WLSSD Digester Foaming experiences

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Western Lake Superior Sanitary District
April 20, 2011
48 MGD design
36 MGD average
120,000 lbs/day
BOD/TSS
Sludge storage tanks, April 2, 2002

Sludge overflow occurred from back of tanks. Sludge went into bay (which was frozen at the time)

Overflow level is at 18’
Overflow occurred here (calculated specific gravity of 0.78)
Rosemount pressure transmitter
“Digester enigma”

• Specific gravity assumed to be the same as water
Changes in level sometimes not real

Rosemount (uses specific gravity)

Radar (looks at level from surface)
Interrupted feed schedule

Level falls with gas flow

Gas production
Several foot level changes in short time period—how is this possible?

An inch a minute
Submerged fixed cover design

Mixer can be pulled while dig. In service
33,000 gallons per foot

THERMOPLASTIC LINING

MIXER BY MFG R

MIXER TUBE SUPPORT SEE DETS H105-106 AND J1/95-105 OR RECOMMENDED BY MIXER MFG R

INSULATION SIDES SEE

FOREPL A
1,500 gallons per foot

33,000 gallons per foot
April 11, 2008 foam/overflow event

- Blizzard
- Plant lost power for 19 hours
- Digester mixers abruptly stopped
Gas exit from top of digester 1
Gas dome of dig 1

Housing for Pressure, vacuum relief valves
This one was in service

Vac., press relief valve

Flame arrestor
Sludge on digester cover that exited through flame arrestor and PSV
Sludge made it to mixer. Highest observed pressure in digester was 34” wc. Safeties lift at 32”. Only number 1 (thermo) digester safety lifted.
Steady stream of liquid from system. It is believed that sludge came out of here and filled up the room.
Sludge lines on wall indicate levels of two different events (power outage 4/11 and 4/13/2008)
Sludge on ground outside of U-tube room. It came out of the door when the operator opened it.
Contributing factors to digester overflows

• Feed solids characteristics

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<th>More problems</th>
<th>Fewer problems</th>
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<td>High % volatiles</td>
<td>Low % volatiles</td>
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<td>High organic loading rates</td>
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<tr>
<td>High gas production</td>
<td>Low gas production</td>
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<tr>
<td>More ferric chloride addition</td>
<td>Less ferric chloride addition</td>
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Other contributing factors to digester overflows

• Mixer operation
  – *Abrupt changes = bad*
Our understanding:

• Not related to activated sludge process
• Surface-active agents entering the plant do not make digester foaming
• High gas production makes problems
What it isn’t:
Volatile solids loading rate, lbs./day

Problems here

Problems here
Conclusion:

- Specific gravity
- No sudden changes
- Fluid behavior (misbehavior)
- We should keep good records