LIFT Scholarship Exchange Experience for Innovation & Technology (SEE IT)
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TRIP REPORT

SCHOLARSHIP UTILITY: *Louisville and Jefferson County MSD, Louisville, KY*

SCHOLARSHIP UTILITY CONTACT: *Zonetta E. English Research Manager, zonetta.english@louisvillemsd.org*

ATTENDEES: Zonetta E. English MBA, Alex E. Novak PE, Treatment Facilities Director and James A. Skinner, Jr. Process Supervisor (Class IV Wastewater Treatment Plant Operator)

TRIP DATES: May 10-21, 2017

UTILITIES/SITES VISITED: Seafield WwTW, Nigg WwTW, Davyhulme WwTw, Oxford STW, Esholt STW and Avonmouth STW

TECHNOLOGIES/INNOVATIONS SEEN: Thermal Hydrolysis: Cambi™ Veolia Biothelys™, Advanced Acid –Phase Anaerobic Sludge Digestion, and Combined Heat and Power (CHP)

TRIP BACKGROUND and RATIONALE (250 WORDS): *Our goal for the trip was to see technologies that were related to biosolids processing. Currently, we process our biosolids via an Andritz drum dryer system that produces a land applied Class A Biosolids product-Louisville Green®. This system is now at the end of its useful life. At the time of the initial scholarship application, we had solicited Request For Expression of Interest (RFEI(s)) For Biosolids Processing and Management Technologies. From the projects referenced in the RFEIs, we searched for treatment facilities that were similar in size, processed a comparable amount of solids, in addition to having established innovative technologies for processing biosolids. We envisioned that the SEEIT Scholarship would allow us to the opportunity to observe first-hand the biosolids technology and the day-to-day operations. By speaking with the staff, we would find out the number of personnel required to operate their biosolids technology, qualifications of the staff, operation and maintenance costs, biogas maximization strategy, innovative technology, challenges and lessons learned. By having this experience, it would provide insight going forward in our procurement process.*

TRIP SUMMARY

MSD visited six (6) facilities in the United Kingdom due to our quest for selecting a new Biosolids Processing Solution for the Morris Forman Water Quality Treatment Center (MFWQTC). In March 2016, we solicited potential vendors for Request for Expression of Interest (RFEI) for Biosolids Processing and Management Technologies. Twenty two (22) organizations responded. Based on the project references provided, we wanted to observe established innovative biosolids processing solutions in the United Kingdom (UK). Initially, we thought we would be viewing the technologies: Thermal Hydrolysis- Exelys™ and Cambi™, GE Monsal Advanced Digestion, Gas mixing technology, Advanced Anaerobic Digestion with Biowaste utilization, and Belt Dryers using hot water exploitation (based on projects identified in the RFEIs). The following is a list of key features and lessons learned from each facility:

Seafield WwTw

Veolia has a 30-year Operations and Management Contract. The facility ceased drying in 2008. A Cambi™ thermal hydrolysis system was installed in 2015. They utilize four (4) employees for Biosolids Processing: Odour Technician, Unit Controller, Electrical Engineer and a Mechanical Engineer. They produce 90% of their electricity on-site. 5.5 MW of electricity can run the entire plant. We learned that steam management access is very important. If you select this technology, be proactive with maintenance access and having scaffolding available. We learned that you must clean Digesters prior to converting to Thermal Hydrolysis.

Nigg WwTw

Kelda Water Services is the Operating Company. The facility services a population of 280,000-300,000 households. They have the first Cambi™ thermal hydrolysis system in the United Kingdom. It has been in service for approximately sixteen (16) years. Even though the operation is privatized, they do have some union workforce. The facility has a relatively small footprint and the operation is completely enclosed. We learned that Struvite is an issue due to the Thermal Hydrolysis Process (THP). They developed key performance metrics: Number of Odour Contacts (odor complaints), Combined Heat and Power (CHP) % Utilization, and Asset Replacement Spend Profile. They plan to upgrade their Cambi™ thermal hydrolysis and boiler systems to increase gas production.

Davyhulme WwTw

This is the 3rd largest THP in the world. They have four (4) Thermal Hydrolysis (TH) Units (20 reactors). Upstream, they have advanced digestion plants. Davyhulme has seven (7) dewatering transfer stations. In pipe, they have 3% digested sludge and 25% dewatered sludge is trucked to the facility. They provide natural gas to the grid and this energy recovery is a major source of revenue. They emphasized that prescreening is critical to the thermal hydrolysis process. A good conveyance system for sludge cake storage is a must. Also, they emphasized that when sizing your biosolids sludge capacity, allow for adequate redundancy.

Oxford WwTw

The treatment facility site is 31 acres. It has the capacity to treat 56,000 tonnes/day. They have a Veolia BioThyles™ thermal hydrolysis system. Their Operations and Maintenance contract is solely based on performance. If they do not meet the requirements, they do not receive payment. Side stream Ammonia Nitrogen is a concern. They utilize a Bucher Press for their post digestion dewatering. The lessons learned from the staff at Oxford were that side stream acceptability

requirements must be established prior to construction. Plant layout, the two stages of dewatering for thermal hydrolysis, and small parts availability is critical to the daily operations.

Esholt STW
The plant serves a population of 750,000. Prior to thermal hydrolysis, incineration was used dispose of sludge. Their profitability totally centered on maximizing energy recovery to generate electrical power to export to the local grid. We learned how important operating the digesters is critical in the thermal hydrolysis process. Their staff shared how they were able to solve digester foaming issues.

Avonmouth STW
This facility is multi-faceted, In addition to being a sewage treatment works, it is a sludge treatment centre, Food Waste Treatment Plant (FWTP) and a gas to grid entity. It serves a population of approximately one (1) million people. It is 100% self-sufficient in its electrical needs. It even sells its grey water as cooling water to nearby industry. Also, it leases its land to accommodate four (4) wind turbines. We learned the mechanics of how to become a zero energy facility. They have an extensive community outreach program. In addition, we gained knowledge to optimize digester gas production.

Overall, the learning outcomes from our visit to the UK:

- The UK facilities emphasize safety and plant security
- Having spare parts on hand reduce overall operating costs
- Maximizing digester gas production is a key to reduce operating cost for electricity
- Less Digesters are typically needed for thermal hydrolysis than in conventional wastewater treatment processes
- Combined Heat and Power (CHP) is a critical component to each facility's profit center
- You must have dedicated staff solely for Biosolids processing utilizing Thermal Hydrolysis (TH)
- There is sufficient opportunities for renewable energy utilizing TH
- Due to TH, you must be concerned about your side-stream characterization
- Struvite is an issue at these facilities

In summary, the SEEIT Scholarship is an excellent opportunity to see technology that you would consider for any biosolids processing solution. We learned invaluable lessons that we will assist us regardless of the technology we select going forward. Lastly, the utilities in the UK (all privately operated) have the same issues as Public Owned Treatment Works (POTWs) in the United States: energy cost concerns, maintenance challenges, biogas production and odor concerns.