

Director of Compliance and Innovation Report

January 24, 2024

Plant Loading, CSO Report, and Director's Notes

Plant Influent Report:

Biochemical Oxygen Demand, 5-Day (Avg. 46005 lbs/day)	72 percent of design
Total Suspended Solids (Avg. 59962 lbs/day)	55 percent of design
Average Daily Flow (30.99 million gallons/day)	76 percent of design
Maximum Daily Flow (45.94 million gallons/day)	37 percent of design

Plant Influent Total Monthly Flow (million gallons) for November	797.69
Estimated Unbilled Total Monthly Flow (million gallons)	137.92
Total Monthly Precipitation (inches)	1.13

Plant Effluent Report:

Parameter	Report Frequency	Permit Limits	Reported Values	Violations
CBOD ₅ , mg/L	Mo./Wk. Avg	20/40	2/2	0
TSS, mg/L	Mo./Wk. Avg	25/45	4/8	0
NH ₃ -N, mg/L	Mo. Avg/Daily Max	1.5/3.0	0.12/0.12	0
DO, mg/L	Mo. Avg/Wk. Avg/Daily Min	6.0/4.5/4.0	8.34/8.31/8.09	0
pH, S.U.	Daily Min/Max	6.0/9.0	7.92/8.26	0
Total Nickel, mg/L	Mo. Avg	0.0381	0.013	0
Cl ₂ Residual, mg/L	Daily Max	0.05	NA	NA
Fecal Coliform CFU/100mL	Daily Max	400	NA	NA

CSO Report:

Location	Events	Est. Total Duration of Discharges (hrs.)	Discharge (million gallons)
Oakland Avenue (Outfall 003)	1	4.25	0.83
Lincoln Park (Outfall 004)	0	0	0
McKinley Avenue (Outfall 007)	1	6.6	1.28
Seventh Ward (Outfall 008)	1	3.5	4.62

Director's Notes:

Land Application Program:

Land Application went well this year with minimal downtime due to weather or breakdowns. 21,004,638 gallons were applied to ten fields over a 27-day period.

Compliance Reporting:

Annual Financial Report was submitted to IEPA
Letter discussing feasibility of a 0.5 mg/L Phosphorus limit in 2030 was sent to IEPA
Monthly reporting of DMRs

Operations, Laboratory, and Pretreatment Activity Reports – December/January 2024

Operations Activities:

Normal operational activities were conducted as prescribed by standard procedures or in response to conditions within the plant. These include operating, monitoring, and adjusting facility equipment, performing process control testing, records keeping, and coordination with the other departments to realize optimal performance of the Plant.

- 1) Digester #3- Digester was been put back online after making manufacturer's recommended adjustments. The oil foaming and overflowing reappeared and we are waiting for additional instruction from the manufacturer.
- 2) Digester #2- Operators have removed all the sludge that they can. Maintenance will finish pumping sludge to digester #3 when the mixer issues are resolved and mixing resumes.
- 3) Digester # 4 – Jarvis was on site to replace the sludge tubes. Digester is back on line.
- 4) Operations staff continue to actively address PMs as time, workload, and staff levels allow.
- 5) Operations staff continue to assist contractors regarding the Frac tank and Grit system replacement.

Laboratory Activities:

Routine:

A total of 1,596 analyses were performed in the laboratory during the month of December 2023.

Monitoring of treatment plant, industrial users, and receiving stream samples for compliance purposes and process monitoring continued. Laboratory personnel continued to perform additional background nutrient monitoring to help fully characterize the nutrient loading on the plant.

Non-Routine:

- 1) The SDD laboratory continued to send samples of raw influent twice a week throughout the month of December 2023 for the "COVID-19 in Wastewater" study funded by the Illinois Department of Public Health. A Zoom call was held on December 1, 2023, with the study participants and the researchers to discuss the results of the study thus far.
- 2) Keith Richard attended the Illinois Water Environment Association (IWEA) Executive Board and Committee Chair Meeting at Starved Rock Lodge on December 1, 2023. The group meets quarterly to discuss current and upcoming activities of the IWEA and its committees. Keith continues to serve as the Chair of the IWEA Laboratory Committee.

- 3) The annual fume hood airflow verifications were conducted on December 7, 2023. The airflow was measured in all nine fume hoods in the lab using a vane anemometer to verify that the hoods are working properly to exhaust fumes from the lab. All nine hoods were functioning well above the OSHA recommended minimum fume hood face velocity of 100 feet/minute (FPM).

Pretreatment Activities:

Pretreatment - General Activities:

- 1) Pretreatment personnel monitored five commercial and industrial users (IU) during December 2023. Three industry site inspections took place during December.
- 2) There were no waste hauler permits issued in the month of December.
- 3) All but one of the 2023 IU inspections were able to be completed. **Graham Welding** was not able to be contacted and has not responded to any calls or letters from the District. **Graham Welding's** current status is unknown.
- 4) This was the first month that **Primient** was under their new penalty structure. They had only 1 violation, completing 1 month of the required 3 consecutive months with no more than 3 violations. Following successful completion of the 3 month period, their penalty structure will revert back to the structure set in EO 18-003.

Pretreatment Ordinance - Verbal Notices:

The SDD issued a total of 2 Verbal Notices to **Primient** and **ADM** in December 2023:

1. 12/14/2023 - **ADM** was issued a verbal notice and \$1,000 fine for violating their TSS limit of 46,704 pounds. **ADM** discharged a total of 51,153 pounds, with the majority coming from the West Plant.
2. 12/22/2023 - **Primient** was issued a verbal notice and \$1,000 fine for violating their BOD limit of 24,225 pounds. **Primient** discharged a total of 27,186 pounds.

Pretreatment Ordinance - Warning Notices (WN):

No Warning Notices were issued during December 2023.

Pretreatment Ordinance - Notices of Violation (NOV):

No Notices of Violation were issued during December 2023.

Pretreatment Ordinance - Executive Orders:

No Executive Orders were issued during December 2023.

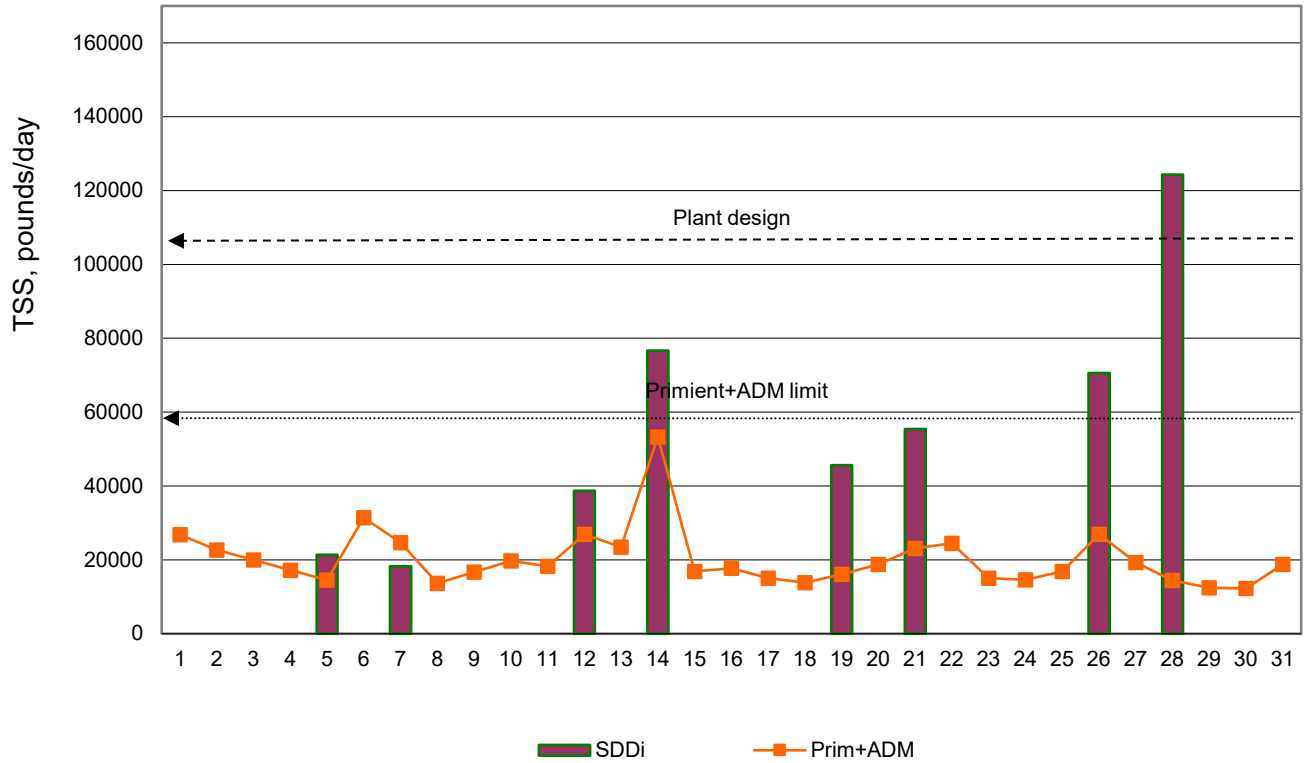
Pretreatment Ordinance - Penalty Assessments:

The following industrial penalties were assessed for December 2023:

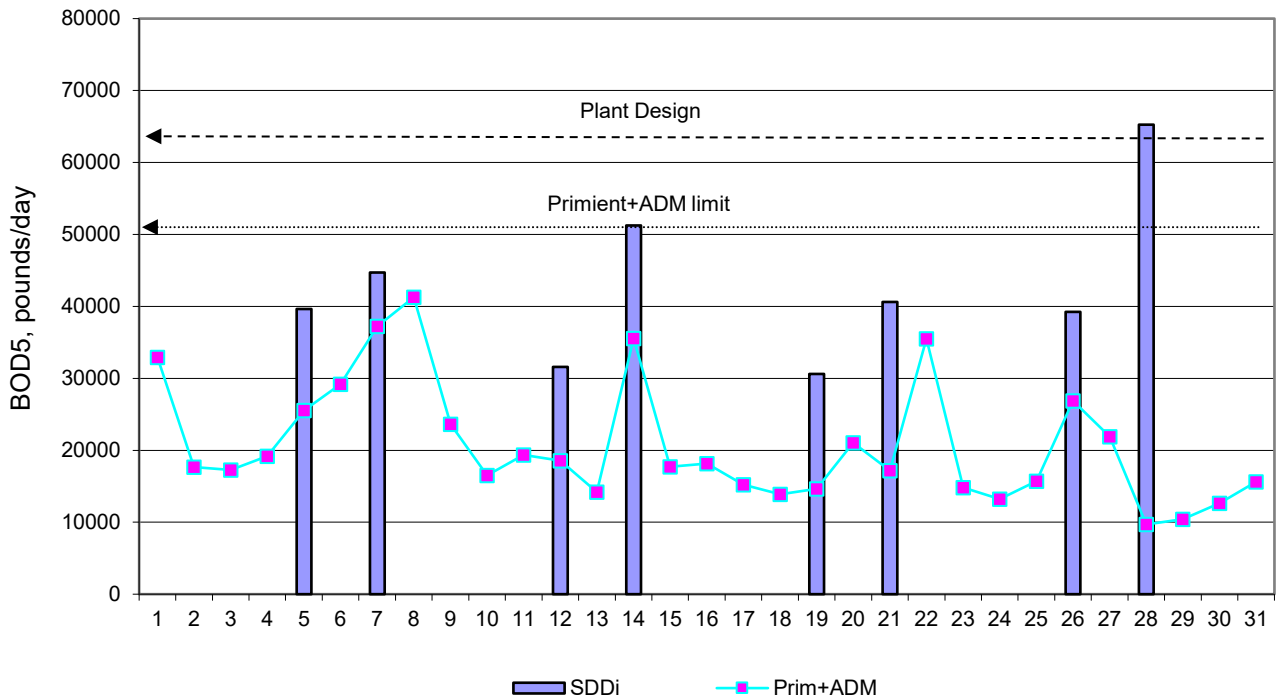
- | | |
|--------------------|----------------|
| 1) Primient | \$1,000 |
| 2) ADM | \$1,000 |

Plant Operating Graphs:

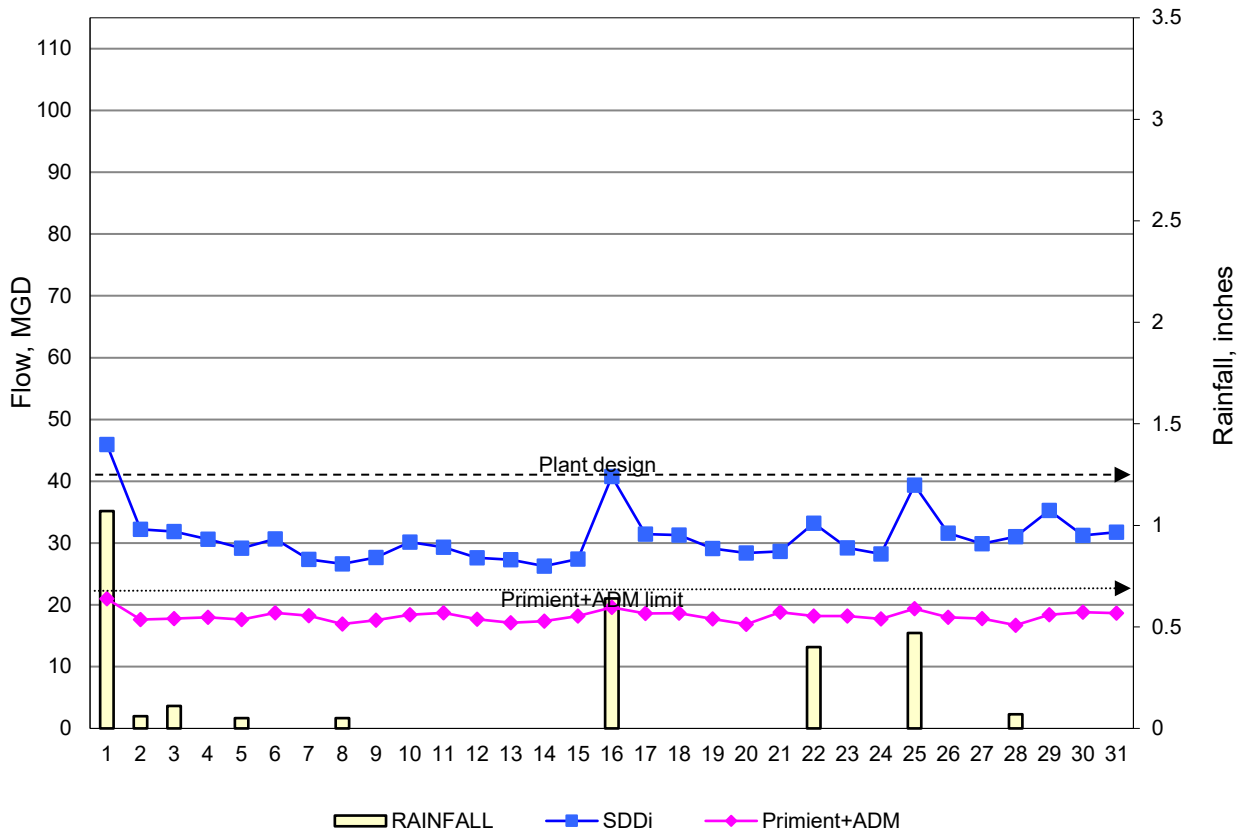
TSS Comparison: SDD Inf Primient+ADM Discharges



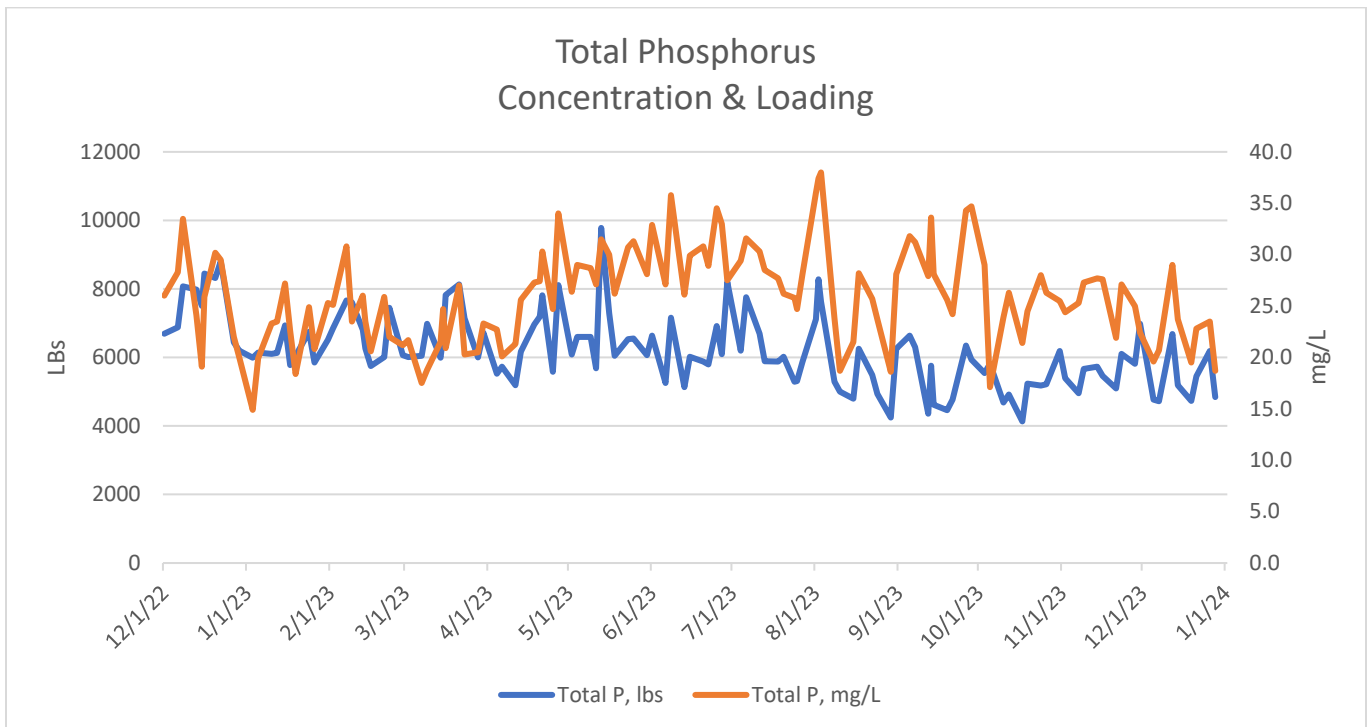
BOD Comparison: BOD Inf vs. Primient + ADM Discharges



Flow Comparison: SDD vs. Primient + ADM Discharges and Rainfall

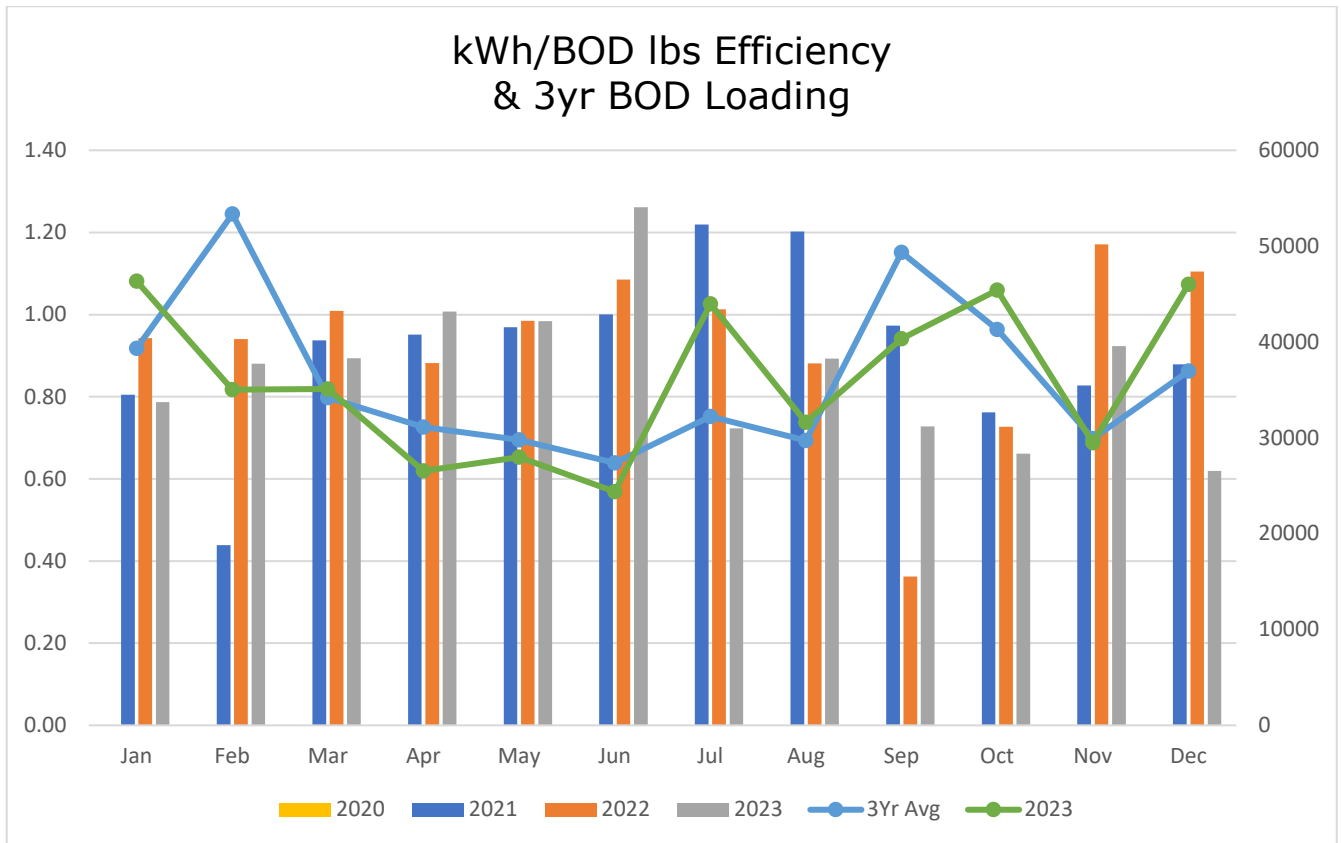
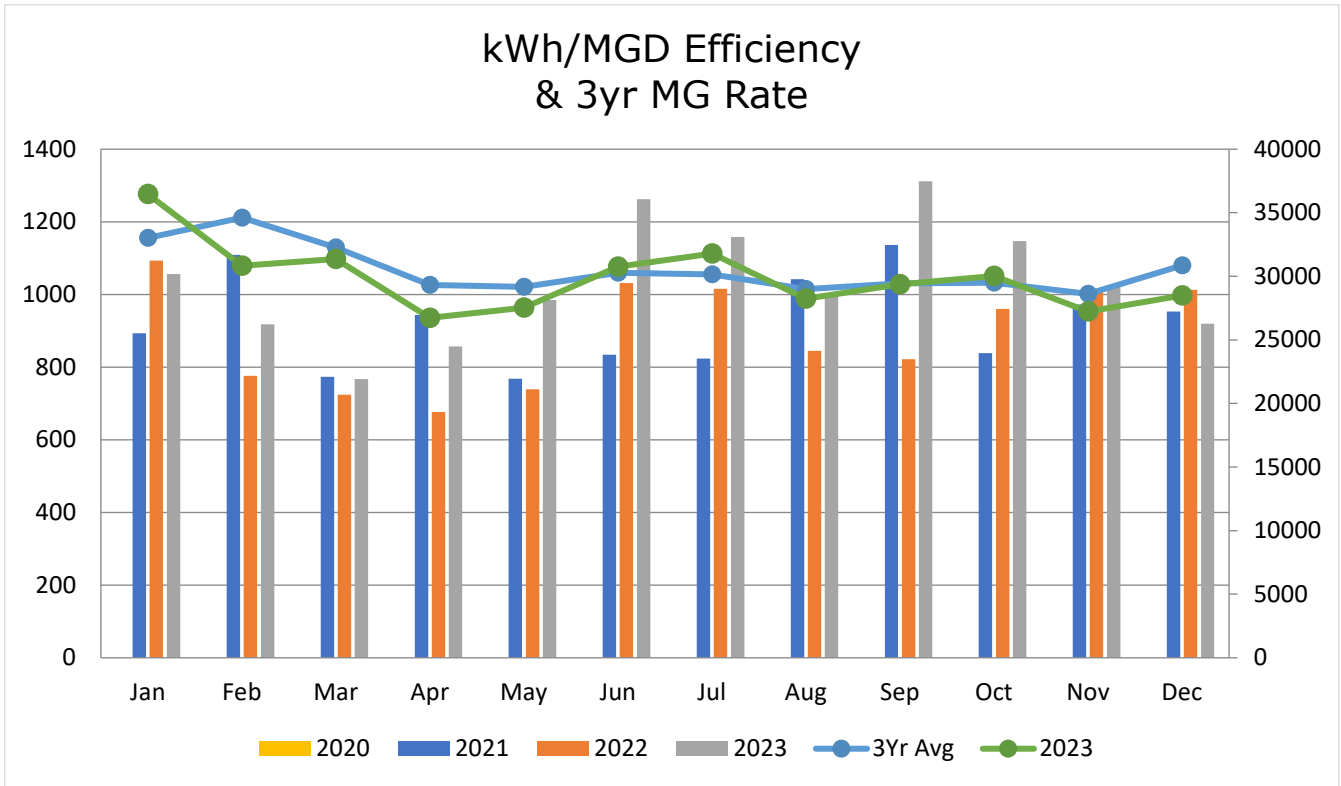


Phosphorus Tracking Graph:



Plant Efficiency Graphs:

December 2023



**Sanitary District of Decatur
Nutrient Program Management Report**

January 17, 2024

During the month of December District personnel attended meetings with members of the Black & Veatch Team to affect progress in nutrient reduction planning and activities.

Currently, activities continue to surround the gathering and sharing of data and information so that all parties can assist in how to move the projects forward as efficiently as possible. In the month of December, the District continued to gather and forward all requested industrial special sampling lab results and plant performance data as requested by the B&V.

B&V has continued the development of their full facility model, continued to develop aged infrastructure evaluation including reviewing evaluation with District staff. In addition, B&V continued to assistance with construction phase services of the Frac Tank Pilot Study including leading the construction progress meetings.

Below you will find a list of the actual meetings conducted in chronological order. The information covers the subject, date, and agenda items of each meeting. Additional information related to any of these meetings or specific agenda items can be supplied to the Board upon request including meeting minutes and documentation used during the meeting as it is all being stored as part of the permanent record.

Nutrient Reduction Program Meetings Conducted during December 2023

<u>Subject</u>	<u>Date</u>	<u>Agenda Items</u>
Fermentation Reactor Pilot Construction Progress Meeting	12/05/2023	<ol style="list-style-type: none"> 1. Submittal Status 2. Status of Owner Supplied Equipment 3. Request for Information 4. Work Change Directive / Change Orders 5. Pay Applications 6. Construction Schedule/Activities 7. Additional Questions / Discussion 8. Next Meeting
Nutrient Program Management Bi-weekly Meeting	12/06/2023	<p><i>Objective:</i> Provided Status Update on Program Tasks</p> <ol style="list-style-type: none"> 1. Frac Tank Pilot 2. Power BI 3. Pretreatment Program Update 4. PDOP/Annual Progress Report 5. Watershed Services 6. Aging Infrastructure <p>WRRF Upgrade Plan</p>
Fermentation Reactor Pilot Construction Progress Meeting	12/19/2023	<ol style="list-style-type: none"> 1. Submittal Status 2. Status of Owner Supplied Equipment 3. Request for Information 4. Work Change Directive / Change Orders 5. Pay Applications 6. Construction Schedule/Activities 7. Additional Questions / Discussion 7. Next Meeting

**Sanitary District of Decatur
Watershed Management Report**

January 17, 2023

During the month of December District personnel attended meetings with members of the Black & Veatch and Geosyntec Teams to affect progress in meeting the NARP requirements as listed in the NPDES permit as well as moving forward on the formation of a future watershed workgroup for the Middle Sangamon River.

Recent activities pertained to items necessary to complete the NARP Study. Foremost in these efforts included Geosyntec continuing their Instream modeling efforts and the completion of baseline scenarios as well as potential watershed management scenarios and alternatives. This month focused on results of alternative scenarios evaluations while receiving District feedback.

Below you will find a list of the meetings conducted. The information covers the subject, date, and agenda items of each meeting. Black & Veatch provided a written summary. Additional information related to any of these items can be supplied to the Board upon request including meeting minutes and documentation used during the meeting as it is all being stored as part of the permanent record.

Watershed Management Meetings Conducted during December 2023

<u>Subject</u>	<u>Date</u>	<u>Agenda Items</u>
Watershed Services Bi-weekly Meeting	12/13/2023	Objective: Update of Modeling for Alternative Scenarios. Modeling results of river response under 1.0 mg/L total phosphorus, 0.5 mg/L total phosphorus and reduced flow from water reuse at industries.



January 3, 2024

Sanitary District of Decatur (SDD)
501 Dipper Lane
Decatur, IL 62522

Nutrient Program Manager
BV Project No. 411502

Attention: Don Miller, P.E., Director of Engineering
Subject: SDD Nutrient Program Management
December Monthly Progress Update (December 1, 2023 – December 31, 2023)

Dear Mr. Miller:

This letter summarizes the work associated to the SDD Nutrient Program Management project for services from December 1, 2023, through December 31, 2023.

1. Program Management, Administration, and Coordination
 - Conducted bi-weekly program conference calls to update progress and discuss key issues.
 - Provided Monthly Project Update.
 - Provided ongoing management of the project including program management, preparation/monitoring of the program schedule and budget as well as program administrative duties.
 - Updated Power BI dashboard with most recent plant monitoring data.
 - Supported and reviewed NPDES permit questions; developed language for an extension to file an exemption.
 - Initiated preliminary financial assistance considerations.
2. Pretreatment Program Update
 - Continued to evaluate special sampling data
 - Continued to update the full facility process model with the industrial special sampling results.
 - Completed incorporation review comments to finalize the Industrial Pretreatment Analysis Report.
 - Submitted draft report on December 20, 2023.
3. Phosphorus Discharge and Optimization Plan (PDOP)
 - No Services were completed this period.
4. Watershed Support Services
 - Conducted bi-weekly progress update meeting.
 - Geosyntec continued to refine the Instream Model providing a review summary of the results of baseline and alternative scenarios of the Instream model.
 - Geosyntec presented/reviewed the results of the final scenarios and further determine if there are sufficient scenarios to address concerns and determine next steps for model development

- Continued initial planning efforts for the Watershed Group formation development.

5. WRRF Upgrade Plan

- Aged Infrastructure Evaluation
 - Continued to develop rating score for each asset evaluated to determine criticality and timing of upgrades.
 - Completed summarizing structural assessments and incorporate into overall aging infrastructure evaluation.
- Plant Facility Evaluation
 - Continued detailed modeling efforts to evaluate and provide whole plant process model simulations related to the alternatives identified for nutrient removal.
 - Continued development of upgrades needed for each unit process to meet nutrient limits including multiple plant loading scenarios which will be considered to identify improvement costs for ADM and Primient.

6. Pilot and Demonstration Testing

- Prepared for and conducted the Construction Progress Meeting with Burdick (Contractor).
- Continued to prepare Pilot Testing Plan

FRAC TANK PILOT PROJECT SCHEDULE	
MILESTONE/ACTIVITES	DATE
Bi-weekly Construction Progress Meetings	August – December 2023
Early Receipt of Pre-purchased Equipment Primary Sludge Pumps Big Bubble Mixing Frac Tank	November 2023
Substantial Completion (pending equipment delivery times)	December 2023
Final Completion	January 2023

Please feel free to contact me with any questions, comments or if you need additional information.
Sincerely,

Bently Green, P.E.
Project Manager, Black & Veatch

Enclosure(s): SDD Nutrient Program Manager Schedule and Anticipated Cost Forecast

Project: Nutrient Program Management - 010224

Activity Name	Completion %	Start	End	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01000 Work's Notice Order	100%	15	22-Mar-23 A																																				
01000 Work Not Started/Submitted to 100	100%	16	22-Mar-23 A																																				
01000 Work Notice P/O	100%	16	22-Mar-23 A																																				
01100 Advertise for Bid	100%	16	22-Mar-23 A																																				
01110 Bid Opening	100%	16	22-Mar-23 A																																				
01120 Bidding	100%	16	22-Mar-23 A																																				
01130 Range of Price Received Equipment	100%	16	22-Mar-23 A																																				
01140 Bidder/Not Completion	0%	16	22-Mar-23 A																																				
01150 Bid Completion	0%	16	22-Mar-23 A																																				
Conceptual Design Development and Detailed Design Support Services	100%	16	22-Mar-23 A																																				
40000 Bid and Bidding Services	0%	16	22-Mar-23 A																																				

Todd D. Archer, PE

Environmental Engineer

Mr. Archer is an environmental engineer with 15 years of experience analyzing water and wastewater treatment processes, plant needs, and has worked on projects involving lift stations and pipeline design. He has served as a project engineer, task leader, project technical lead, and project manager on a variety of water related projects. Mr. Archer has extensive experience writing technical memorandums, conducting planning for treatment plants, developing designs and writing specifications. Has supervised team of water professionals and served as a mentor and coach ranging from recent graduates to seasoned professionals. Currently a member WEF, KWEA, and MWEA. In the past, I have held leadership positions with MWEA, Engineers' Club of St. Louis, and past-President of the Gateway Chapter of Engineers' Without Borders. Been a member of KWEA Collection Systems and MWEA Stormwater Committees. Proficient in full suite of Microsoft software, including Microsoft Projects and Bluebeam studio.

Wastewater/Disinfection

Engineering Manager, Disinfection Evaluation and Design, Downriver Utility Wastewater Authority, Wyandotte, Michigan. The Downriver Utility Wastewater Authority's existing UV system (rated capacity of 175mgd, 225mgd hydraulically) reached the end of its' service life and solicited engineering services for a disinfection evaluation and design.

Mr. Archer led the disinfection evaluation of alternatives which consisted of a screening analysis to consider a large number of established and emerging disinfection alternatives and development of a short-list of viable alternatives. Todd supported BV's disinfection expert in performing bench-scale testing of viable disinfection alternatives which included UV, chlorine (hypo), and peracetic acid. Todd co-authored the disinfection evaluation report which recommended to replace the existing UV system with another UV system capable of disinfecting up to 225 mgd. Todd also discussed the various number of procurement approaches available to the client and worked to develop an approach that best fit the client's needs. Todd then led the development of the construction documents for the replacement UV system.

Engineering Manager, North Topeka BNR Improvements, Topeka, Kansas. The City of Topeka was under a consent decree to meet nutrient limits of 10/1 for total nitrogen and phosphorus. The City retained Black and Veatch to lead the process modeling and then continue with design of the selected alternative which consisted of a SND race-track type design, retro-fitted into the existing aeration basins. This was challenging due to the large and square shape of the basins. Black and Veatch utilized CFD analysis to confirm adequate flow dispersion and mixing was obtained throughout all areas of the basins.

Engineering Manager, Water Reclamation Facility Effluent Pump Station Design, Des Moines, Iowa. The Water Reclamation Authority (WRA) in Des Moines, Iowa needed an effluent pump station designed to discharge treated effluent during high river levels so

Education

BS – Civil Engineering,
Southern Illinois
University Carbondale,
2008

Registration

Professional Engineer:
Missouri (2013)

WRA retained Black and Veatch to design the effluent pump station, while also providing provisions for future disinfection upgrades to work with the pump station.

Engineering Manager, Sioux City UV Disinfection Improvements, Sioux City, Iowa. The City of Sioux City's existing sodium hypochlorite/sodium bisulfite disinfection process had aged and as a result, the City was seeking to convert to UV disinfection. The City retained Black and Veatch to analyze UV alternatives, support equipment selection through a competitive bidding process, and perform detailed design.

Mr. Archer was the engineering manager and oversaw the UV equipment alternative evaluation and the primary author for the UV equipment procurement bid documents. The competitive bid process required extensive coordination with the City's procurement department, UV system suppliers, and the City's management team to ensure all parties were aligned. Mr. Archer conducted the competitive bid analysis based on a 20-year lifecycle cost analysis and recommended the system that represented the lowest cost alternative to the City. Currently the project is finalizing the bid evaluation and will be moving into detailed design.

Engineering Manager, Trinity River Authority Denton Creek Regional Wastewater System, Denton, Texas. The Denton Creek Regional Wastewater System had exceeded its rated capacity and facility wide improvements project was required to meet the needs of the community.

Mr. Archer was the engineering manager for the UV disinfection system. His task consisted of developing a detailed design for the UV system for secondary discharge requirements and also providing accommodations for the UV system to provide future reuse capability for the future. Specific tasks on this project consisted of the following: preparation of the UV equipment preselection bid documents; evaluation, summary, and recommendation of the preselected UV system for detailed design; development of design drawings, development of related design specifications, including construction sequencing. The general contract for this project will be advertised in February 2024.

Project Technical Leader, Springbrook Water Reclamation Center Disinfection Evaluation, Naperville, Illinois. The City of Naperville had an aging sodium hypochlorite/sodium bisulfite disinfection process that serviced the north and south facilities at their Springbrook Water Reclamation Center (SWRC) therefore they retained the consultant to perform a disinfection alternative evaluation.

Mr. Archer served as the technical lead and oversaw the alternative evaluation, which included a cursory evaluation of both mature and innovative disinfection technologies, review of historic plant data, development of a sampling plan to generate additional UVT and undisinfected bacteria data, and a life-cycle and non-cost evaluation of updating the sodium hypochlorite/sodium bisulfite systems, utilizing separate UV systems at both the north and south facilities, and utilizing a combined UV system. The evaluation was documented in a TM, and findings were presented to the City during a workshop. The evaluation found that a combined UV system met the City's cost and non-cost needs. The City has extended the consultant's contract to include the pre-selection and design of the new UV system, where Todd will provide technical guidance to the design team and will review documents produced.

Project Technical Leader, CSO Disinfection Study, Auburn, New York. The CSO study evaluated the City's four CSO treatment facilities and the storage and release facility. The facilities were constructed in the mid-1990s and some of the equipment and appurtenances are reaching the end of their useful life. The Assessments for civil, site, process/mechanical equipment, structural, HVAC, plumbing, electrical and controls were completed and recommendations for improvements with a phased project schedule to upgrade facilities were developed.

Mr. Archer served as the technical lead for the bench scale study comparing the use of sodium hypochlorite and peracetic acid (PAA) for the CSOs. This consisted of developing a testing plan, coordinating with the laboratory performing the analysis, reviewing and analyzing the bench scale results, and summarizing the findings in writing for the final recommendation.

Project Manager, Linden Roselle Sewerage Authority (LRSA), UV Replacement, Linden, New Jersey. LRSA's existing UV disinfection system was installed in the late-1990s and some of the equipment and appurtenances have reached the end of their useful life. The consultant was scoped to assess the existing disinfection system and facility for civil, site, process/mechanical equipment, structural, HVAC, plumbing, electrical and controls. Upon completion of the assessment, it was recommended to replace the existing UV disinfection system.

Mr. Archer served as the project manager for UV equipment procurement and design. This consisted of developing a procurement strategy that adhered to New Jersey's and LRSA's procurement requirements. Upon procuring the UV equipment, the UV equipment would be designed around the selected system with the general construction contract including a defined scope and fee for the UV equipment.

Project Engineer, Master Plan Update, Great Lakes Water Authority, Detroit, Michigan. The Great Lakes Water Authority operates a large WWTP with a wet-weather treatment capacity of 1,660 million gallons per day. During dry-weather flows, treated effluent is discharged through the Detroit River Outfall, typically up to 900 mgd. During wet-weather flow events, the Rouge River Outfall is utilized to pass treated effluent through the WWTP, up to 800 mgd. A master plan update for the facility was scoped to evaluate major processes within the WWTP.

Mr. Archer's role was the task lead for the disinfection systems. The gaseous disinfection system for the DRO was being updated with new chlorinators and sulfonators and the RRO had just constructed a new sodium hypochlorite and sodium bisulfite feed systems. Evaluated alternatives considered conversion solely to UV, converting the DRO (dry-weather) flows to UV and maintaining chemical disinfection for wet-weather flows. Given the uncertainty of future regulations and the recently upgraded disinfection facilities, it was recommended the disinfection system be evaluated again as the disinfection systems were nearing their end of life (approximately 10- to 15-years) from the Master Plan update.

Project Engineer, Nelson Complex Chemical Disinfection Improvements, Johnson County Wastewater, Kansas City, Kansas. The facility's existing medium pressure UV system was failing, so the consultant was tasked with designing improvements to the

backup chemical disinfection feed system. Mr. Archer led the design of the new disinfection system which included installing four new sodium hypochlorite bulk storage tanks within the existing facilities, developing a design and construction plan to maintain operation of the WRRF during construction, coordinating with the other engineering disciplines, and developing specifications and drawings for construction.

Project Engineer, Piqua WWTP Upgrade and Expansion Project, Piqua, Ohio.

Mr. Archer was the project engineer for the conversion of the existing chlorine gas and sulfur dioxide system to a new, 21.5 mgd, low pressure, high output (LPHO) high wattage UV system. This effort included sizing the UV equipment; generating UV equipment and piping layout options; developing 20-year net present worth costs for each UV manufacturer and pre-selecting the UV equipment through a competitive proposal process; coordinating with the other disciplines; and developing specifications and drawings for construction.

Project Engineer, Nelson Complex Wastewater Disinfection Pilot, Johnson County Wastewater, Kansas City, Kansas. Mr. Archer designed and coordinated a UV disinfection pilot at Nelson Complex treatment facility. He was responsible for designing the pilot study and data collection. He also analyzed the data and made recommendations for full-scale implementation.

Project Engineer, Nelson Complex Disinfection Facility Plan, Johnson County Wastewater, Kansas City, Kansas. Mr. Archer evaluated the disinfection system at Johnson County Wastewater's Nelson Complex and was the primary author of the Disinfection Facility Plan. The work involved reviewing historical performance of the disinfection system, interviewing operations staff, and identifying possible reasons for the unreliable performance of the existing UV system. This work consisted of two bench scale studies with different coagulants and disinfectants to determine optimal treatment for secondary effluent, to meet permit requirements. Mr. Archer assisted with the study design, lab operations, data analysis, and reporting. This information was ultimately used to develop a 20-year net present value for the viable disinfection alternatives.

Project Engineer, Preliminary Engineering Report, Great Lakes Water Authority, Detroit, Michigan. The Great Lakes Water Authority operates a large WWTP with a wet-weather treatment capacity of 1,660 million gallons per day. During dry-weather flows, treated, and disinfected, effluent is discharged through the Detroit River Outfall. Disinfection occurs by chlorine gas and dechlorination is by sulfur dioxide gas. During wet-weather flow events, the Rouge River Outfall is utilized to pass treated effluent through the WWTP, although it was undisinfected. A preliminary engineering report was written to evaluate disinfection alternatives for disinfecting wet-weather flows discharged through the Rouge River Outfall.

Mr. Archer was the task lead for the disinfection evaluation at the Great Lakes Water Authority's Rouge River Outfall. This included alternatives to chlorinate and dechlorinate with the existing disinfection feed equipment, constructing a new dedicated RRO disinfection facility, and disinfection with UV. The preliminary evaluation recommended to proceed with a dedicated RRO Disinfection Facility. Given the cost to construct a dedicated chlorine contact tank though, a physical model was created of the Rouge River Outfall discharge conduits to be utilized in developing a contact time (CT) disinfection approach.

Project Engineer, Wastewater Disinfection Evaluation, Arlington County Water Pollution Control Plant (WPCP), Arlington, Virginia. Mr. Archer evaluated various disinfection alternatives, which included bulk sodium hypochlorite, peracetic acid (PAA), UV, and ozone. He summarized current and future regulatory drivers (e.g. bacteriophage as a disinfection indicating organism) for disinfection, evaluated the WPCP's effluent data, developed a 20-year net present value cost, and a non-cost evaluation to recommend the preferred disinfection alternative for the client.

Project Engineer, Facility Plan, Water Pollution Control Plant (WPCP), Council Bluffs, Iowa. Mr. Archer assisted in developing a facility plan with the primary task being a stress test on the biological process to evaluate the WPCP's treatment capacity. Mr. The master plan update addressed treatment options at the plant, future flows, emerging effluent issues, and evaluated disinfection alternatives. Mr. Archer's responsibilities included evaluating historical effluent data and writing technical memoranda.

Task Lead, JBLM WWTP, U.S. Army Corps of Engineers, Seattle District. As part of this the consultant design/build construction project, Mr. Archer was task manager for the design of a new UV disinfection facility. The UV disinfection facility consisted of three channels and was designed to disinfect secondary, tertiary, or a combination of secondary and tertiary water. The design also incorporated elements that would allow the UV system to produce reuse quality effluent in the future. Plant start-up occurred in the Fall of 2016.

Process Lead, Dewatering Equipment Pilot Study, City of Macon, Missouri. Mr. Archer was the process lead for the dewatering equipment pilot study at the City of Macon's WWTP. The City utilized 40-year-old vacuum coil filter dewatering equipment to dewatering a blend of raw primary and trickling filter biosolids. With the equipment at the end of its useful life, Mr. Archer assisted the City through a pilot study process where a screw press, volute press and rotary fan press were evaluated at the WWTP over the course of three days. Tests were performed to check maximum solids throughput, hydraulic throughput and cake solids with raw biosolids and lime conditioned biosolids. The study results were summarized in a report that compared the capital and operations & maintenance costs, and the non-cost factors for each type of dewatering equipment evaluated, as well as provide a recommendation on whether to continue conditioning the biosolids with lime prior to dewatering. Mr. Archer was responsible for coordinating with various equipment manufacturers to oversee the operation of the pilot equipment, and for developing the life cycle costs and non-cost factors for each dewatering equipment evaluated.

Project Engineer, Confidential Client, Houston, Texas. Mr. Archer evaluated various disinfection alternatives, which included bulk sodium hypochlorite, peracetic acid (PAA), UV, on-site generation of sodium hypochlorite, and ozone. He recommended a disinfection alternative to be implemented and his responsibilities included evaluating the plant's effluent data to help determine the best disinfection option and authoring technical memorandum to convey the results of the evaluation. He also developed a 10-year NPV analysis of the disinfection alternatives, which was utilized in recommending a preferred disinfection alternatives for additional evaluation.

Project Engineer, Wastewater Treatment Master Plan, Piqua, Ohio. Mr. Archer participated in the updating the client's sewerage master plan. The master plan update

addressed treatment options at the plant, future flows, emerging effluent issues, and evaluated disinfection alternatives. Mr. Archer's responsibilities included writing technical memoranda and evaluating historical effluent data.

Project Engineer, Green Bay MSD (GBMSD) Wastewater Treatment Plant Facility Plan Update, Green Bay, Wisconsin. Mr. Archer assisted with writing a Disinfection Facility Plan for two facilities operated by GBMSD. The facility plan evaluated various disinfection alternatives, which included ferrate, peracetic acid (PAA), UV, sodium hypochlorite (bulk and onsite generation), and ozone, and recommended a disinfection alternative to be implemented. Mr. Archer's responsibilities included authoring portions of the facility plan, evaluating the plant's effluent data to determine the best disinfection option and preparing a technical memorandum to convey the results of the evaluation. He also developed a 20-year NPV analysis of the disinfection alternatives, which was utilized in recommending a preferred disinfection option.

Lead Process Engineer, Deer Park Wastewater Treatment Facility UV Disinfection System, Deer Park, Texas. Mr. Archer led the process design of a new 24-mgd UV disinfection system for the City of Deer Park. This included preliminary and detailed design.

Project Engineer, Regional Water System Improvements Preliminary and Final Design, Oak Lawn, Illinois. The \$1.5M project, included the expansion of two larger water storage and pumping facilities, the replacement of one booster pumping station (Booster Station 1) and the expansion of one booster pumping station (Booster Station 2). Mr. Archer designed an expansion to the existing chlorine gas feed system to boost chlorine residual, which was required due to construction of a new larger pump station.

Project Engineer, De Pere Wastewater Treatment Facility UV Disinfection System Expansion, De Pere, Wisconsin. Contract Value: \$390,000 (Construction - \$3.2M). For the Green Bay Metropolitan Sewerage District, Mr. Archer prepared preliminary and detailed design of a new UV disinfection system to replace existing disinfection system, which proved difficult by the upstream filters and the desire to locate the new UV within the existing chlorine contact tank.

Project Engineer, WWTP CSO Disinfection Project, Jacksonville, Illinois. Mr. Archer assisted with the design of retrofit improvements to the client's existing gas chlorine disinfection system. Mr. Archer developed specifications and assisted with development of the construction drawings. He also performed hydraulic calculations for the various flow scenarios.

Project Engineer, WWTP Improvements - Construction Phase Services, Chicago, Illinois. This \$228M construction project at the Calumet Water Reclamation Plant began in 2009 and was completed in 2012. Mr. Archer assisted with general services during construction of plant improvements for two wastewater treatment plants operated by the Metropolitan Water Reclamation District of Greater Chicago. Mr. Archer reviewed shop drawings, drafted file letters, responded to requests for information (RFIs), and performed monthly invoice checks for sub-consultants.

Project Engineer, Preliminary Engineering Report for Regionalization, Eastern Lincoln County, Missouri. Mr. Archer participated in writing a preliminary engineering

report for the client. Mr. Archer was responsible for writing the report, evaluating the various treatment alternatives for five separate communities, including developing planning level costs for three treatment alternatives.

Project Engineer, Regional Water Reclamation Facility Upgrades, Jefferson City, Missouri. Mr. Archer assisted with the design of an ultraviolet (UV) light disinfection facility and improvements to the headworks at the client's 60-mgd facility. Mr. Archer was the task leader for the headworks improvements, which consisted of replacing the manual bar screen, in the bypass channel, with a new mechanically cleaned screen. He developed the construction drawings and specifications for the mechanical bar screen, new screening conveyance system, and new screenings washer compactor. The design of the headworks improvements required coordination with other engineering disciplines. Mr. Archer also assisted with the design of the UV facility by reviewing construction drawings and specifications, and by evaluating constructability options.

Project Engineer, Macon Wastewater Treatment Plant UV Disinfection Design, Macon, Missouri. Mr. Archer designed the UV disinfection system for the 5.4-mgd wastewater treatment plant. He was responsible for soliciting cost proposals for use in calculating a 20-year net present value (NPV) analysis, which is a critical tool in selecting the proper UV system for the client. In addition, he is developing the process related specifications, including the low pressure, high output UV system, and preparing the process related construction drawings.

Project Engineer, Regional Water Reclamation Facility Master Plan Update Jefferson City, Missouri. Mr. Archer participated in the updating of the client's sewerage master plan. The master plan update addressed treatment options at remote facilities, headworks overflow issues, emerging effluent issues, and evaluated disinfection alternatives. Mr. Archer's responsibilities included writing technical memoranda for the evaluation of mechanical bar screens and an evaluation of data pertinent to the disinfection alternatives.

Project Engineer, Macon Wastewater Treatment Plant Facility Plan Update, Macon, Missouri. Mr. Archer assisted with updating the client's Facility Plan. The facility plan evaluated various disinfection alternatives, which included UV, on-site generation of sodium hypochlorite, and bulk delivery of sodium hypochlorite, and recommended a disinfection alternative to be implemented. Mr. Archer's responsibilities included authoring the facility plan, evaluating the plant's effluent data to help determine the best disinfection option and preparing a technical memorandum to convey the results of the evaluation. He also developed a 20-year NPV analysis of the disinfection alternatives, which was utilized in recommending a preferred disinfection option.

Project Engineer, Various Wastewater Lagoon Upgrades, Missouri. Mr. Archer prepared engineering reports for several lagoons owned by Aqua-Missouri that were submitted to the Missouri Department of Natural Resources. The reports evaluated treatment alternatives to bring the facilities into compliance with new effluent BOD, TSS, ammonia, and disinfection limits. The analysis considered cost and non-cost parameters, and recommended the most effective alternatives to the client. He also participated in meetings with the client and regulatory agency.

Conveyance Experience

Project Technical Lead, Cameron Great Northwest Wholesale Water Commission, Cameron, Missouri. The Great Northwest Wholesale Water Commission (GNWWC) was formed to address drinking water issues facing a 12-county area in northwest Missouri. These challenges include accessibility, drought, reliability, aging infrastructure, and financing of improvements. The consultant was selected to perform studies and evaluations for the development of a regional water supply for GNWWC, and to provide planning and design services for the necessary infrastructure improvement. Todd served as the Project Technical Lead for the design of approximately 36 miles of 16- to 18-inch transmission mains, a new booster pumps station, new ground storage tank, and a new elevated storage tank. This role consisted of overseeing the development of drawings, details, and specifications for the bidding documents.

Project Engineer, Southwest Missouri Regional Water Supply, U.S. Army Corps of Engineers, Kansas City District. The consultant is working with the USACE, MoDNR, and Southwest Water (formerly the Tri-State Water Resource Coalition) using Planning Assistance to States (PAS) funds to evaluate conceptual pipeline alignments and develop planning-level costs to provide water from Stockton Lake to Southwest Water member communities, which includes City Utilities of Springfield. Todd has been serving as a technical resource assisting with the preliminary design, cost estimating, and reviewing the rate study to estimate water rates for the Southwest Water member communities.

Project Technical Lead, Indian Creek Lift Station Condition Assessment, City of Cedar Rapids, Iowa. Mr. Archer provided engineering support and guidance during for an extensive condition assessment and study that developed a list of improvements for the existing 3-mgd Indian Creek Lift Station. This lift station is currently dedicated to pumping dry and wet weather flows and discharges from the major industrial companies located within the service area. A hydraulic analysis was performed to evaluate the existing pumps performance to meet future demands. For the condition assessment, several components of the facility were in poor condition due to the very high corrosive nature of the industrial wastewater. Recommendations for improvement were provided, along with a preliminary cost for the work.

Project Engineer and Project Manager, St. Louis MSD's Caulks Creek Force Main, St. Louis, Missouri. The consultant has designed two separate pressurized pipes for the St. Louis Metropolitan Sewerage District. Todd used WaterCAD software to model the existing pump system for a steady state analysis based on existing pump and force main data provided by the client. He then evaluated results of the various model scenarios and presented them in a clear and comprehensive manner for reporting purposes. Todd also has services as the project manager for these projects. A significant factor in successfully bidding these projects was resolving permitting issues. Todd held several coordination meetings between the client, and stakeholders (two levee districts, USACE, US Fish & Wildlife, Missouri American Water, and tele-communications companies) to discuss and resolve permitting concerns.

Project Engineer, Burt Izard Lift Station Improvements, City of Omaha, Nebraska. Mr. Archer performed a preliminary design recommendation for replacing existing slide

gates within flow diversion manholes approximately 50-ft below grade, replacing the existing overhead bridge crane with a crane with an acceptable level explosion-proof protection, and replacement of the hydraulically actuated grit basin covers.

Project Engineer, Missouri River Discharge Pipeline, Omaha, Nebraska. Mr. Archer assisted with the design of a replacement pipeline used to convey waste solids from the water treatment plant to the Missouri River. Mr. Archer developed the hydraulic model of the pipeline using WaterCAD. He then used the hydraulic model to assist with the pump selection. Mr. Archer also performed hydraulic calculations for flow conditions that could not be modeled.

Project Engineer, Pipeline Construction, Milwaukee, Wisconsin. Mr. Archer assisted with general services during construction of a landfill gas pipeline. Mr. Archer reviewed construction drawings and developed quantity takeoffs for various pipe installation techniques.

Project Engineer, Creve Coeur Creek (L-52) Pump Station Construction Phase, Maryland Heights, Missouri. Mr. Archer coordinated the general services during construction for an \$18M, 60 mgd pump station. He reviewed shop drawings, responded to requests for information (RFIs), and attended monthly progress meetings. He also produced an electronic operation and maintenance (O&M) manual for the Creve Coeur Creek pump station, which included compiling pump station equipment data and operational procedures, communicating with client operations management, and coordinating with the consultant's O&M manual team on the development of the electronic O&M manual.

Project Engineer, Creve Coeur Creek Forcemain, Maryland Heights, Missouri. Mr. Archer was responsible for preparing an accurate and detailed construction cost estimate. He was in contact with several disciplines to accurately prepare the construction cost estimate.

Project Engineer, Glaise and Rock Creek Combined Sewer Relief, St. Louis, Missouri. Mr. Archer authored a section in the preferred alternatives report that discussed cost effective and green alternatives the client can implement to reduce overflows. In addition, he reviewed the sewer line inspections, assisted with the stormwater modeling, and performed periodic field work to investigate watershed problem areas.

Drinking Water Experience

Technical Leader, USACE Kansas City District, Whiteman Air Force Base WTP Repairs Project, Knob Noster, Missouri. Mr. Archer was the project technical leader for the Whiteman Air Force Base WTP Repairs project. This project completed an overall condition assessment of the entire WTP and documented its key findings 4 weeks after the project started at a workshop to discuss the evaluated alternatives. Following this discussion, the consultant finalized this effort in a draft and final report for the US Army Corps of Engineers and US Air Force to obtain the requisite approvals to move into design. The design is expected to begin in January 2022. Todd's responsibilities included managing the individual engineering disciplines to ensure a thorough well defined solution was presented, while adhering to the client's schedule. He was also responsible for ensuring

the company's quality procedures were adhered to prior to releasing the deliverables to the client.

Project Manager, Missouri American Water (MOAW), Warrensburg WTP Groundwater Well Sampling Project, Warrensburg, Missouri. MOAW requested the consultant support them in continuing to evaluate the source of non-pathogenic, filamentous bacteria present within their source water. Mr. Archer was the project manager and technical lead for the project. His primary responsibilities included developing the sampling work plan, maintaining schedule, and coordinating with the client to keep them updated of project progress.

Project Manager, Warrensburg WTP Phosphate Feed System Replacement Project, Warrensburg, Missouri. Mr. Archer was the project manager for the replacement of the existing poly-phosphate feed system at the Warrensburg Water Treatment Plant. Todd coordinated feedback from MOAM's project manager and the WTP superintendent to implement a more compact, less costly, and easier system to operate than the system it replaced. The design was coordinated with MOAM on-call contractor as a de facto, design-build effort and the entire project was designed, procured, permitted and constructed within a 6-month project schedule.

Project Manager, Warrensburg WTP Source Water Study Project, Warrensburg, Missouri. Mr. Archer was the project manager for the Warrensburg WTP source water study which consisted of sampling each of the groundwater production wells which supply the source water to the WTP. Additionally, sampling was conducted at the WTP to identify a source for a non-pathogenic filamentous bacteria. Upon collection of these samples, additional lab work was done using a rapid small-scale column test to simulate granular activated carbon and sand filtration as treatment alternatives. The project summarized all of this work in a final report, which included planning level costs for each of the evaluated alternatives.

Project Engineer, Regional Water System Improvements Preliminary and Final Design, Oak Lawn, Illinois. The \$1.5M project, included the expansion of two larger water storage and pumping facilities, the replacement of one booster pumping station (Booster Station 1) and the expansion of one booster pumping station (Booster Station 2). Mr. Archer designed an expansion to the existing chlorine gas feed system to boost chlorine residual, which was required due to construction of a new larger pump station. This was especially challenging as the existing chlorine room had limited space and the building could not be expanded. Ultimately, the room was reconfigured with new scales for the 150-lb cylinders, evaporators, eductors, and diffusers to provide the design chlorine residual.

Task Leader – Risk & Resiliency Assessment & Emergency Response Plan, WaterOne AWIA Risk & Resiliency Assessment & Emergency Response Plan, WaterOne, Johnson County, Kansas. Mr. Archer is serving as the Task Leader for the Risk and Resiliency Assessment and Emergency Response Plan (ERP) to help guide WaterOne's AWIA response which requires public drinking water suppliers to assess the security and resiliency – both physical and cyber – of their systems in response to all "natural hazards" and other forms of "malevolent" acts. WaterOne serves customers across 17 cities, 272-

square miles, and approximately 425,000 customers. The project will also prepare an ERP that will be certified by the EPA.

Miscellaneous Experience

Project Engineer, the Attributes and Needs of the Water and Wastewater Infrastructure in the Bi-State St. Louis Region, Metro Water Initiative Partnership, St. Louis, Missouri. The Metro Water Initiative Partnership was formed by several member organizations and included: Missouri American Water, Illinois American Water, City of Kirkwood Water, City of St. Louis Water, Public Water Supply District No. 2, Metropolitan St. Louis Sewer District, and ASCE/EWRI St. Louis Chapter. Its primary objective was dedicated to advancing community conversations about the importance of investing in our region's water and wastewater infrastructure. A critical component of this message was the development of the Attributes & Needs of the Water and Wastewater Infrastructure in the Bi-State St. Louis Region report. Mr. Archer performed research, interviewed member organizations, and wrote several sections of the Attributes & Needs report which was used to summarize the aging infrastructure and overall needs for water and wastewater in the St. Louis metropolitan area. He also participated in monthly client meetings to discuss the development, progress, and status of the report.

Project Member, Lambert International Airport – Environmental Management System, St. Louis, Missouri. Mr. Archer assisted with the development of an Environmental Management System for the Lambert International Airport. Mr. Archer also was the task leader for updating the airport's neglected environmental compliance software. This consisted of coordinating with airport staff, reviewing documents, such as Spill Prevention Control and Countermeasures (SPCC), Stormwater Pollution Prevention Plan (SWPPP), Underground Storage Tank (UST) Operations and Maintenance Plans, and managing updating of information into the software. Mr. Archer also conducted field investigations to identify potential compliance issues as part of an environmental compliance.

Project Engineer, Spill Prevention Control and Countermeasure Plans, Albany, New York. Mr. Archer prepared Spill Prevention Control and Countermeasures (SPCC) plans for operations facilities operated by the New York State Thruway Authority. An implementation plan was included in these plans to call out the areas and/or items which needed improvement. As part of this project, Mr. Archer conducted site visits, developed inspection reports and logs, and prepared the final plans for certification by a professional engineer.

Project Engineer, Disaster Recovery Program Management, Minot, North Dakota. The City of Minot was inundated with flood waters in 2011 and caused extensive damage to critical infrastructure. Mr. Archer assisted with development of an Action Plan to rehabilitate damaged infrastructure, compliant with CDBG fund requirements. This included using GIS based software to develop infrastructure quantities and develop preliminary replacement costs using the software CostWorks.

Engineering and Construction Oversight, Chester and Desoto Subdivision Emergency Track Repairs, Union Pacific Railroad, Multiple Sites in Missouri, Illinois and Arkansas. Mr. Archer performed field engineering and construction oversight during

emergency work to repair railroad embankments damaged from flooding at locations along Union Pacific Railroad's Chester and Desoto Subdivision. Mr. Archer provided engineering and construction recommendations to provide permanent stabilization using rock fill of the railroad embankments that failed during flood events. These projects required communication with the Army Corps of Engineers and local Department of Natural Resources Offices to ensure that the repairs conformed to permit and regulatory requirements.

Project Engineer, Emergency Services for Train Derailment, Fults, Illinois. Mr. Archer assisted with evaluation, determination, and implementation of Best Management Practices (BMPs) at the site of a train derailment. Mr. Archer performed field investigations, reported his findings to the project engineer, and implemented the recommended BMPs at the site.

Intern, Sherbut-Carson-Claxton, LLC, Collinsville, Illinois. Mr. Archer prepared construction cost-estimates for civil improvements, performed hydrologic and hydraulic calculations, and assisted with design considerations for site improvements. He also performed inspection services during construction, which included pipeline construction.

Engineer Intern, Vulnerability Assessment and Emergency Response Plan, City of Caseyville, Illinois. Mr. Archer was responsible for developing the vulnerability assessment and emergency response plan for the City of Caseyville, IL in response to the Bioterrorism Act of 2002. Through this process he interviewed operations staff and reviewed physical infrastructure to assess the vulnerability to this drinking water system. He then developed an emergency response plan to address the identified vulnerabilities.

Professional Activities

Member, Water Environment Federation

Member, Missouri Water Environment Association

Member, Kansas Water Environment Association

Member, Engineers' Club of St. Louis