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LIFT Scholarship Exchange Experience for Innovation & Technology (SEE IT)
Sponsored by: WRF, WEF, and NACWA

TRIP REPORT

SCHOLARSHIP UTILITY: *Name, City, State*

Eagle River Water & Sanitation District
Tim Drescher (Avon Wastewater Treatment Facility Supervisor)
Melissa Marts (Engineering Department, Project Engineer, P.E.)
Vail, Colorado

SCHOLARSHIP UTILITY CONTACT: *Name, Title, E-mail*

Tim Drescher – Avon WWTF Supervisor
tdrescher@erwsd.org

ATTENDEES:

Tim Drescher & Melissa Marts

TRIP DATES:

August 15th and 16th 2018

UTILITIES/SITES VISITED:

Missoula and Kalispell Wastewater Treatment Facilities in Montana (USA)

TECHNOLOGIES/INNOVATIONS SEEN:

- Primary Sludge Fermentation (single stage)
- Fully functioning BNR aeration processes that employ a mix of process configurations to achieve low levels of N & P
- Test pilot (R & D) for Clearas Water Recovery system

TRIP BACKGROUND and RATIONALE (250 WORDS): *What technology did you select to visit? What is the problem you are trying to address? How did you envision the LIFT SEE IT scholarship trip helping your utility?*

The innovative technology that the District chose to visit was primary sludge fermentation because we are currently considering the implementation of this technology at our Avon WWTF, due to the facility being carbon limited. Rather than using an external or chemical source to provide these crucial VFAs, we are considering the possibilities of generating this carbon source with the sludge that already exists in the facility.



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After the initial application for this scholarship, our engineer modeled the amount of carbon needed to meet Regulation 85 total nitrogen & phosphorous concentrations and primary sludge fermentation would not generate enough carbon to meet our treatment goals. Our focus of this trip changed from stand-alone primary fermentation processes to focus on in-line sludge fermentation to reduce the quantity of external carbon required. Concerns with primary sludge fermentation is the potential to generate odors and the Avon WWTF has experimented with fermentation in the primary clarifiers in the past which may have caused filament growth and resulted in downstream process issues.

We believe that this is of significant priority to the water industry because many facilities in the United States are carbon limited. It is widely known that fermentation of primary sludge is an effective method to produce VFAs; what is not nearly as documented is the struggles associated with downstream solids handling processes, odors, maintenance and operations. We felt that the LIFT SEE IT scholarship would help our utility because we would be able to see the process live, and speak with the supervisory and operations staff members who help operate and test the performance of the fermenter.

TRIP SUMMARY (1 page max. Please include 10 photos and a 1-2 minute video montage from the trip. The video does not need to be professional, however if you have the means to create a professional video feel free to do so): *Why did you select the specific utility and technology for the visit? Based on your visit, do you think this technology/approach works for your utility? How useful was the trip in your decision making process? What were some of the trip highlights and takeaways?*

With the help of Carollo Engineering, Tim Drescher, the Operator Responsible in Charge (ORC) of the Avon WWTF, was able to identify several cold weather facilities in the United States that implement primary sludge fermentation. Tim chose to focus in on Montana because of their stringent nitrogen and phosphorus limits already in place, geographic similarities, and comparable population growth concerns that have stretched our respective facilities.

Missoula has a separate fermentation tank that has been converted from an old solids digester. They ferment approximately 50% of their primary sludge and have a goal of producing 400 mg/L of VFAs. Operational requirements include monitoring fermenter level, pH, and detention time (which is approximately 23 days). Lab tests to measure VFA concentration appears to be rather labor (45 to 90 minutes, depending on the behavior of the spectrophotometer) intensive and does not appear to be precise (the values appear to be quite variable). Because the fermenter was converted from an old digester, the tank is not the optimal size and the liquid level is kept low (approximately 7 ft) to achieve the proper SRT. The fermenter was not retrofitted with a sludge collection system, which also poses challenges to operations. ERWSD was concerned with filament generation, however since Missoula has switched to BNR operations, filaments have not been a concern. Missoula uses a woodchip biofilter to treat odors from the fermenter. We made sure to try to smell the fermenter through a hatch, but the odor control was properly designed, and therefore the pressure remained negative, so the odor stayed contained within the fermentation tank. In addition, Missoula has previously experimented with fermentation in their primaries. During the experiment, they found that the sludge blanket would “fluff up” and there were some issues with odors, foam, and corrosion. They did not have issues with torque on their sludge



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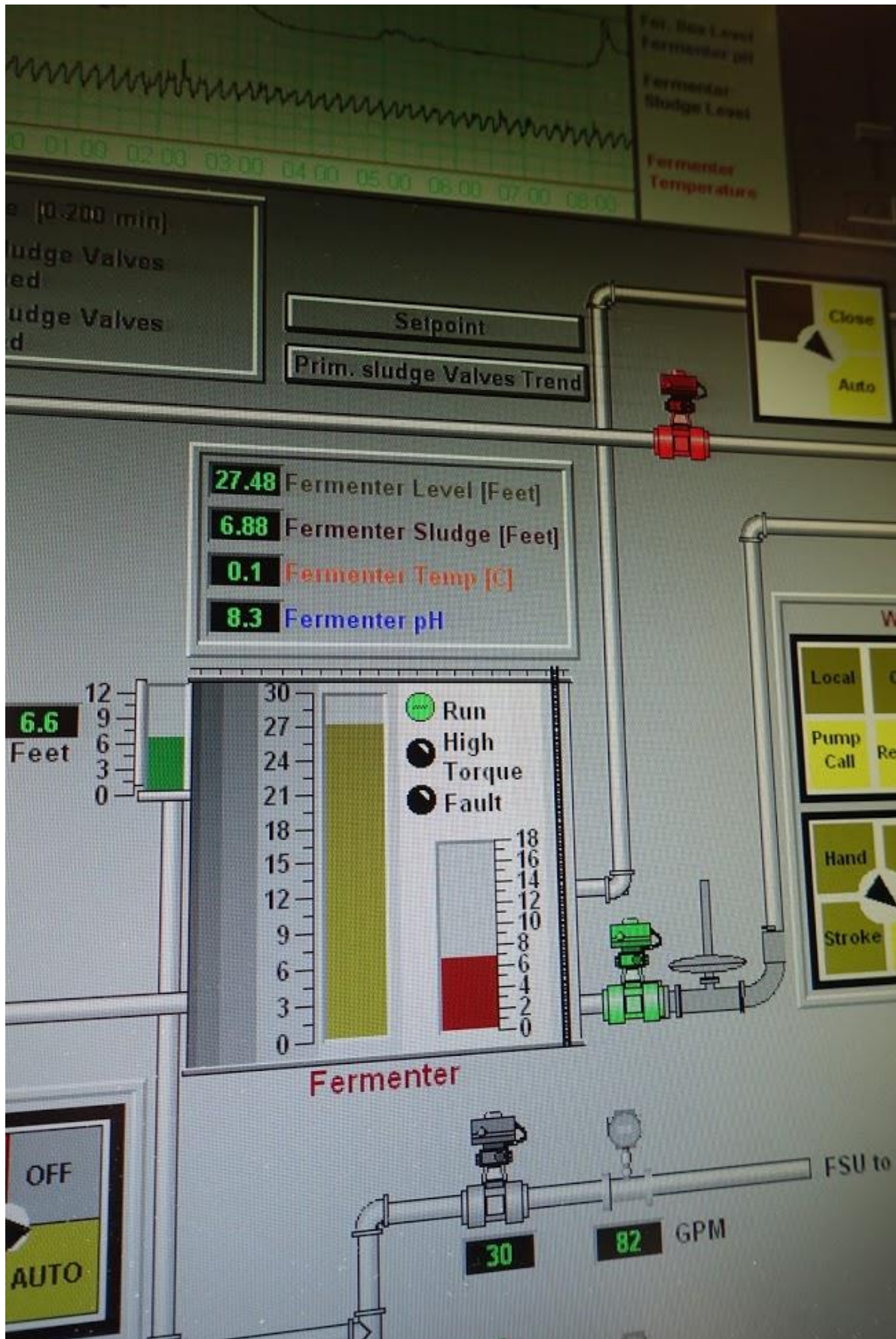
collection system, which is a concern for the Avon WWTF.

Kalispell generates VFAs in a pre-anoxic basin which they aerate for 5 minutes every 2 hours. They noted that they are able to generate about 100-120 mg/L of VFAs, however it is hard to have a definitive answer as to how much they truly generate. Kalispell operates a Modified Johannesburg Configuration biological nutrient removal (BNR) process with many interesting caveats. The system operates with a pre-anoxic basin followed by anaerobic and main anoxic basins before the aeration basins. Recently a post-anoxic zone was added to the end of the train. VFAs from the pre-anoxic basin are routed to the beginning of the anaerobic basin. Operators stated that they can grow filaments if there is an upset in the fermenter.

Based on this trip, ERWSD believes it should proceed with investigating implementation of primary sludge fermentation within our primary clarifiers in order to generate these crucial VFA's. The ability of this process to produce VFAs was confirmed, and the ability to operate in this manner with our current infrastructure looks promising. Concerns about potential odors and the possible production of filaments remain a concern and will need to be monitored carefully.



Fermenter overview screen on SCADA (Missoula)





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Roof and sludge mechanism of the single stage primary sludge fermentation tank (Missoula)



Exhaust air from the fermenter is routed through a woodchip biofilter for effective odor control (Missoula)





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VFA testing kit (Missoula)



Clearas Water Recovery Test Pilot (Missoula)





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Single stage primary sludge fermenter (Kalispell)



Fermenter cover and sludge mechanism (Kalispell)





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A peak inside the cover - the digesters happened to be in a bit of an upset condition during our visit, which is why sludge is seen floating to the top of the surface. (Kalispell)



Exhaust air from the fermenter combined with other process areas were treated with a biofilter (Kalispell)





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Primary effluent water spilling over straight weirs (KalisPELL)

