Thermal Hydrolysis Supporting Systems

Adding dependability, maintenance, and performance to the systems powering thermal hydrolysis

C. Doug Werme, PE
Brian McLean, PE
Thermal Hydrolysis Supporting Systems

- Thermal Hydrolysis has great digestive, neutralizing and normalizing properties.
- Thermal Hydrolysis increases sludge and digestion efficiency.
- Let's talk steam.
  - Changes to making High-Pressure steam
  - Controlling steam
  - Changes to piping
  - Optimizing energy efficiency
Thermal Hydrolysis Benefits

- Thermal Hydrolysis gives you great sludge.
  - Energy rich sludge.
  - Enhances Volatile matter removal
  - Better Dewatering
  - Low Viscosity – better pumping
  - Better digestion of sludge
  - Very minor amounts of water added
Lets talk Steam

- Steam is Hot stuff.
  - Steam does not need pumping.
  - Steam can produce a vacuum just by cooling
  - Steam is inert (water)
  - Lots of power in steam
  - Very low electrical cost
  - Made with lots of fuel
Lets talk Steam

- Steam Systems Hate.
  - Large percentage swings in load over short time periods (inertia).
  - Make up water (Steam losses and consumption).
  - Being too small.
  - Long Piping Systems, especially outdoors.

- Sizing Steam Systems
  - Steam systems are sized off all system parameters.
    - Maximum rate of BTU’s or Pounds per hour
    - System Volume
    - Conveying Velocity
    - Pressure Drop
Steam Systems verse Thermo Hydrolysis

Thermo Hydrolysis
- Once through steam = No Return
- Large Load changes
  - Batching
- High pressure requirements

Steam System
- High Pressures require boiler operator: “C” Blue Seal (3rd class engineer’s License or above MUST BE PRESENT AT ALL TIMES BOILERS ON.
- High Pressure Piping 250# rating
- Once through steam requires pretreatment for make-up water (deaeration, softening, reverse osmosis, chemical, mechanical)
- Protect boiler from extreme load changes
The typical system
The Physical Layout

Make up Water

Water Treatment

Boiler

Boiler

Boiler Room

Thermal Hydrolysis

Sludge

Thermal Hydrolysis

Sludge and Condensate
Adding Heat Recovery
Adding Energy and Heat Recovery

- For heat recovery use the lowest grade (temp) first
- Return condensate before the reactor (Pipe Losses)
- Lots of physical travel of make up water
- Where to perform water treatment
- Softening and Reverse Osmosis: backwash and waste
Protecting Boiler

- Boiler
- HX
- Thermal Hydrolysis
- Water Treatment
- Heat Recovery
- Make up Water
- Sludge and Condensate
- Sludge
Protecting Boiler

- Reduces wear and tear on the boiler.
- Change working fluid to hot oil (inertia).
- O&M on HX instead of boiler.
- Reduces water treatment.
- Might superheat steam.
- Double insulate piping.
- Add volume (inertia).
- Unfired equipment.
Questions?

Brian R. McLean  
C. Doug Werme  
518-782-4500  
mcleanbr@cdmsmith.com  
wermecd@cdmsmith.com