chlorine contact chamber is combined and dechlorinated prior to discharge to the Coachella Valley Storm Water Channel. For the period from June 2015 through March 2020, the average flow from the activated sludge treatment system was 4.40 mgd. The average flow from the oxidation pond treatment system was 1.39 mgd. On average, the pond effluent comprises 24% of the combined outfall effluent discharge.

In April of 2021, the oxidation pond treatment system was discontinued and no longer contributes to the final discharge. All flow from the primary clarifiers is directed through the activated sludge treatment system. Only waste streams contribute to the pond system.

There is often no flow upstream of the VSD outfall in the Coachella Valley Storm Water Channel. Therefore, the effluent flow is often the only flow present in the channel at the downstream receiving water monitoring location.

Work Plan

The current permit requires VSD to analyze a grab sample once per month for ammonia, as N (NH_3-N), at sample location EFF-001C. These compliance samples are sent to a contract laboratory for analysis.

Per the approved ammonia study, VSD has been utilizing the following sampling plan to monitor the performance of the process changes that began in mid-2019 and to continue to make adjustments as needed. VSD staff have been analyzing 24-hour composite samples weekly for ammonia, as N, taken at the following locations (see Figure 2 and Table 1):

- INF-001 (treatment plant influent)
- Primary clarifier effluent (activated sludge and pond system influent)
- EFF-001A (activated sludge treatment process effluent)
- EFF-001B (oxidation pond treatment process effluent) – offline as of April 2020
- EFF-001C (combined final effluent after dechlorination)

At a minimum, samples were collected from the above locations for ammonia. The intent of sampling the was to accumulate a robust data set and to identify seasonal variability in ammonia concentrations and/or changes in operational strategies that may be needed to offset variability. Samples were analyzed in-house, in VSD's wastewater treatment plant laboratory.

Sample results from these locations enabled VSD staff to observe and trend ammonia concentrations and removals throughout the treatment processes. Supporting samples of process data were collected to more closely evaluate processes as needed.

Examples of process data at the activated sludge plant are mixed liquor suspended solids (MLSS) and dissolved oxygen (DO). A MCRT, of no less than seven (7) days, was used to calculate wasting values to maintain a healthy population of organisms capable of nitrifying ammonia in the activated sludge process. DO probes receive real time data from a single point in each of the four (4) aeration tanks in operation. This real time data is used to automatically adjust airflow to the aeration tanks based on an assigned DO setpoint. The DO setpoint has been assigned no less than 2.0 mg/L to ensure that there is adequate DO for nitrification. VSD staff collect DO values from multiple points of the aeration tanks with the use of a handheld field probe, as needed, to assess variability of DO levels within the tanks.

To ensure enough air is being provided in the treatment ponds, the handheld field probe will also be used to collect DO values at the effluent end of each pond in series. Values will be collected daily. The D.O. value leaving the final pond should be maintained above 2 mg/L. After April 2021, VSD staff collect D.O. values on the final pond to ensure enough air to maintain stability of pond conditions even though no discharge is occurring from the pond system.

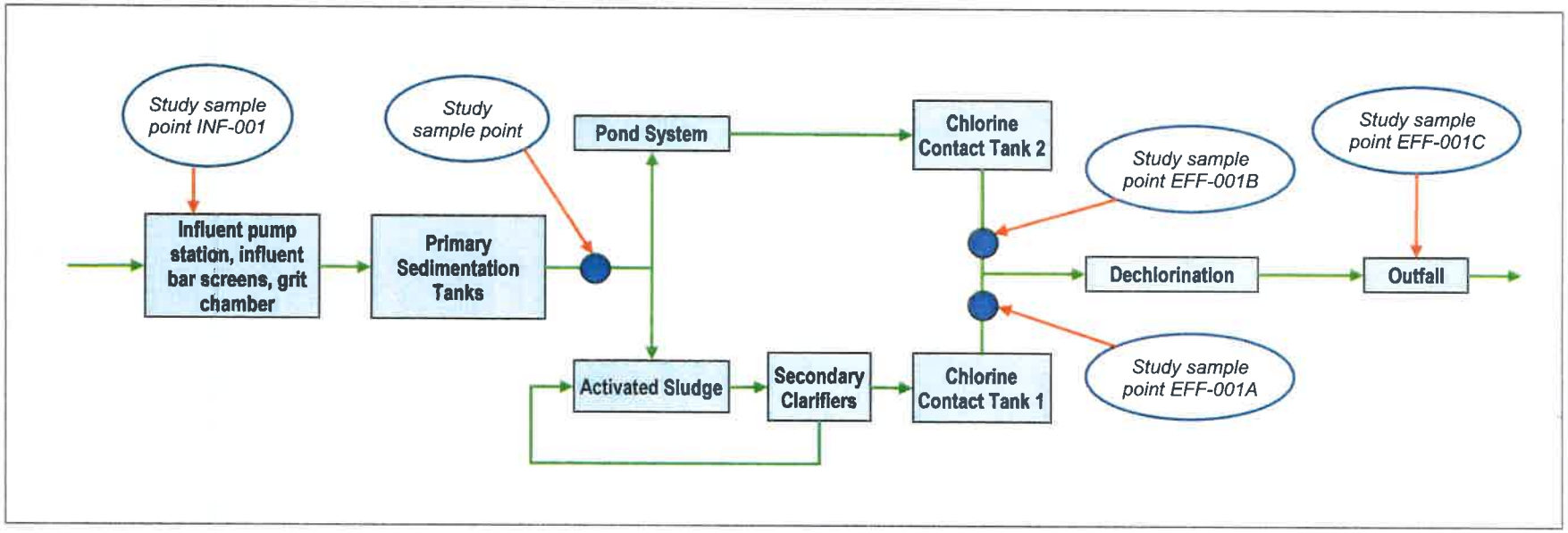
In addition to the monitoring described above, during the study VSD has conducted additional monitoring and observations to assess other changes that may result from the process modifications. Examples of the monitoring included plant energy usage, secondary sludge settleability, alkalinity, activated sludge microbiology (e.g., evidence of filamentous or foam producing organisms) and final effluent quality, assessed primarily in terms BOD, TSS, and NH_3-N)

Table 1. Ammonia Study Sampling Plan

Sample Location	Sample Type	Frequency	Duration
INF-001 – treatment plant influent	24-hr composite	Weekly	12 months
Primary clarifier effluent - activated sludge and pond system influent	24-hr composite	Weekly	12 months
EFF-001A - activated sludge treatment process effluent	24-hr composite	Weekly	12 months
EFF-001B - oxidation pond treatment process effluent (discontinued April 2021)	24-hr composite	Weekly	12 months
EFF-001C - final effluent after dechlorination	Grab	Monthly	12 months
INF-001 – treatment plant influent	Grab	Monthly	12 months

Figure 1. VSD Wastewater Treatment Plant Ammonia Study Sampling Locations

Figure 2. VSD Wastewater Treatment Plant Process Flow Diagram with Ammonia Study Sampling Locations



Conclusion

VSD has been able to demonstrate a reduction in the ammonia concentration in the Effluent discharged to the receiving waters. Table 1 demonstrates the raw data from the permit required monthly sampling of the influent and effluent locations. Figure 3 is a graphic representation of the content in Table 1. Figure 4 is the ammonia reduction trends from the effluent only. Data averages indicate that the Influent location has 56 mg/L of ammonia entering the treatment facility. After biological and chemical treatment, the effluent ammonia is 3.9 mg/L on average.

Table 1: Raw data from Monthly sampling of Influent (INF-001) and Effluent (EFF-001C) for Ammonia, as N and Total Nitrogen, as N.

	Influent (INF-001)		Effluent (EFF-001C)	
	Ammonia (as N)	Total Nitrogen (as N)	Ammonia (as N)	Total Nitrogen (as N)
Apr-20	65	110	2.7	21
May-20	58	85	8	21
Jun-20	61	91	1.8	17
Jul-20	53	75	1.7	21
Aug-20	44	160	1.4	12
Sep-20	51	67	7.5	18
Oct-20	49	69	14	21
Nov-20	56	78	4.4	18
Dec-20	67	85	1.3	14
Jan-21	59	79	4.1	15
Feb-21	57	75	4.9	19
Mar-21	58	82	0.72	14
Apr-21	58	80	0.33	11
May-21	56	77	2.1	13
Jun-21	51	76	4.4	15
Jul-21	75	68	5.3	16
Aug-21	51	72	1.2	11
Sep-21	44	64	0.65	7.6
Oct-21	54	77	8.4	18
Average	56.2	82.6	3.9	15.9

Figure 3: Trend of Ammonia and Total Nitrogen concentrations in the Influent vs Effluent

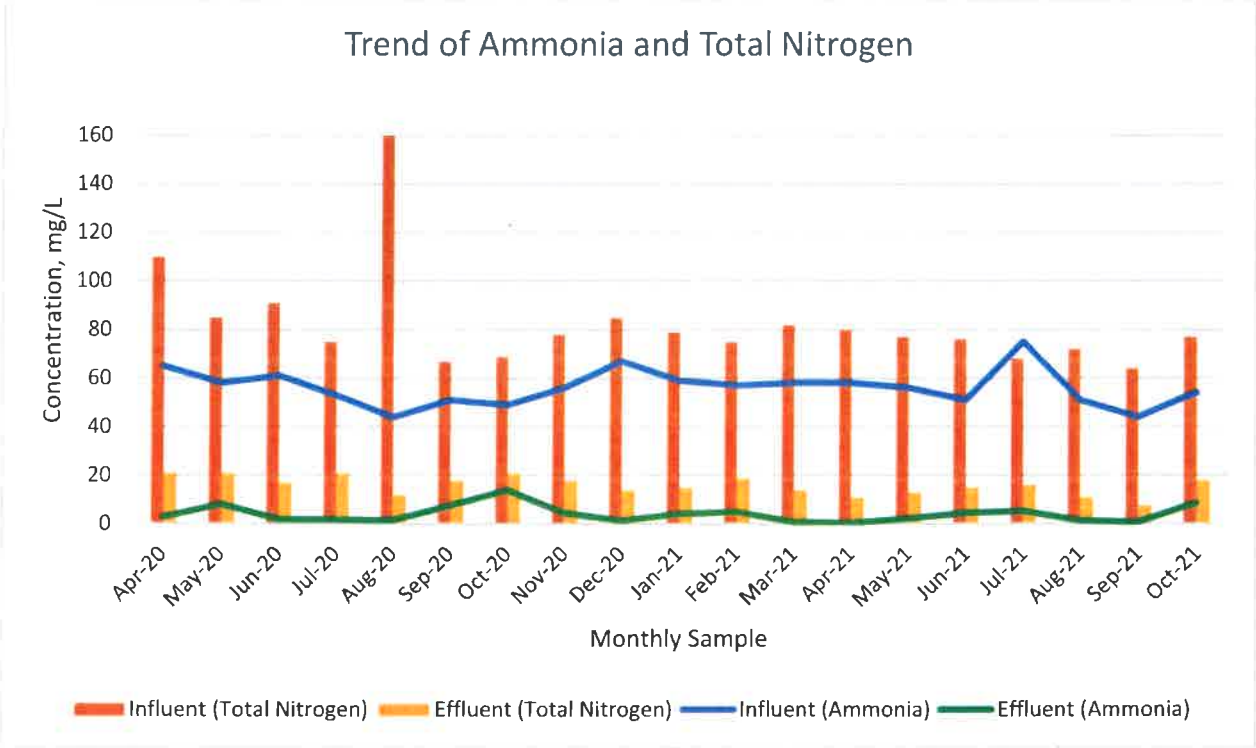
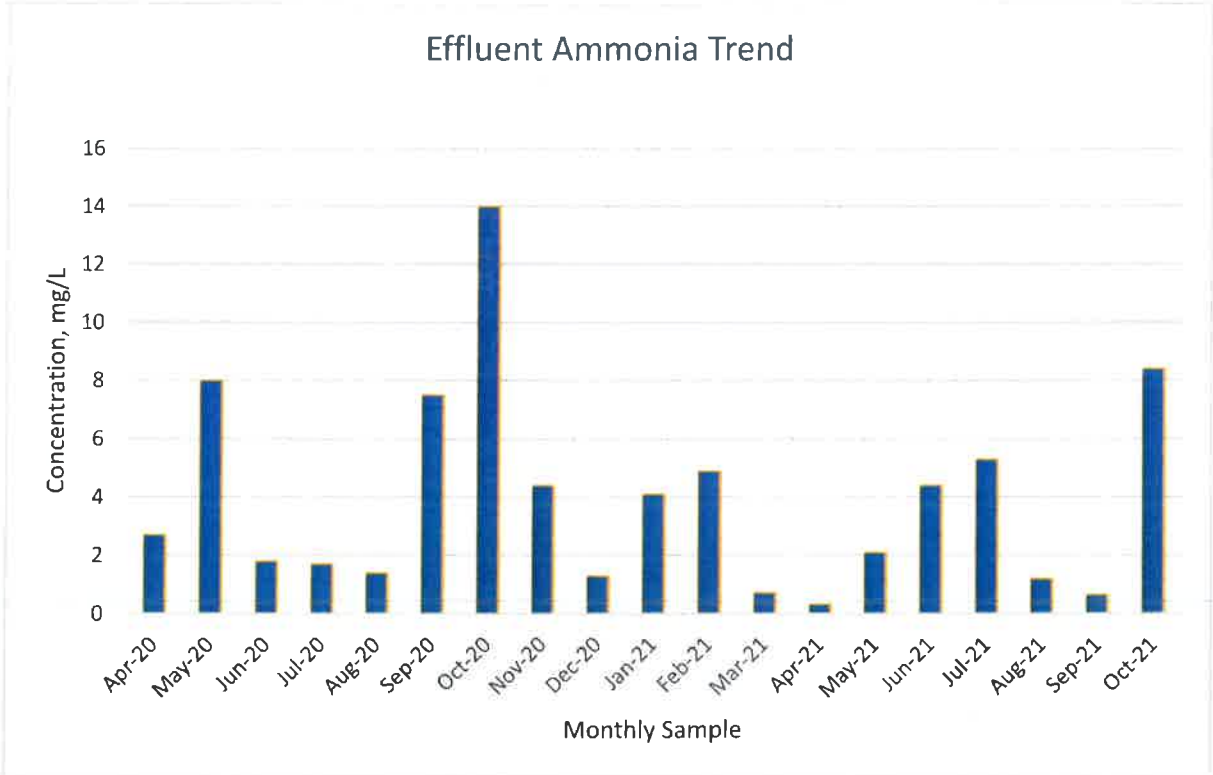


Figure 4: Effluent Ammonia concentrations since implementation of new Permit



Certification Statement:
I certify under penalty of law that this document and all attachments were prepared under the direction of supervision in accordance with a system designed to assure qualified personnel properly gathered and evaluated the information submitted based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations.

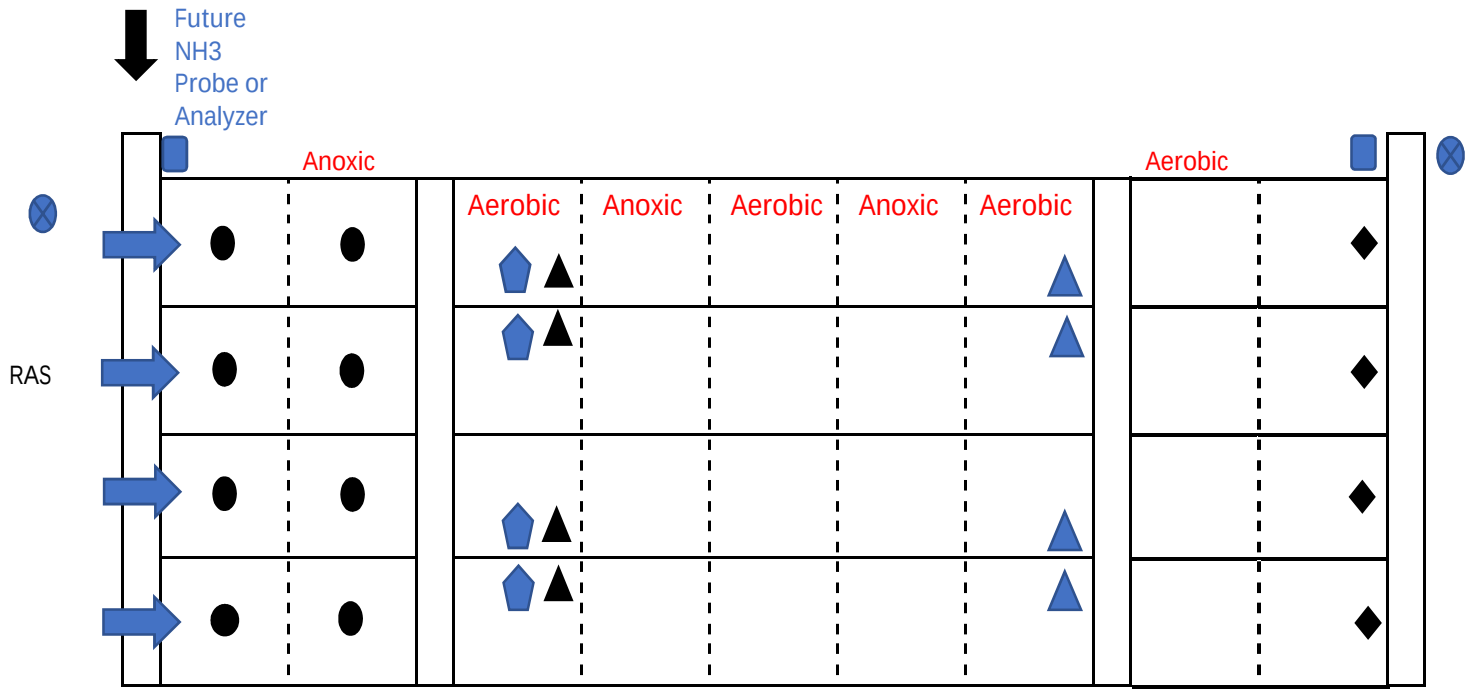
Regards,

Anna Bell
Laboratory & Compliance Supervisor
Valley Sanitary District
45-500 Van Buren St
Indio, CA 92201

Selective Plant Process Evaluation

I have chosen this plan to evaluate the major process changes and plant modification that will take place to our facility over the next several years. Know that this will be a multiyear project that will be dependent on funding, I have chosen to evaluate the entire current plant and predict the areas that will need evaluation. Starting with the major modifications and changes that will take place to the Headworks (Influent Pump Station, Screening, and Grit Removal) have already been evaluated and are planned for as part of the Phase 1 upgrades to the plant. After evaluating these plans and specifications, I saw no major modifications that need to be done to this area. As part of this upgrade, the Digester and Thickener systems have also been evaluated. I saw no major modifications that were need to the digesters, but I did give my concerns to the modifications to the thickener system. As part of finalizing these plans I recommended replacing the proposed DAFT system with a RDT system. I know the rest of the plant process control systems are be looked at as part of the Phase 3 Plant upgrades which will take the plant from secondary treatment to full tertiary treatment. With this upgrade I know the entire process of the plant will be evaluated. This will take additional funding to complete these modifications, so I know that this is a several year plan. To be complete in my evaluation I have evaluated the other plant processes to see if I think we may need to make modifications before the main plant modifications. I have evaluated the disinfection system and see no changes that are necessary at this time except maybe changing a chlorine residual probe and maybe adding some additional effluent instrumentation. The one issue that could be pending in the short term before the major plant expansion is the fact that the SWRCB may require us to remove ammonia from our plant effluent before the plant goes through the major upgrade from secondary to tertiary treatment. We may need to make temporary modification to the current plant to treat for complete ammonia removal and denitrification. This plan before you is my plan to test the current plant aeration process to see what could be done to make that change to complete nitrification/ denitrification with the least cost and the most rapid modification if the SWRCB places in our NPDES permit this requirement.

Primary Effluent



SYMBOLS KEY:

Current Anoxic Mixers

Current DO Probes

Current ANISE Probes

Future NH3 Probe (Possible PO4 Analyzer if must remove Phosphorous)

or Analyzer

Future NISE Probe

(On RAS Pipeline)

Future DO Probes

Future SS Probes

Study Plan

1.) Evaluate current data and run background information. Need NH3, NO3, pH, Alkalinity, Dissolved Oxygen data. Need the following:
   a.) Aeration basin influent – NH3, NO3, pH/Alkalinity, PO4; RAS Influent – NO3
   b.) Influent to First Aerobic Zone – TSS (MLSS); Effluent – DO, Microscopic examination
   c.) Second Anoxic Zone Effluent (First Anoxic zone after the Selectors) – pH/Alkalinity
   d.) Third Anoxic Zone Effluent – NO3, pH/Alkalinity
   e.) Final Aerobic Zone Effluent (Before final aerobic zones) – NH3, NO3, PO4
   f.) Plant Influent flow
   g.) Return and Waste Activated Sludge flow

h.) SVI data
i.) MCRT
j.) Sludge blanket levels in secondary clarifiers

Approximately one month (December 2021)

2.) Change Aeration Basin No. 4 to Step feed process configuration. Continue same test data gathering. Increase MCRT to approximately 12 days.
Approximately one month (January 2022)

3.) If not satisfied with the first results, divert some of the primary effluent around anoxic selectors to the entrance to the Step feed channel by first aerobic zone. Continue same test data gathering.
Approximately one month (February to March 2022)

Test other process changes to test if the above does not resolve NH3 problem:

Internal High rate Recycle flow from back of aeration basin to the front of the selectors.

Install baffles between zones with mixers in the anoxic zones.

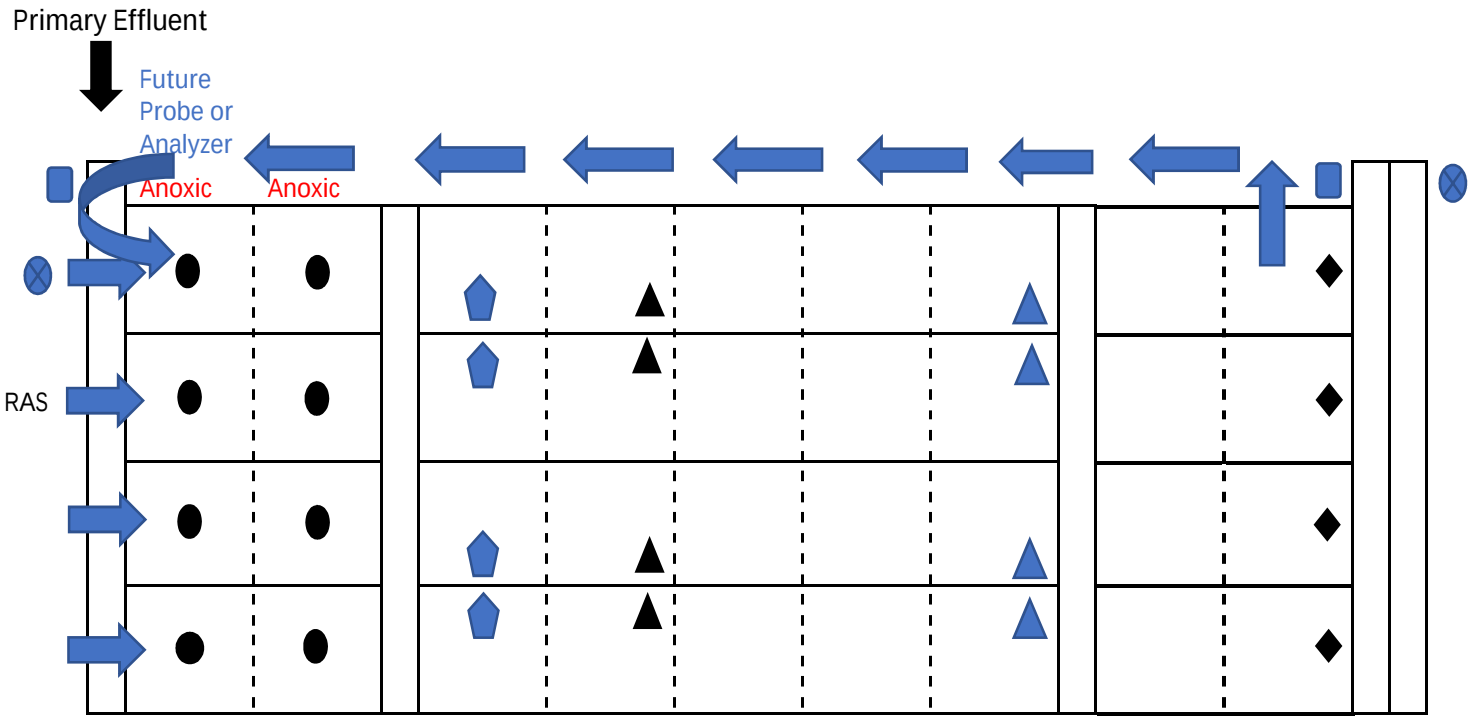
Check nutrient balance in aeration basin between nitrogen, phosphorous, and potassium to determine if correct.

Do a DO cross section of the aeration basins to determine the optimum locations to install the DO probes.

Selective Plant Process Evaluation – Phase 2

We have run the first phase of our pilot project for approximately 5 months. As stated before, our plan was to test the current plant aeration process to see what modifications could be quickly done to move the plant to complete nitrification/ denitrification with the least cost and the most rapid modification if the SWRCB placed in our NPDES permit the requirement to remove ammonia from our plant effluent. We have determined that modifications can be made to the plant aeration systems to bring about ammonia reductions. We have seen ammonia limits averaging below 2.0 mg/L. Now we must determine what modification will bring about the most consistent and stable operations.

In this phase, we are going to modify Aeration Basin No. 4 to a Single Sludge Pre-Anoxic Zone configuration. We will run a temporary Nitrate recycle pipeline from the last aerobic zone in Aeration Basin No. 4 outside the tank around to the front anoxic selector close to the discharge of the RAS into the tank. This will return the highly nitrate laden water to the anoxic zones in the front of the basin for greater denitrification to take place. From phase 1 testing we know nitrification/ denitrification is taken place in the aeration basin but not as extensively or consistently as we need it. This modification should improve the facility nitrification/ denitrification. We will increase the SRT to greater than 10 – 12 days, set the RAS rate to greater than 100%, and then set the internal recycle rate to between 200 – 400%. While making these process modifications, we will increase the aeration basin dissolved oxygen to >2.0 mg/L base load to improve the nitrification taking place in the aerobic zones of the Aeration Basin No. 4.



SYMBOLS KEY:

Current Anoxic Mixers 

Current DO Probes 

Current ANISE Probes 

Future NH3 Probe  (Possible PO4 Analyzer if must remove Phosphorous)

or Analyzer

Future NISE Probe 

(On RAS Pipeline)

Future DO Probes 

Future SS Probes 

Study Plan

1.) Evaluate current data and run background information. Continue monitoring NH3, NO3, pH, Alkalinity, Dissolved Oxygen data. Continue the following:
   a.) Aeration Basins No. 3 and 4 Influent – NH3, NO3, pH/Alkalinity, PO4; RAS Influent – NO3
   b.) Influent to First Aerobic Zone – TSS (MLSS)pH/Alkalinity; Effluent – DO, Microscopic examination
   c.) Final Aerobic Zone Effluent (Before final aerobic zones) – NH3, NO3, PO4
   d.) Plant Influent flow in MGD
   e.) Return and Waste Activated Sludge flow in MGD
   f.) SVI data
   g.) MCRT, days
   h.) Sludge blanket levels in secondary clarifiers

2.) Test other process changes if the above does not resolve NH3 problem:

   Install baffles between zones with mixers in the anoxic zones.

   Check nutrient balance in aeration basin between nitrogen, phosphorous, and potassium to determine if correct.

   Do a DO cross section analyze of the aeration basins to determine the optimum locations to install the DO probes.

3.) Complete a report itemizing any additional instrumentation that is need and any additional process modification that might be needed to develop complete, consistent, and reliable nitrification/ denitrification.

Dave Commons