**WATER ENVIRONMENT ASSOCIATION OF TEXAS**

TACWA Member Meeting - SAWS

September 17, 2021

GoToMeeting

9:00 AM - 11:30 AM

Meeting Notes

**Welcome and Introduction (Jeff Haby)**

* Thank you sponsors: Arcadis, Ardurra, Black & Veatch, Brown and Caldwell, Carollo, CDM Smith, Clean Water Strategies, CP&Y, Freese Nichols, Garver, Gresham Smith, GAI, Hazen, HDR, isle, Jacobs, Jones|Carter, KJ, Lloyd Gosselink, Lockwood Andrews & Newman, Tetra Tech, Weston, TACWA

Jeff Haby: Hopefully this is our last virtual event, but we are being challenged this year with personnel leaving the industry. Going forward as an industry we should embrace advanced operator training and work together to increase the knowledge of our personnel. There is a hunger for joining the industry, but how do we train them? We should all embrace advanced operator training and mentorships, and SAWS especially needs to focus on this. We could possibly move operators around so they can look at other unique operations in Dallas, Houston, etc., and all will be TCEQ approved. We learn by talking to other operators, engineers, and consultants. We want Texas to be the best – how do we train up?

* WEAT has an apprentice program for the Texas workforce, it is a potential way to bring operators in and increase participation.

**Business Portion and Regulatory Update**

**Rex Hunt:**

* **Nutrient Update:** EPA produced a draft nutrient criteria document; it has now been approved and finalized as their official document for nutrient management. TCEQ can either accept this document or come up with their own criteria. Water quality standards for reservoirs will most likely change, more proposals will arise soon. Streams and bay nutrient requirements will also probably follow these standards.
* **TCEQ Permitting Schedule:** permitting people are trying to maintain their own permitting timelines, applications must be submitted 6 months ahead of time and they are strict about this. The problem is that TCEQ is short-staffed, therefore they are having scheduling issues. The penalty may be a fine for late submittals.
* **Antidegradation:** no new news since last spring, Dripping Springs case is still under review by TCEQ, Port of Corpus Christi case was recommended for denial last spring but was moved up for clarification on technical points and that is where it is now. We should not expect more updates on either case this year.
* **WOTUS:** we are back to the 1980s version of WOTUS, this could affect wastewater facilities if they are trying to develop new plans but does not otherwise affect wastewater discharges. There will be more mitigation required and more intricacy in the permitting process.
* **Multi-Sector General Permit:** wastewater treatment facilities must have notice of intent that you intend to renew multi-sector general permit by November 12. Permits have not changed much, but benchmarks for stormwater samples have increased.

**Janet Sims:**

* TCEQ is requiring the electronic submission of individual wastewater permit applications as of August 1.
* The issues related to the Minimum Analytical Levels (MALs) proposed by TCEQ have not been resolved. The MALs will impact TPDES permits and pretreatment programs. TCEQ based the MALs on old methods and technology that are no longer used. If an applicant is not able to achieve the MALs, there is a potential that limits for obscure organic compounds will be recommended/placed in permits. A meeting with TCEQ has been scheduled to discuss the proposed MALs. Janet will provide an update at the next TACWA meeting.

**Julie Nahrgang:**

* 217 rule writing is about 8 months behind schedule, we will likely see stakeholder meetings posted sometime in October
* September 20th marks the first day of the 3rd Special Session of the 87th Texas Legislature which will look at redistricting and focus on how Texas will divide ARPA funds. We hope to have a piece of these funds directed towards water and wastewater. Julie will provide more updates at the next TACWA meeting.
* Senate Bill 3 is about 50 pages long and has a November 1st deadline; effective utilities must provide information about their critical load facilities and meet PUC requirements; this includes wastewater treatment plants. We are helping members by developing a template because there is a bit of a gray area for many facilities on what needs to be submitted to the PUC.
* On September 1 about 600 of the new bills came into effect.

**Gordon Pederson:**

July 1, NACWA had a virtual regional dialogue with all the board members from EPA region 6. They offered to open the dialogue on Oct. 7 to all agencies within the region 6 area.

**Clarence Wittwer:**

The Atlas is a software that allows for secure conversations and sharing case studies with other professionals in local government without selling personal information and protecting privacy. Abstracts not selected for WEAT could be uploaded to The Atlas as a case study.

**Next meeting is Friday, November 12 from 9 AM to 11:30 AM Hosted by San Jacinto River Authority**

*Business Section of the meeting closed at 10:00 AM*

***PRESENTATIONS***

**Aeration System Design and Optimization (Megan Martin, Tye Jordan)**

Wastewater Process Energy Costs: 60% Diffused Aeration, 23% Influent Pumping, 8% Solids Handling, 6% RAS Pumping

* Blowers are the largest single energy user at WWTPS
* Airflow generated from rotating lobes, impellers or screws
* Two main types: positive displacement and centrifugal
* Suitability depends on plant design and airflow requirements
* Technology is evolving to be more energy efficient

Blower designs start by identifying the best efficiency point. A blower can over pressurize (surge) and blowers have curves. Highspeed blowers can reach up to 80% efficiency.

* PD blower’s efficiency is lower than centrifugal blowers
* Typical blower turndown is 50%
* WWTP loadings = turndowns approx. 8:1
* System turndown is often more important than efficiency of a single blower unit

The difficulty is ensuring the transition between blowers is smooth and happens without surges

Evaluation Standard - Wire to Air - ASME PTC-13

* Cover all blower technologies
* Evaluates entire blower package

Recently evaluated multiple vendors and looked at air flow generation and found which packages worked at all ranges

**Introduction to Diffusers**

Diffusers are defined by bubble size, age, material, loading, geometry and differentiated by geometry, airflow, SOTE/ft, clean water SAE, and DWP (inches water)

* Geometry could be membrane disc, ceramic disc, tube, or panels (although panels have been failing)
* Multiple diffuser manufacturers and configurations
* The diffuser type selected comes down to operator preference

Alpha factor for diffuser design:

* Loading (surfactants, COD)
* Mode of Operation (SRT/MCRT, MLSS)
* Diffuser Fouling (bubble dynamics)
* Diffuser Characteristics (material, pore size)

How to deal with Alpha: select appropriate diffuser selection, understand flow regime, optimize diffuser configuration, implement diffuser cleaning

**System Configurations**

1. Shared Systems
2. Dedicated Systems

Choosing between the two comes down to pressure. It can be tempting to design a system to handle all the air at once, which burns energy. Dedicated systems allow optimization of each application. This can simplify controls. Separating the two systems optimized blowers

Process Controls: tighter controls allow for saved energy but can become very complex.

* Manual is least complex and least expensive, usually a seasonal valve adjustment, can lead to over or under aeration

Automatic process controls can save 25-40% energy compared to manual control. As you add more instruments, you are adding more components that require maintenance and more operators.

It is important to have a control that encompasses the entire system. Adding automatic controls better suits the needs of the system.

It is critical to select a system that gives you a level of control you are looking for that matches the capability of your staff.

**Summary**

* Diffused aeration is largest energy consumer at typical WWTP
* Areas to consider: blower selection and sizing, diffuser selection, system configurations, process controls
* Aeration is dynamic and requires an adaptive approach
* To optimize the aeration system, it is important to evaluate all components of the system!

**Inducing Granulation in Activated Sludge BNR Systems to Improve Settling (Jim McQuarrie)**

This topic is important to utilities because it is about application knowledge more than technology. It is very flexible

**History**

1914 Arden and Lockett are credited with inventing the activated sludge process. They targeted the slow settling flocculating process as their goal was clear water by the end of the process.

* **Anaerobic Selectors (Internal Selection) - 1900s**
* A/O Process improves upon the activated sludge process by using an anaerobic selector to develop a selective biomass that is naturally reoccurring in nearly all treatment plants. The process enhances phosphorus removal while reducing sludge-bulking organisms
* **Surface Wasting and Surface Traps (External Selection) - 1980s-2000s**
* **Nereda – Aerobic Granular Sludge SBR - 2000s**
* Compact and versatile
* 30% less energy and 50% less space
* Proprietary
* Exponential global growth of installations
* Takes less time for sludge to settle
* Generated a lot of PhD students
* **AGS Augmentation to Conventional Plant**
* Several plants opted to waste aerobic granules and dump them into the activated sludge process. Over time, it started to produce a balancing effect and brought SVIs down considerably

**Essays**

* Selection of slow growing organisms as a means for improving aerobic granular sludge stability
* The mechanisms of granulation of activated sludge in wastewater treatment, its optimization, and impact on effluent quality
* Flocs in Disguise? High granule abundance found in continuous-flow activated sludge treatment plants
* Balancing Flocs and Granules for Activated Sludge Process Intensification in Plug Flow Configurations
* Inducing granulation within a full-scale activated sludge system to improve settling
* Enhancement of activated sludge wastewater treatment with hydraulic selection

**Concluding Remarks**

* Flexible concepts tailorable to site specific conditions
* Internal Selection: high anaerobic rbbCOD:MLVSS condition - a portion of RAS to create high condition with proportioning to control granule size and abundance
* External Selection: out-select negative selectors, identify and promote positive selectors
* Granule Abundance Control between 20% to 40%
* Unintended Settling: low DO operation, mixing requirements, crossflow SBR concepts?
* Develop a compendium with summary on proposed BP

**Biosolids Management Over the Long Haul (John Richardson)**

Four Entities Combined to Resolve a Regional Issue

* The treatment process helps dictate the biosolids process

Each entity faces unique challenges, yet recognizes the need for long-term biosolids management

1. Central Davis Sewer District will lose 25% of its land application area due to the new West Davis Corridor
* Two secondary treatment trains
* Sludge from trickling filter train is anaerobically digested and land applied
* Aerobic sludge from the oxidation ditch train is composed
* Biosolids are composted/land applied/disposed of in landfill
1. Jordan Basin WRF’s solids disposal at ET Technologies at risk due to odor issues at landfill
2. South Valley WRF
* Residential encroachment increased odor complaints
* Disposal at ET Technologies no longer reliable
* Thermal dryers require high capital and maintenance costs as well as safety issues
* Thermal oxidizer added to mitigate odors from thermal driers
1. Timpanogos Special Service District forced to shut down composting
* Biosolids composting ceased in December 2020 due to odor complaints and legal issues
* Loss of composting results in loss of convenient green waste disposal and compost product for communities
* Landfill disposal increases uncertainty and operating costs
* Considering adding primary clarifiers + anaerobic digesters

**Alternatives Development and Evaluation**

1. Land Application at Regional Facility
2. Composting at Regional Facility
3. Private Monofill at Regional Facility
4. Soil Regeneration at Regional Facility
5. Incineration at Regional Facility
6. Deep Earth Digestion at Regional Facility

Evaluation Criteria: lifecycle cost, overall footprint, regulatory issues, long-term control factors, self-reliance, industry experience

**Emerging Contaminants of Concern**

* PFAS Concerns: chemicals used extensively in household products, do not break down and accumulate over time, cause adverse health effects, multiple exposure pathways to humans and ecosystems. Sources include industrial discharges, firefighting, homes and businesses. This leads to thousands to millions of ppt discharges to water.
* PFAS during wastewater treatment: Wastewater influent → PFAS Sorption to Sludge → Effluent discharge to streams or for irrigation. With biosolids it can be mitigated.

**Summary of Alternatives**

Alternative 1: Land Application at Regional Facility

* Moderate capital cost and high operating cost
* 13,000 acres required by 2050, assume purchase and lease back to farmers
* Class B required, monitoring for metals, nutrients required, agronomic uptake of nutrients by crops, PFAS are not mitigated
* May not be resistant to residential encroachment, difficult to mitigate odors
* High level of control, minimal dependence on external entities
* Extensive installations in the US

Alternative 2: Composting at Regional Facility

* Moderate capital cost and high operating cost
* 140 acres total required by 2050
* Meets Class A criteria, monitoring for metals required, PFAS not mitigated
* May not be resistant to residential encroachment, difficult to mitigate odors
* High level of control, minimal dependence on external entities
* Extensive installations in the US

Alternative 3: Private Monofill at Regional Facility

* Significant capital and operating cost
* 280 acres required by 2050
* Can be unclassified, compaction and slope stability concerns
* May not be resilient to residential encroachment, difficult to mitigate odors, requires closure plan
* High level of control, minimal dependence on external entities
* Limited installations in the US

Alternative 4: Soil Regeneration at Regional Facility

* Significant capital and operating cost
* 350 acres required by 2050
* Can be unclassified, PFAS not mitigated, monitoring for metals required
* May not be resistant to residential encroachment, difficult to mitigate odors, requires closure plan
* High level of control, minimal dependence on external entities
* Limited installations in the US

Alternative 5: Incineration at Regional Facility

* Highest capital and operating cost
* 3-5 acres required by 2050
* Can be unclassified solids, needs emissions permit, PFAS may be mitigated, greenhouse gas emissions
* Consistent feed solids, may be resistant to residential encroachment, odors are mitigated
* High level of control, minimal dependence on external entities
* Limited installations in the US

Alternative 6: Deep Earth Digestion at Regional Facility

* Insufficient information to estimate cost
* Insufficient information to estimate land usage
* Part 503 may not apply, requires specific geology, may require underground injection discharge permit, PFAS not mitigated
* May be resistant to residential encroachment, odors can be mitigated
* High level of control, minimal dependence on external entities
* One installation in US (LA county)

**Next Steps:**

* Entities are considering alternatives they deem favorable
* Each entity reflects its constituents and passions

**Meeting adjourned at 11:30 AM**