MWEA WWAdCon 2013
Grandville CWP Egg Shaped Digester
Unconventional Startup

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Presentation Agenda

Brief Introduction to Project
  Solids Handling before and after
  Why ESD vs. Conventional

Discussion of ESD Startup
  Micro-digestion Technique
  Seed Sludge
  Lab Analysis

Operator Training

Questions
City of Grandville Overview
Grandville Clean Water Plant
Project Overview (Expansion and Renovation)
Solids Handling Prior to Project

- Aerobic Digestion
- Anaerobic Digestion
- Thickening
- Storage
- Land Application
Solids Handling Prior to Project

- Aerobic Digestion
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Solids Handling Prior to Project

- Aerobic Digestion
- Anaerobic Digestion
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Solids Handling after Expansion
Solids Handling Expansion
Solids Handling Expansion
Why Egg Shaped Anaerobic Digester (ESD)?

- Process
- Footprint
- Cost (life cycle)
  - cleaning
  - efficiency
- Client comfort
- Ability to go to Class A
Why Egg Shaped Anaerobic Digester?

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Why Egg Shaped Anaerobic Digester?

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How the ESD Works:
How the ESD Works:
How the ESD Works:
Combined Heat and Power Unit

Dual Fuel (bio-gas and natural gas)
- 280 kW using Bio-gas,
- 360 kW using Nat Gas

Internal exchangers to capture heat from engine cooling jacket and exhaust

Efficiency of 86%
How do you go from a 183,000 gallon anaerobic digester to a 1 million gallon anaerobic digester?
What is Micro-Digestion?
Micro-Digestion Advantages

• Good Seed Sludge starts the process
• Complete Control
• Process Allowed to Acclimatize
• No loss of Bio-Mass
• Steady State Operation Quickly
• Alkalinity Builds Quickly
• Temperature Control
What do you need for startup?

- Identify Vessel Characteristics
- Starting Sludge Volume
- Initial Seed Volume at least 10% of Vessel Volume
- Feed based on 18 HRD of Vessel Volume
- Environmental Control
ESD Startup Challenges

- 90,000 gallons of seed sludge to start.
- 30,000 gallons Raw sludge
- Seed sludge screening
- Keeping “Old Conventional Digester” Operational
- Storing Seed Sludge
- Available Sludge
- Clean Secondary Digester
Secondary Digester Cleaning
Secondary Digester Cleaning
How to Prepare Seed Sludge?
Screening Seed Sludge
Seed Sludge

• Collected 217,610 gallons of seed sludge over two weeks
• Seed Sludge was pumped over to the ESD in three days
• Stored Temp: 67F
• Volatile Acids: 353 mg/L
• Alkalinity 460 mg/L
• pH: 6.1
Mixing and Heating

- Mixing and Heating Startup

- Operating Temperature was reached in less than 24 hrs. from a start of 67F to 98F
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Lab Analysis on Raw Sludge and Digested Sludge

Total Solids

Volatile Solids

Alkalinity

pH

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Operator Training

- Pumping, Valving, and Piping
- ESD Operating System
- New SCADA
- Emergency
Pumping, Valving, and Piping

• Which Valve Does What
• Mixing Piping and Valves
• Heating Piping and Valves
• DST Piping
• ESD Piping
Sludge Pumping Room
ESD Pipe Gallery
ESD Pipe Gallery
Heat Exchanger
Heating Water Loop
Gas Storage
ESD Operating System

- Familiarizing Operators
- Function
- Control
- Programing
- Alarms
- Problems
ESD Screen

ESD Main Overview

[Diagram of an ESD system with various equipment and connections labeled.]
Pump Screen

Primary Tanks 5-8 Sludge Pumps

DST Flow
FT-330
82.8
CFM

Scum Hopper
Valve 389
CLOSED

Hopper Primary
Tanks 7 & 8
Valve 360
CLOSED

Hopper Primary
Tanks 5 & 6
Valve 361
OPENED
Schedule Screen
Foam Spray
Down Draft
Scum Removal Mode
Emergency

• Foam Control
• Power Outages
• Gas Pressures
• Heating

Check System Alarms!!!
Questions?