

# Wisconsin Wastewater Operator's Association

46<sup>th</sup> Annual Conference

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Session K 10:55

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



# Treatment History

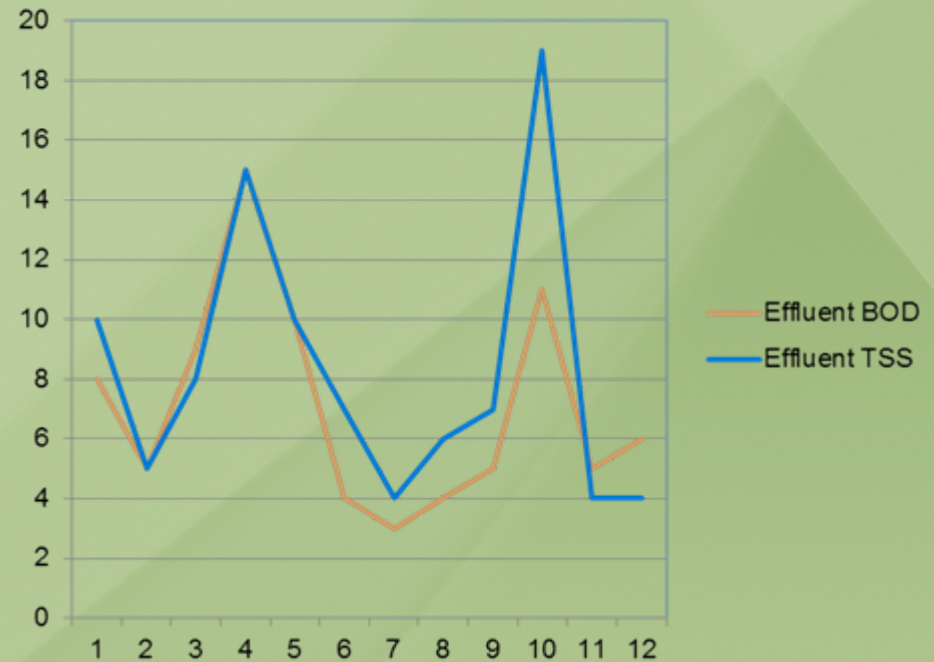
- Treatment met effluent limits
- BOD under 30 mg/l
- TSS under 30 mg/l
- Phosphorus under 1 mg/l
- No problems

# Summary of test results prior to upset

## June 2009 Influent



## June 2009 Effluent

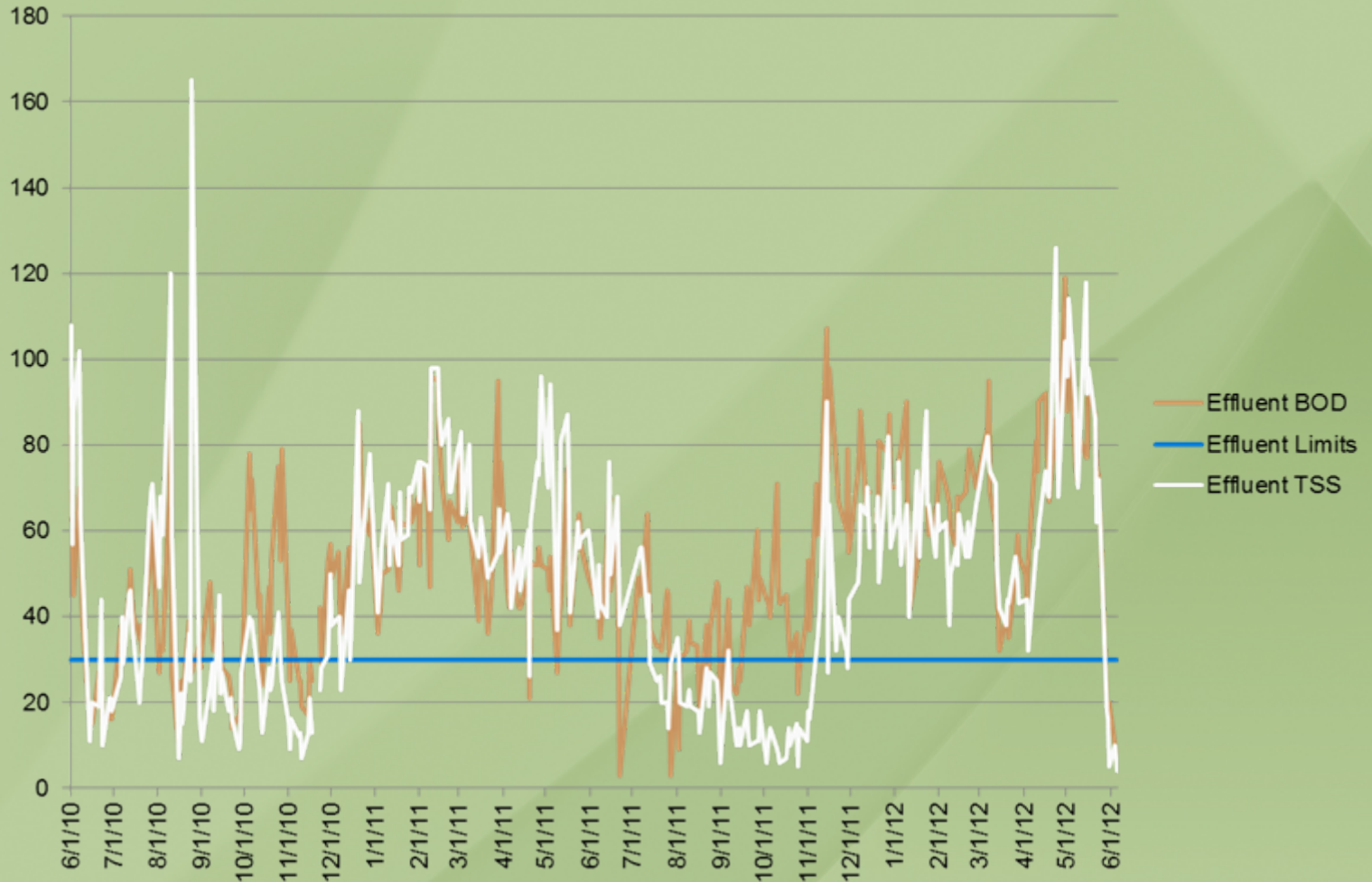


# Users on System

- Stores
- Restaurants
- Schools
- County Garages
- Marina
- Iron Works
- Nursing Home
- Hauled Waste temporary accepted

# Upset Started in 2010

## Effluent Results

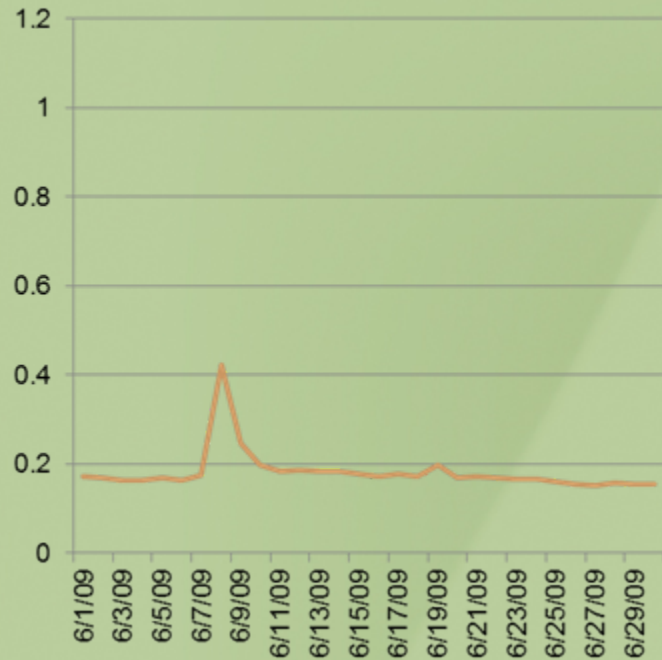


# Initial Actions

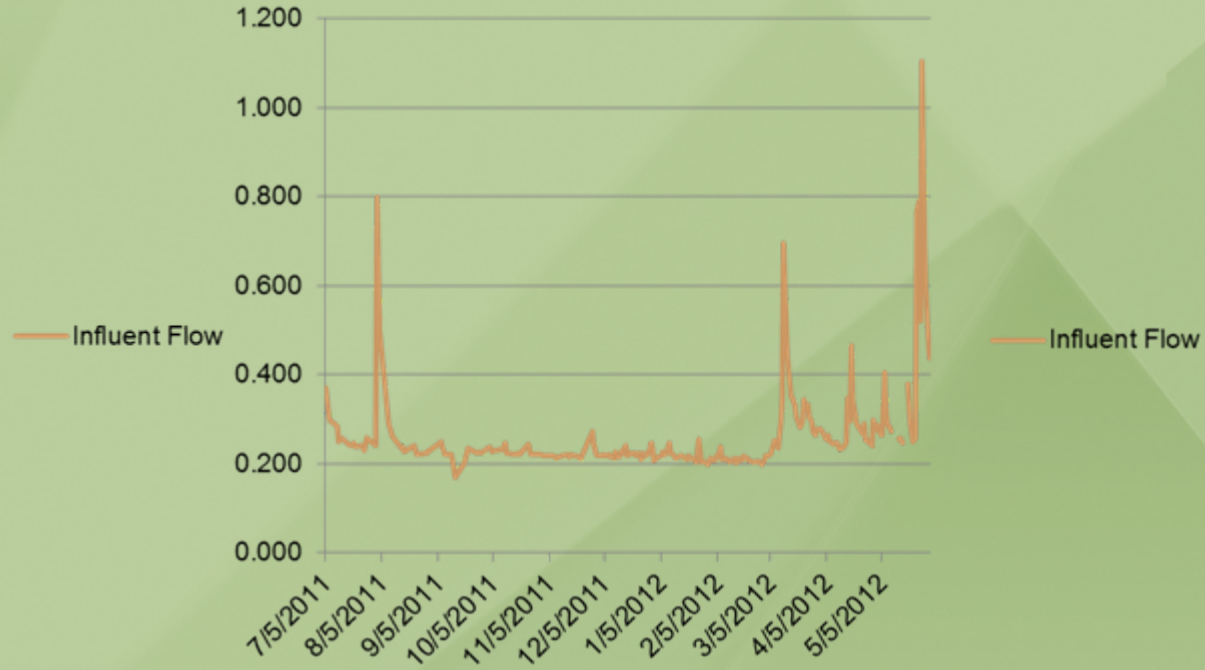
- Determine equipment functioning
- Look at History
- Daily Lab Tests
- Micro Biologists Review MLSS and operations

# Influent Flow Comparison

## Influent Flow

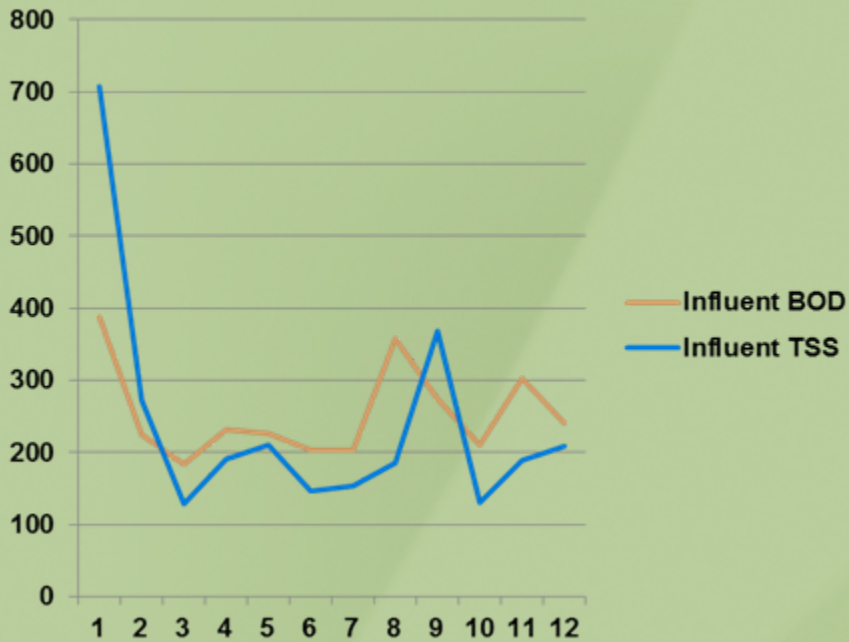


## Influent Flow

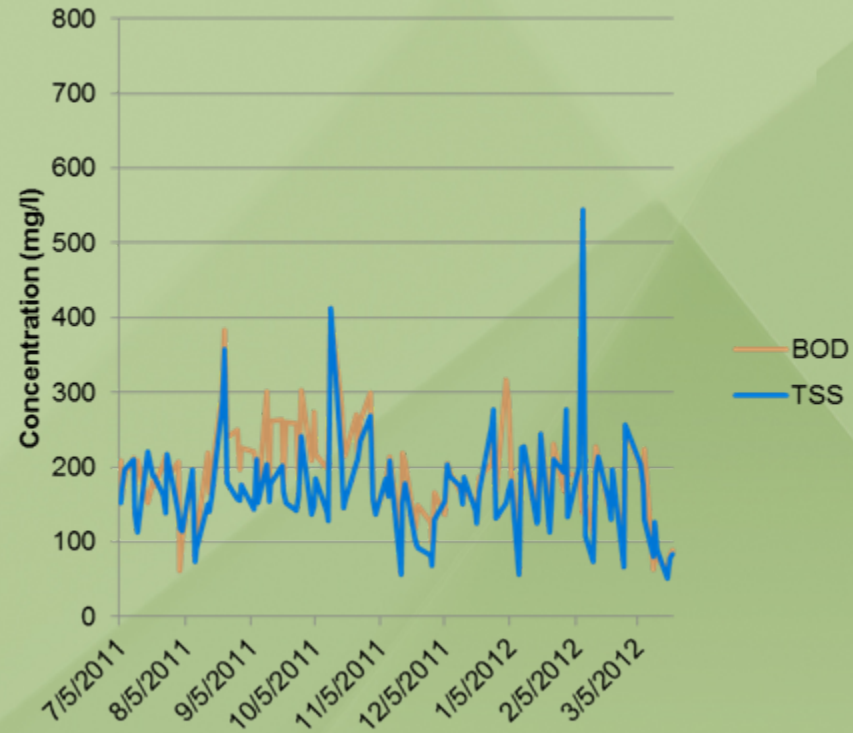


# Influent Flow Comparison

## June 2009 Influent



## Influent BOD and TSS



# Microbiology

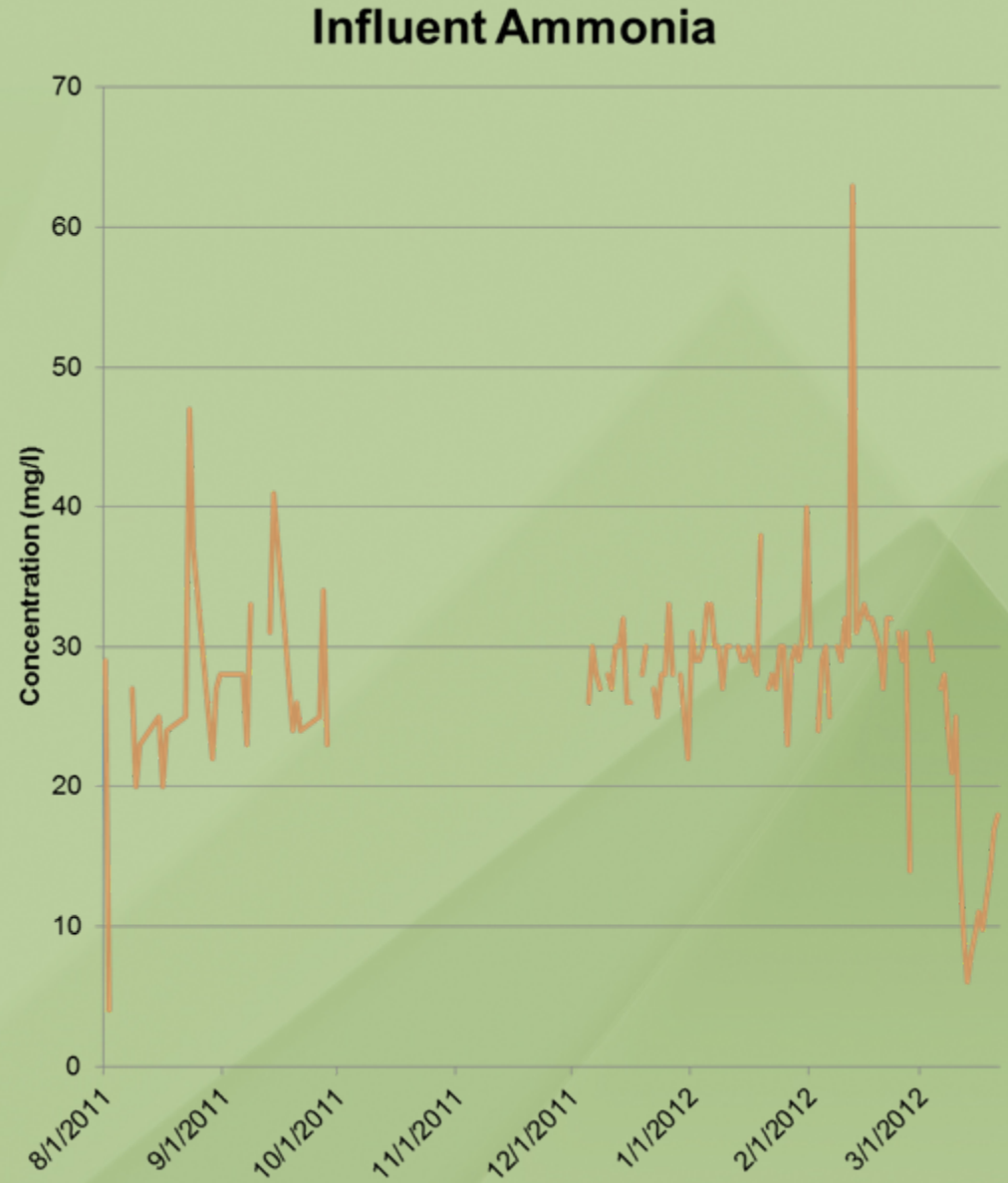
- Aeration basin: Little to no biomass was present in the aeration basin sample. A few flagellates were present otherwise, no other protozoa or metazoa were observed.
- There were a few crawling and swimming ciliates present, particularly *Paramecium* and *Coleps*, but no rotifers. Rotifers are very 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

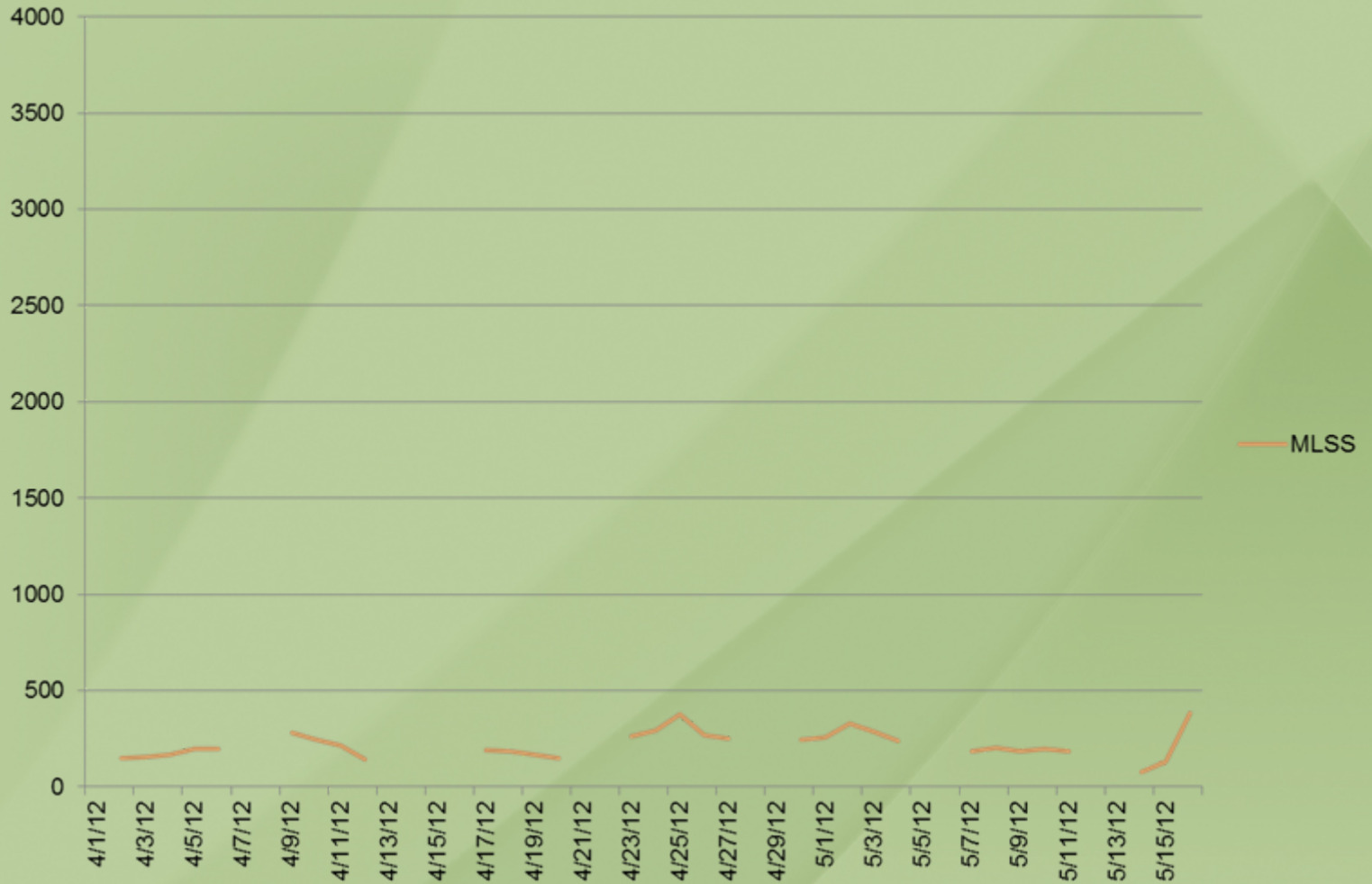
- There were some samples in manholes performed
- Most were normal
- There were two high samples, 83 mg/l and 59 mg/l
- A procedure to sample the Community's sanitary system was discussed
- Still not positive what is the toxin

# 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

# MLSS

## MLSS



# 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

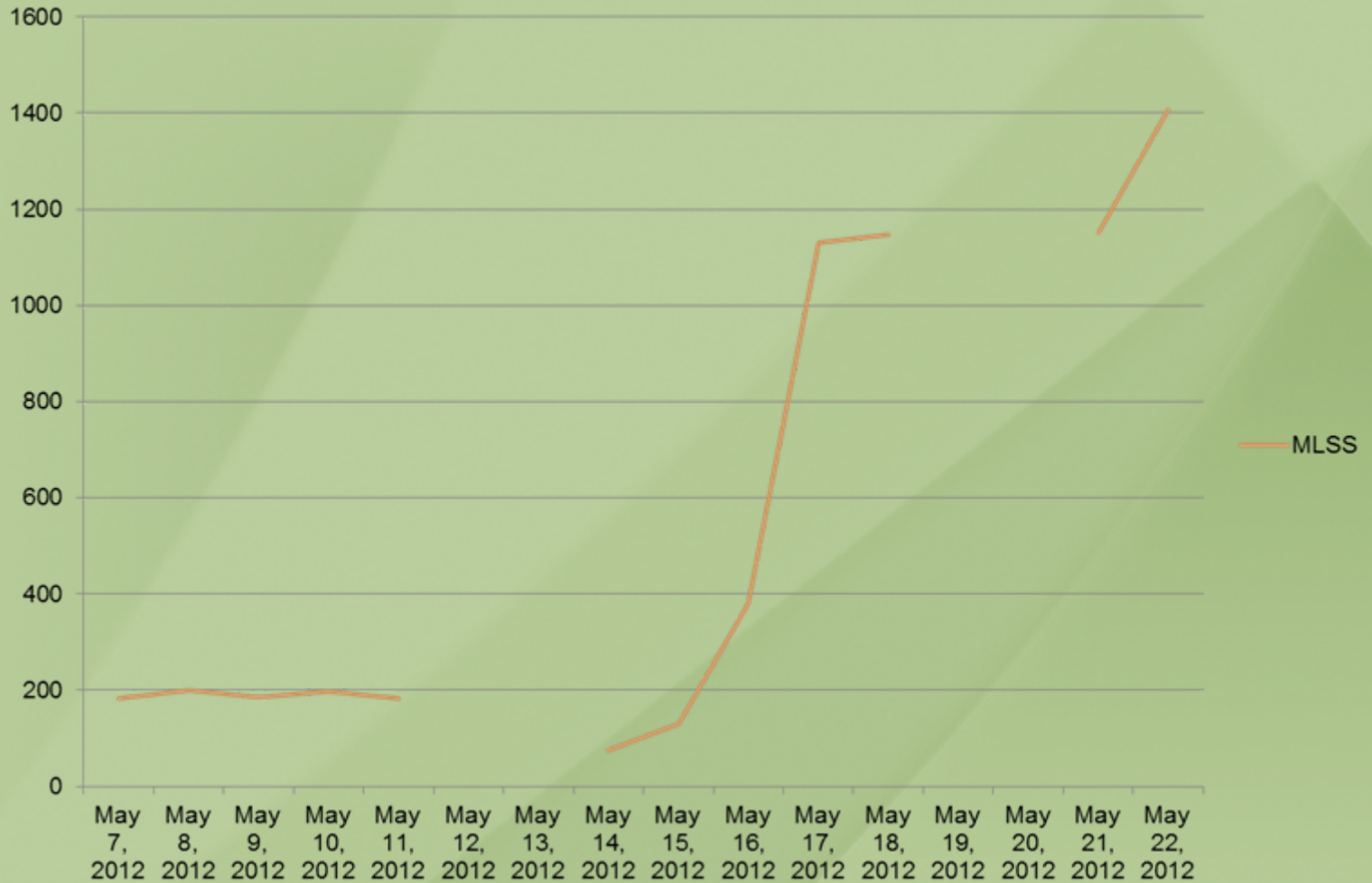
- Process Manufacture on site reviewing equipment
- Outside Operations Experts on site reviewing day to day operations
- WET tests
- TIE test
- Prepare to do Priority Pollutant Scan

# 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

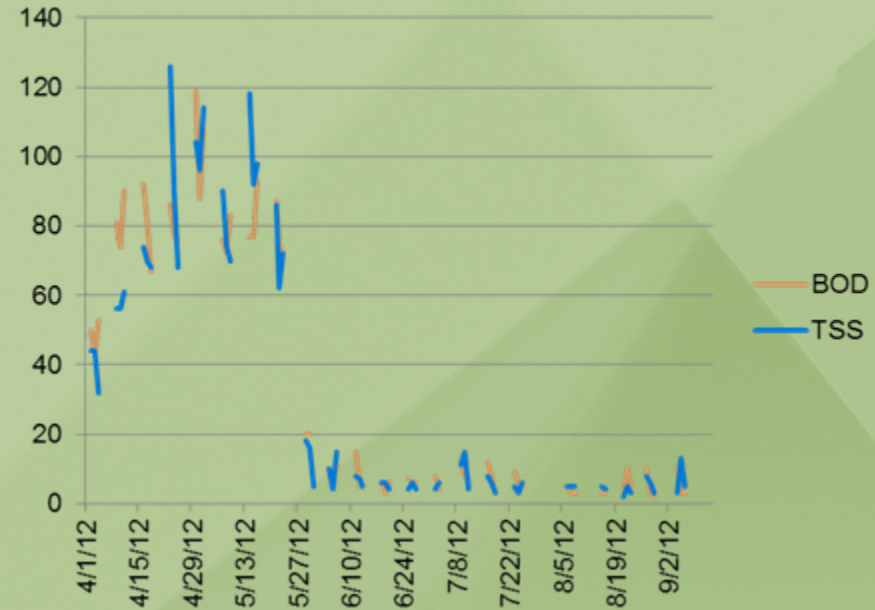


# WWTP upset over

## MLSS



## Effluent BOD & TSS



# 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

