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inDENSE™ CASE STUDY

EPHRATA BOROUGH AUTHORITY, PA USA

QUICK FACTS

- **INDUSTRY:** Municipal
- **PROCESS TYPE:** Activated Sludge (A2O)
- **TECHNOLOGY:** inDense™
- **PERMITTED FLOW:** 3.8 MGD
- **STARTUP DATE:** January 2019

BACKGROUND

Ephrata Borough Authority WRRF, located in the Mid-Atlantic region of the United States, has been battling chronic sludge settling issues since undergoing a BNR upgrade in 2011 to meet new permit limits. During the winter months, SVI values have reached as high as 300 mL/g. During the upgrade, the facility was converted from BOD and Ammonia removal to total nitrogen (TN) and total phosphorus (TP) removal. An additional ring was added to the existing oxidation ditch increasing detention time in order meet these new permit regulations.

In spite of the upgrades, no appreciable improvement in settling was observed. Numerous efforts were made in the last 5 years to improve settleability with minimal success. In August of 2018, the facility decided to incur the additional expense of adding polyaluminum chloride (PAC) to the system. This chemical addition was moderately successful with SVI reductions of about 50% with dosing up to 70 GPD.

Oxidation Ditch

inDENSE Installation

Secondary Clarifier

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SOLUTION

Several operational modifications were also recommended prior to the installation of the inDENSE process. Sludge characteristics can be improved with wholistic process optimization, which is important when evaluating inDENSE. Modifications made by the plant staff included removing aeration discs from the anerobic zone (4th pass) and reducing the disc speeds in the anoxic zones. The sludge age was also increased from 13 days to 16 days which improved overall operation. The inDENSE system was installed in late 2018 and became operational on January 8, 2019. A progressive cavity pump was supplied and installed by the facility to provide feed flow to the inDENSE system from the RAS tank.

The overflow, composed of the light fraction of MLSS, gravity feeds to an existing scum collection pit where the existing WAS pumps transfer waste sludge to solids handling. The underflow, composed of the denser fraction of MLSS, gravity feeds back into the RAS tank where it co-mingles with existing RAS before being pumped back to the head of the oxidation ditch.

The facility has a permitted flow of 3.8 MGD with the following average effluent limit concentrations:

Total Phosphorus	2 mg/L
Ammonia (Nov 1st - Apr 30th)	6 mg/L
Ammonia (May 1st - Oct. 31st)	2 mg/L

PERFORMANCE

The plant modifications and installation of the inDENSE process were successfully completed without treatment interruption. The facility's staff provided all the necessary work in order to place the inDENSE system into service. The system was operational approximately two weeks after installation began. Once in service, all waste sludge was processed through the inDENSE system. Within several weeks, the SVI was reduced from a December 2018 monthly average of 144 mL/g to a February monthly average of 71 mL/g. The settling velocity of the MLSS also improved with the clarifier sludge blanket levels. As settling continued to improve over time, the plant was also able to reduce their PAC addition by about 70%. The system continues to show stable performance with effluent ammonia values less than 1 mg/L on average. Additional work will be conducted through the summer of 2019 to understand improvement to Bio-P.

CONCLUSION

Most wastewater treatment plants suffer from settleability issues periodically. Ephrata Borough Authority would have winter time SVIs as high as 300 mL/g. Multiple attempts were made to correct this issue including process modifications and chemical addition. With the addition of the inDENSE process, the facility was able to correct this issue allowing for improved settleability and BNR performance.

OXIDATION DITCH OPERATIONAL DATA