Investigation of a WWTP Upset
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WWTP History

- Upgraded in 1996
- New Extended Aeration Process
- Design Flow of 0.380 mgd
- Current Average flow is 0.2 mgd
- Residential Community
- Limited Industrial and typical Commercial
WWTP Components

- Bar Grate
- Fine Screen
- Grit Removal
- Wetwell and Drypit pumps
- Splitter Box
WWTP Components

- Extended Aeration Pond
- Clarifier
- RAS/WAS Air Lift Pumps
- Aerated Sludge Digester
- Reed Beds Sludge Storage
- UV Disinfection
- I/I Lagoon
WWTP Sketch
Treatment History

• Treatment met effluent limits
• BOD under 30 mg/l
• TSS under 30 mg/l
• Phosphorus under 1 mg/l
• No problems
Summary of test results prior to upset

June 2009 Influent

June 2009 Effluent
Users on System

- Stores
- Restaurants
- Schools
- County Garages
- Marina
- Iron Works
- Nursing Home
- Hauled Waste temporary accepted
Upset Started in 2010

Effluent Results

- Effluent BOD
- Effluent Limits
- Effluent TSS
Initial Actions

- Determine equipment functioning
- Look at History
- Daily Lab Tests
- Micro Biologists Review MLSS and operations
Influent Flow Comparison
Influent Flow Comparison

June 2009 Influent

Influent BOD and TSS

Concentration (mg/l)

BOD
TSS
Microbiology

• Aeration basin: Little to no biomass was present in the aeration basin sample. A few flagellates were present otherwise, no other protozoa or metazoa were observed.

• There were a few crawling and swimming ciliates present, particularly *Paramecium* and *Coleps*, but no rotifers. Rotifers are very sensitive to toxic conditions, so their absence may indicate toxins or other conditions unfavorable for their survival.
Toxins?

• Initial thoughts were Quaternary Ammonia compounds
• Started testing ammonia in influent
• Requested MSDS from commercial and industrial users
• Possibility of a “Meth Lab” somewhere?
Results

Influent ammonia concentrations approximately normal Averaging 20 to 35 mg/l
Results

• MSDS revealed some Quaternary Ammonia cleaning agents were being used
• Went to major water users, School, Industries, County Garage, Marina, Nursing Home
• Explained what is happening at WWTP and why certain compounds were toxic
• No large amounts or bad housekeeping was determined
Results

• Local Police were contacted and no suspicious activities or houses were under investigation for “Meth” activities
Collection System

- There were some samples in manholes performed
- Most were normal
- There were two high samples, 83 mg/l and 59 mg/l
- A procedure to sample the Community’s sanitary system was discussed
- Still not positive what is the toxin
Actions

- Daily Process Testing was required
- Refresher courses were given
- MLSS, Settling, SOUR, DO, pH, Microscope exams, Clarifier sludge depths, Temperatures, SVI, SRT, F/M, Visual, Odors, RAS SS
DNR Involvement

- DNR concerned and actively working with community
- Reviewing data
- System moratorium
- Meetings and conferences
- Weekly updates required
Re-Seeding System

- Tried re-seeding several times
- Activated sludge brought from two separate communities at two separate times
- Did not immediately provide any results or increase in MLSS
- Theory that a regular periodic toxin was coming in to the WWTP
Continue Actions

• Process Manufacture on site reviewing equipment
• Outside Operations Experts on site reviewing day to day operations
• WET tests
• TIE test
• Prepare to do Priority Pollutant Scan
Continue Actions

• News article on the WWTP issues
• Article came out locally in Mid May
• Dramatic shift in WWTP operations by the end of May
• Coincidence or did May 7 reseeding efforts work
WWTP Turns Around

MLSS

May 7, 2012
May 8, 2012
May 9, 2012
May 10, 2012
May 11, 2012
May 12, 2012
May 13, 2012
May 14, 2012
May 15, 2012
May 16, 2012
May 17, 2012
May 18, 2012
May 19, 2012
May 20, 2012
May 21, 2012
May 22, 2012
WWTP upset over
Future

• Prepared an Action List for any future upsets

• After plant is working normally for a month, take a sample and perform a Priority Pollutant Scan as a baseline

• Took samples of sludge and did a Priority Scan to determine if any history of toxin

• Sludge results Typical
Conclusion

• Toxin was not conclusively identified
• Have suspicions
• One toxin present in aeration basin at a significant % greater than expected
Incidental Picture on a Sunday
Questions and Comments