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From Vision to Reality: Implementing AnitaMox IFAS for Effective THP Filtrate Waste Treatment

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Abstract

The Neuse River Resource Recovery Facility (NRRRF) is a 75 million gallons per day (mgd) advanced wastewater treatment plant in Raleigh, North Carolina that needs to maintain a total nitrogen (TN) of 3.3 mg/L based on mass load allocations at design flow. As part of the City of Raleigh's Bioenergy Recovery Program, the facility recently transitioned to producing Class A biosolids through the implementation of thermal hydrolysis followed by mesophilic anaerobic digestion (THP+MAD). While this upgrade improves biosolids quality and energy recovery, it also introduced a substantial sidestream nutrient load due to the high concentrations of ammonia and orthophosphate released during dewatering of digested sludge.

The Sidestream nitrogen load contributes approximately 20% of the total influent nitrogen load, prompting the City and Hazen and Sawyer to evaluate sidestream treatment technologies. A comprehensive evaluation of sidestream nitrogen removal technologies was conducted including an evaluation of multiple deammonification technologies, two of which were shortlisted and advanced to 30% design. A Request for Information (RFI) process was developed with the City to evaluate the vendors based on both quantitative performance metrics and qualitative operational considerations.

Following a detailed workshop and review of RFI responses, the Veolia AnitaMox Integrated Fixed-Film Activated Sludge (IFAS) system was selected for full-scale implementation. The AnitaMox IFAS process was chosen for its demonstrated ability to treat high-strength ammonia loads typical of THP filtrate, its compact footprint, and its operational resilience. The final design included a new filtrate pump station, equalization tanks, an IFAS reactor, a dedicated clarifier, and a service building housing blowers, electrical systems, RAS pumps, and chemical storage.

The sidestream facility is designed to reduce nitrogen loading from 2,870 lb/d to 718 lb/d; a 75% reduction. Construction of the THP system was completed in October 2024, followed by completion of the deammonification facility in May 2025. Seeding of the AnitaMox IFAS reactor occurred shortly thereafter, and startup is currently underway.

This paper will present the startup experience of the AnitaMox IFAS system, with a focus on the unique challenges associated with treating THP-derived sidestreams. Key startup considerations include managing high total suspended solids (TSS) and fines in the influent, as well as achieving and maintaining the optimal process temperature of 28°C necessary for stable deammonification. Early operational data, lessons learned, and strategies for optimizing performance during the critical startup phase will be shared.