

Biosolids Profile –ESD Class A System City of London



CLIENT: City of London

LOCATION: London, OH

CONSULTANT: CH2M Hill

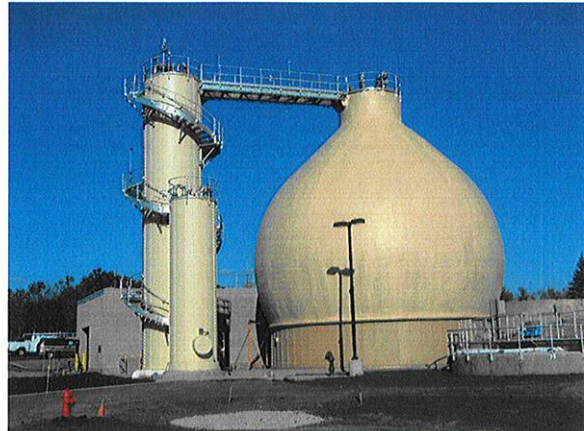
In 2006, the City of London embarked on a major expansion of its wastewater plant including a new biosolids processing facility to replace existing conventional digesters. The new digestion system was designed as a two phase, Class A system with CB&I's ATP/ESD process.

The Phase 1, thermophilic ATP Reactor acidifies the incoming feed sludge and provides pathogen reduction in a batch feed process in compliance with the USEPA time-temperature requirements. The Phase 2, mesophilic Egg Shaped Digester (ESD), utilizes the volatile acids, generated in the first phase, to further reduce solids and produce methane, completing the solids reduction process.

Thickened primary and WAS are blended and stored in a blend well prior to feeding the digestion process. A heat recovery system, employing an isolation Tank, is provided for heating blended feed sludge and cooling ATP Reactor sludge prior to feeding the ESD Vessel. The heat recovery system eliminates additional heating of the ESD Vessel.

A hot water-sludge exchanger is utilized to bring the ATP Reactor up to temperature. The temperature is held for at least 1 hour each batch. HRT of the ATP Reactor is minimized to prevent excessive volatile solids destruction in the acid phase.

CB&I utilized the micro-digester approach to first start up the ESD Vessel. Two weeks later the ATP Reactor was brought on-line utilizing sludge from the ESD Vessel. Class A Biosolids was achieved within 45 days of process start-up.



DESIGN CRITERIA:

- Design sludge flow 34,000 gpd
- Phase 1 thermophilic ATP Reactor
1 Day HRT (nominal) at 65°C
- Phase 2 mesophilic ESD
13 Days HRT at 37°C
- 10-12 batch cycles per day

PROCESS COMPONENTS:

CB&I provided the following process systems on a design-construct basis:

- (1) 450,000 gallon Egg Shaped Digester
- (1) 10'-0" diameter ATP Reactor – 304 SS
- (1) 7'-0" diameter Isolation Tank – 304 SS
Raw sludge inner chamber (7.0' ID)
ATP treated outer chamber (5.0' ID)
- (1) 1000 CF Dry Seal Gasholder
- (3) System Exchangers
- Jet Pump draft tube mixing
- Instrumentation and Control Panel
- Structural Metals, Bridges and Stairs
- Vessel Insulation and Painting
- System Design Oversight

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PLANT DESIGN CONDITIONS

- 5.8 MGD Average Design Flow
- 13,102# day, average design load
- 17,338# day, maximum design load
- Design Feed at 3-7% solids
- > 75% volatile solids fraction

PLANT CONFIGURATION

- Screening and degritting of raw waste
- Activated sludge process
- New ATP/ESD Digestion Facility
- Gravity Belt Thicken WAS
- Dewatering - Belt Filter Press

SOLIDS HANDLING SPECIFICS

- Sludge feed rate at 8-12,000 gpd, current
- Primary & WAS at approximately 3-5%
- 37,000 Gallon ATP Reactor, nominal capacity
- 450,000 Gallon ESD Vessel, nominal capacity
- 1000 FT³ Dry Seal Gasholder
- 1 – Existing Digested Sludge Storage Tank

OVERALL SLUDGE STABILIZATION PERFORMANCE

- > 45% Total Solids reduction
- > 55% Volatile Solids reduction
- \geq 17% dewatered cake
- Sludge is stored in existing storage tank prior to dewatering
- Dewatering operation 2 – 3 days per week
- Pathogen reduction - Class A Biosolids
- Metal concentration - no heavy metal analysis available

COMMENTS

First ATP/ESD Facility constructed in the state of Ohio. Digester Facility startup began in the summer of 2008 utilizing a micro-digester approach with digested sludge from a nearby anaerobic digester facility. System achieved Class A pathogen reduction and volatile solids reduction within 45 days after startup.

The process design includes a heat recovery system, which minimizes heating requirements for the overall process. The ESD Vessel operating temperature is maintained through the heat recovery system and a supplemental cooling exchanger that is incorporated into the ESD mixing system. The ESD mixing system utilizes the CB&I proprietary jet pump draft tube mixing system to reduce overall energy requirements for the system.

The Digestion Facility is fully automated to facilitate unmanned operation on weeknights and weekends.