



A Fly In Your Ointment

WWOA 48th Annual Conference

October 8, 2014

Presented by

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Acknowledgement

- Bruce Neerhof-Operator, Lakeland College

Lakeland College



Wastewater Plant Capacities

- Design Flow
 - Average 0.083 MGD
 - Maximum Month 0.117 MGD
 - Peak 0.358 MGD
- Daily Flow
 - Summer 0.035-0.055 MGD
 - School Year 0.055-0.070 MGD
- Design BOD 138 pounds per day

Plant Building



Anoxic Selector



Activated Sludge Plant



Aeration Tank



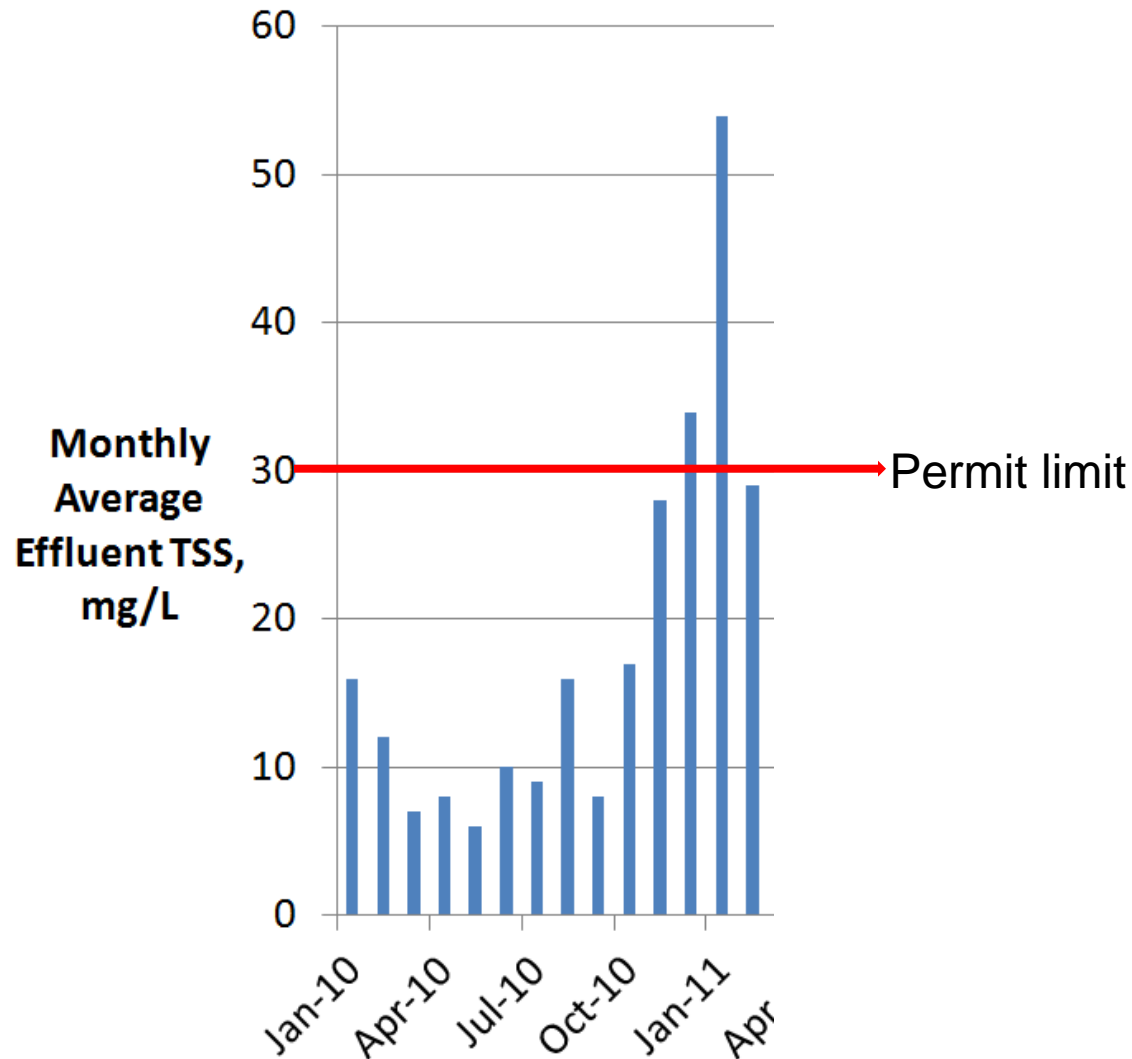
Clarifier



Building



Suspended Solids Issue-Data



Approach to Identifying Problem

- Review plant effluent data
- Review operational daily data
- Discuss chemical cleaning with college
- Check selector for soluble BOD
- Microscopic analysis of sludge

Results of Investigation

- Data showed increased Sludge Volume Index
- Sludge age increased to over 15 days
- Oxygen level good 2-4 mg/l - higher at night
- Decant of Aerobic Holding tank - no change
- Microscopic examination showed filaments

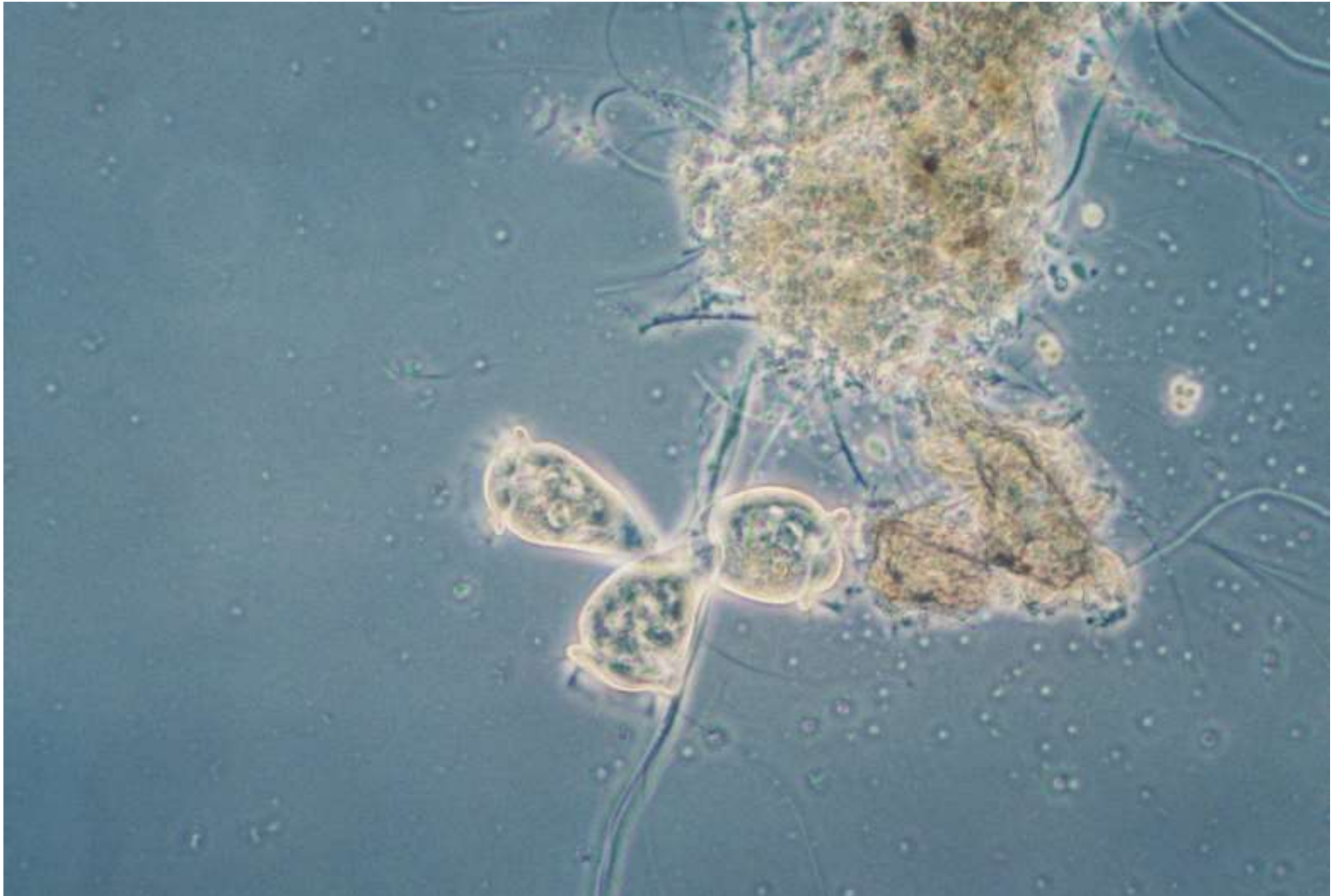
Micrographs from a Sample Received
March 4, 2011
Lakeland College Treatment Facility

By Jeff MacDonald, Microbiologist

250X The Stalked Ciliate *Vorticella*



250X Stalked Ciliate *Carchesium*



250X Free-swimming Ciliate
Trachelophyllum



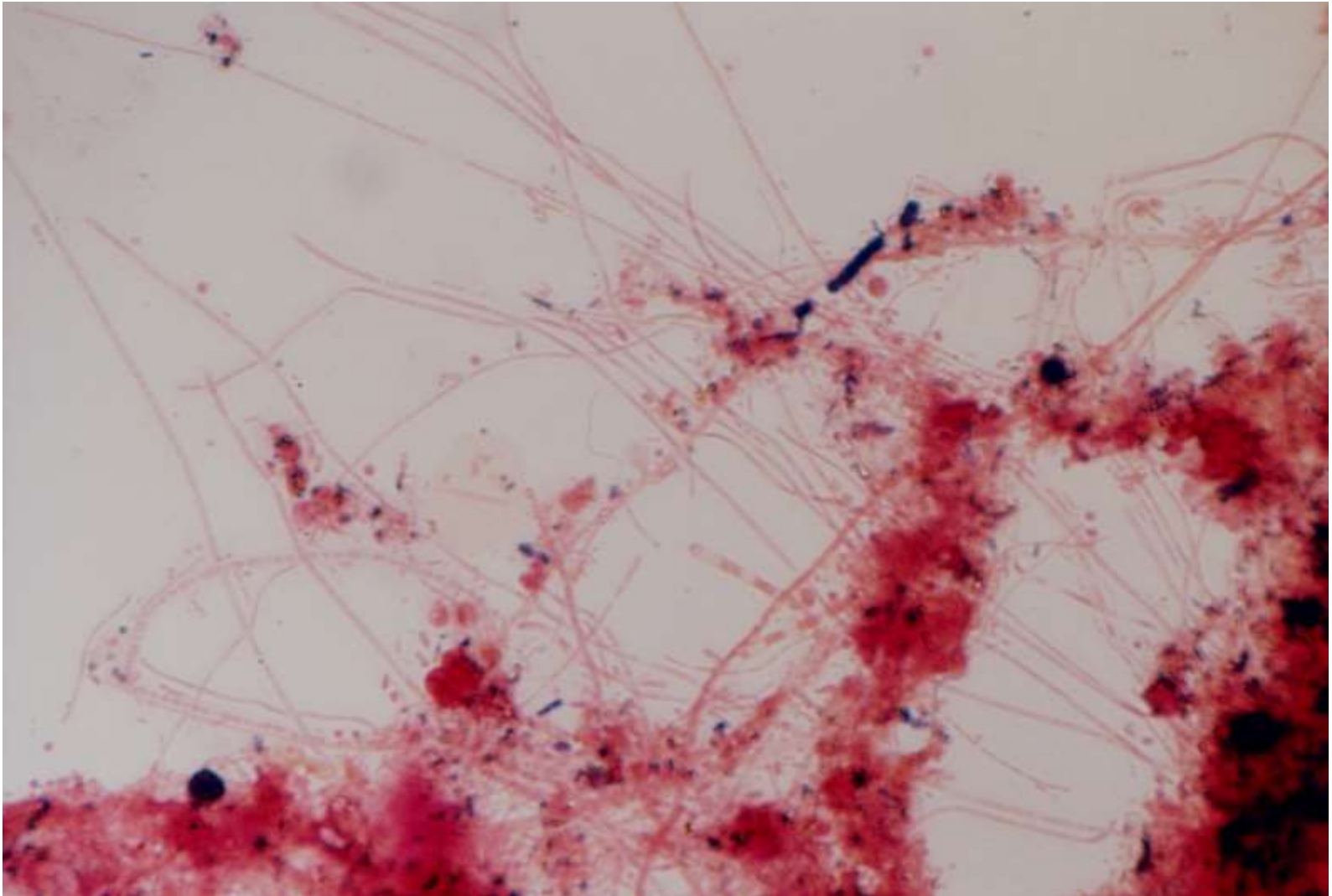
250X *Amoeba Mayorella*



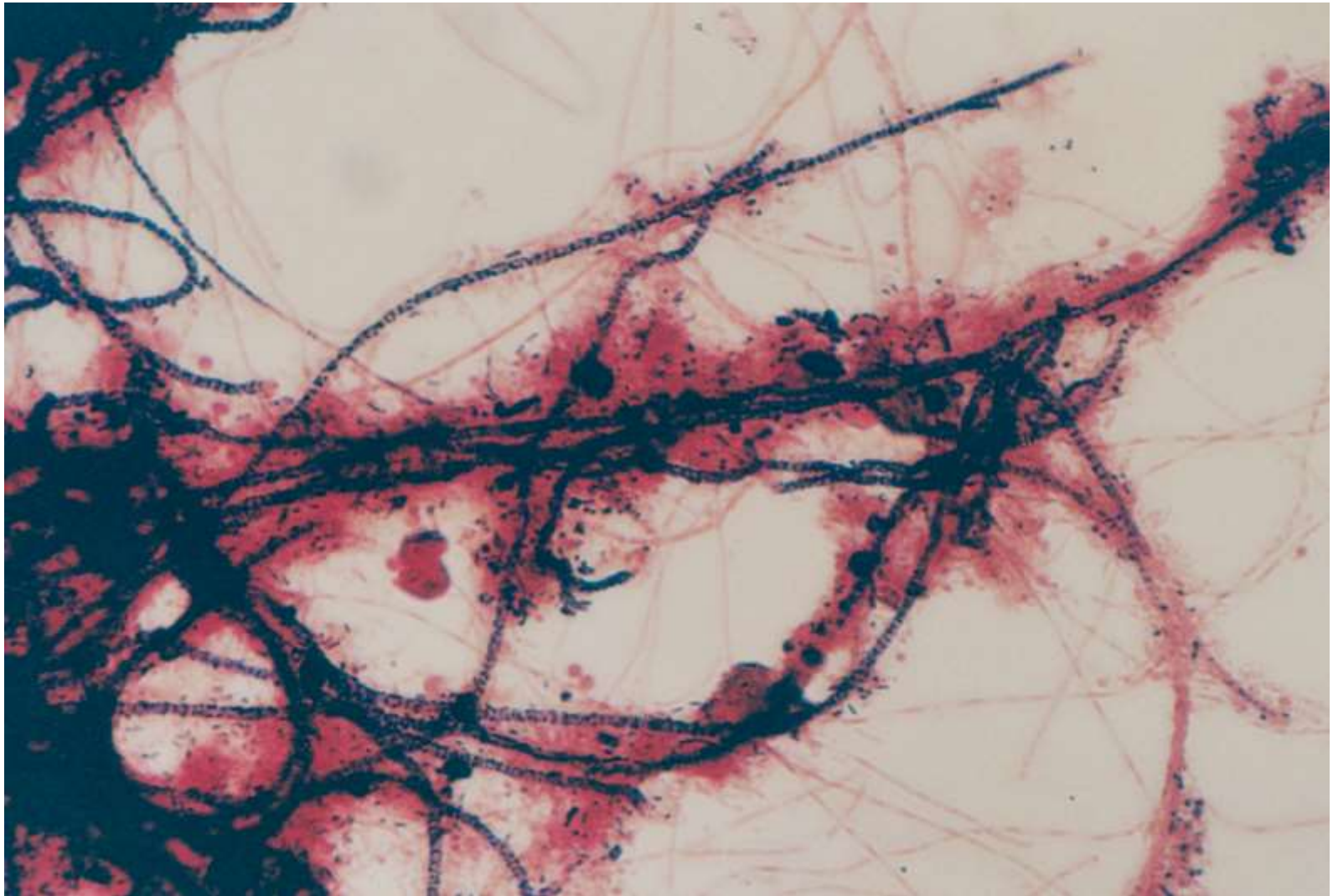
250X Floc and Filaments



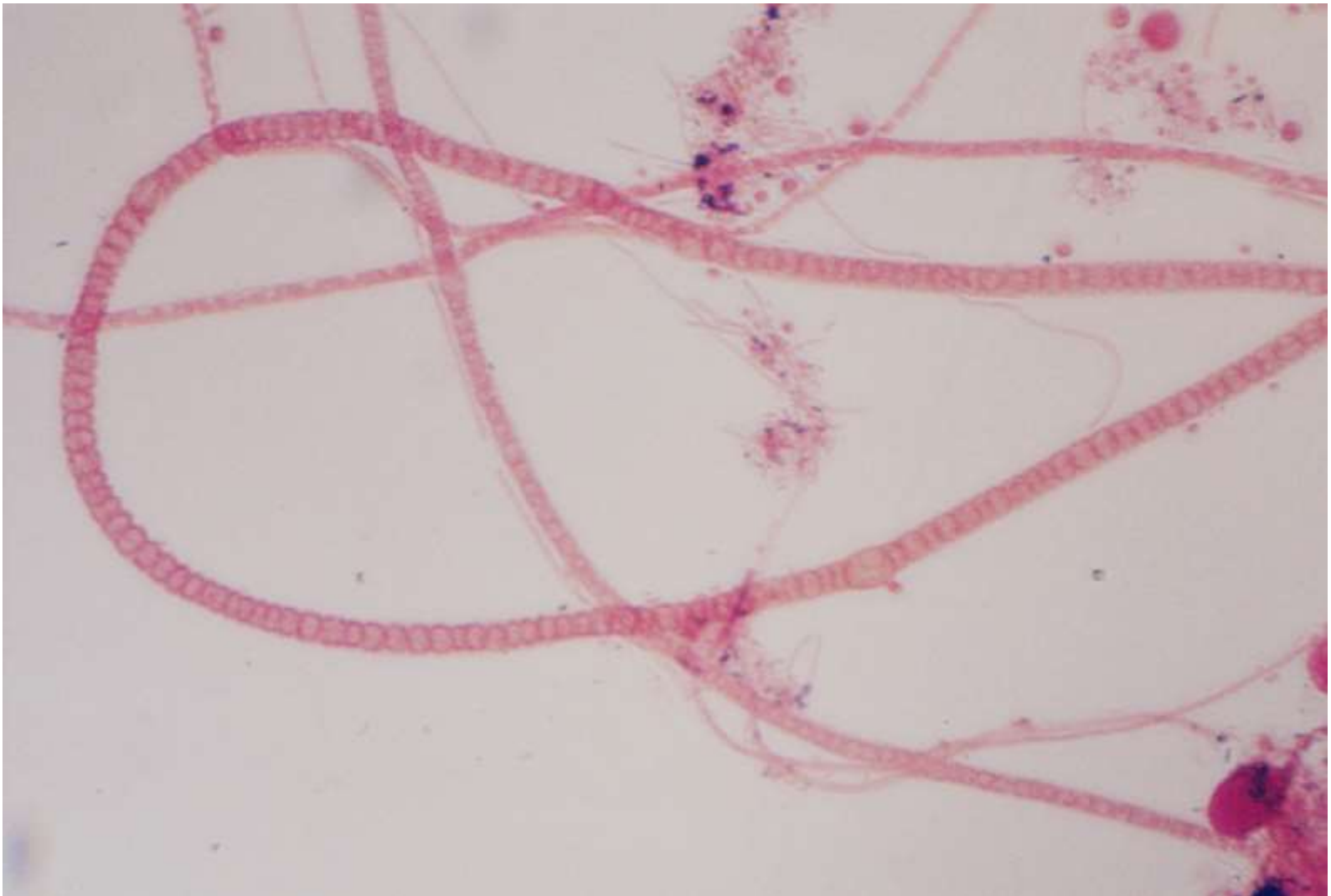
980X *Haliscomenobacter hydrossis*



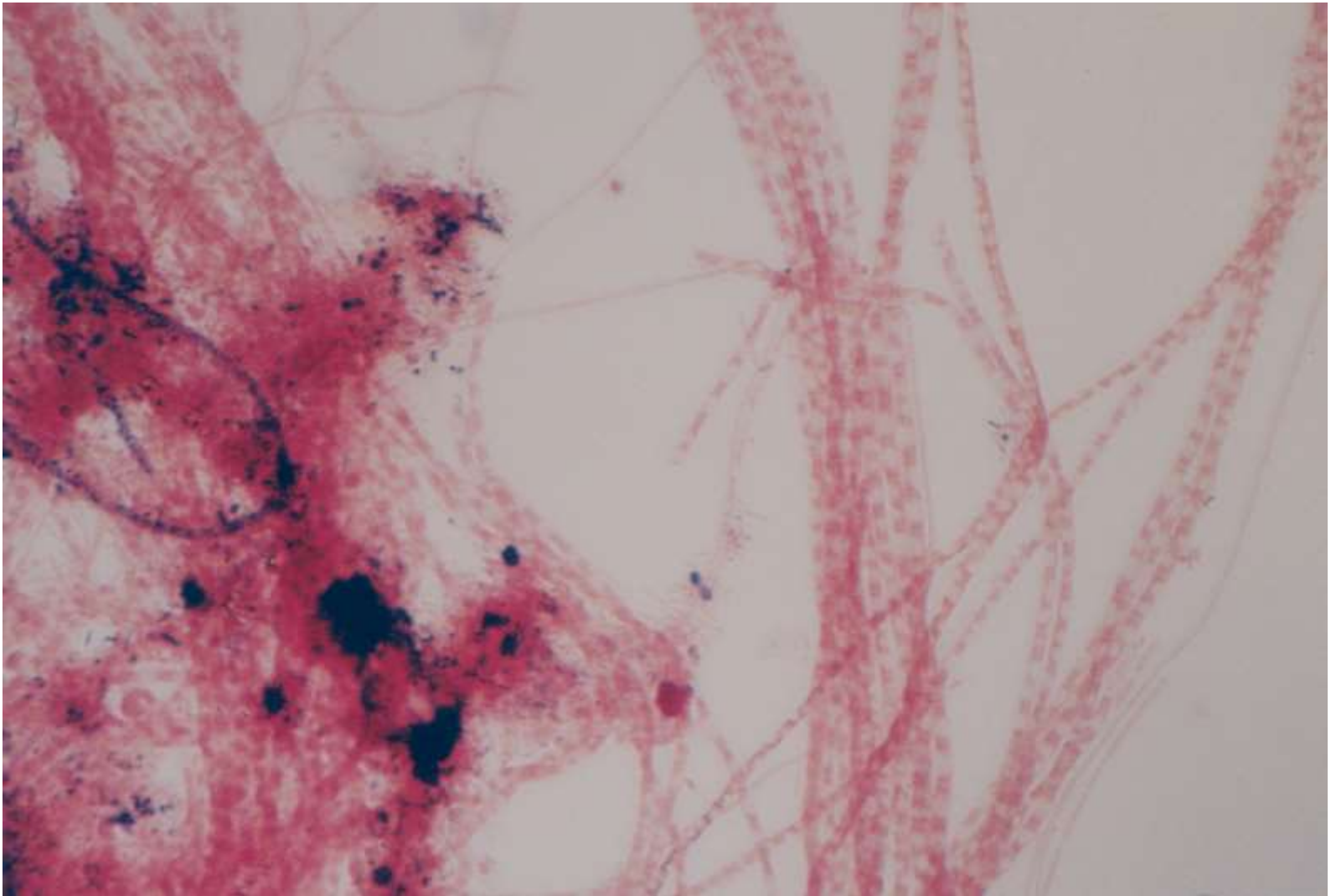
980X Filament Type 0041



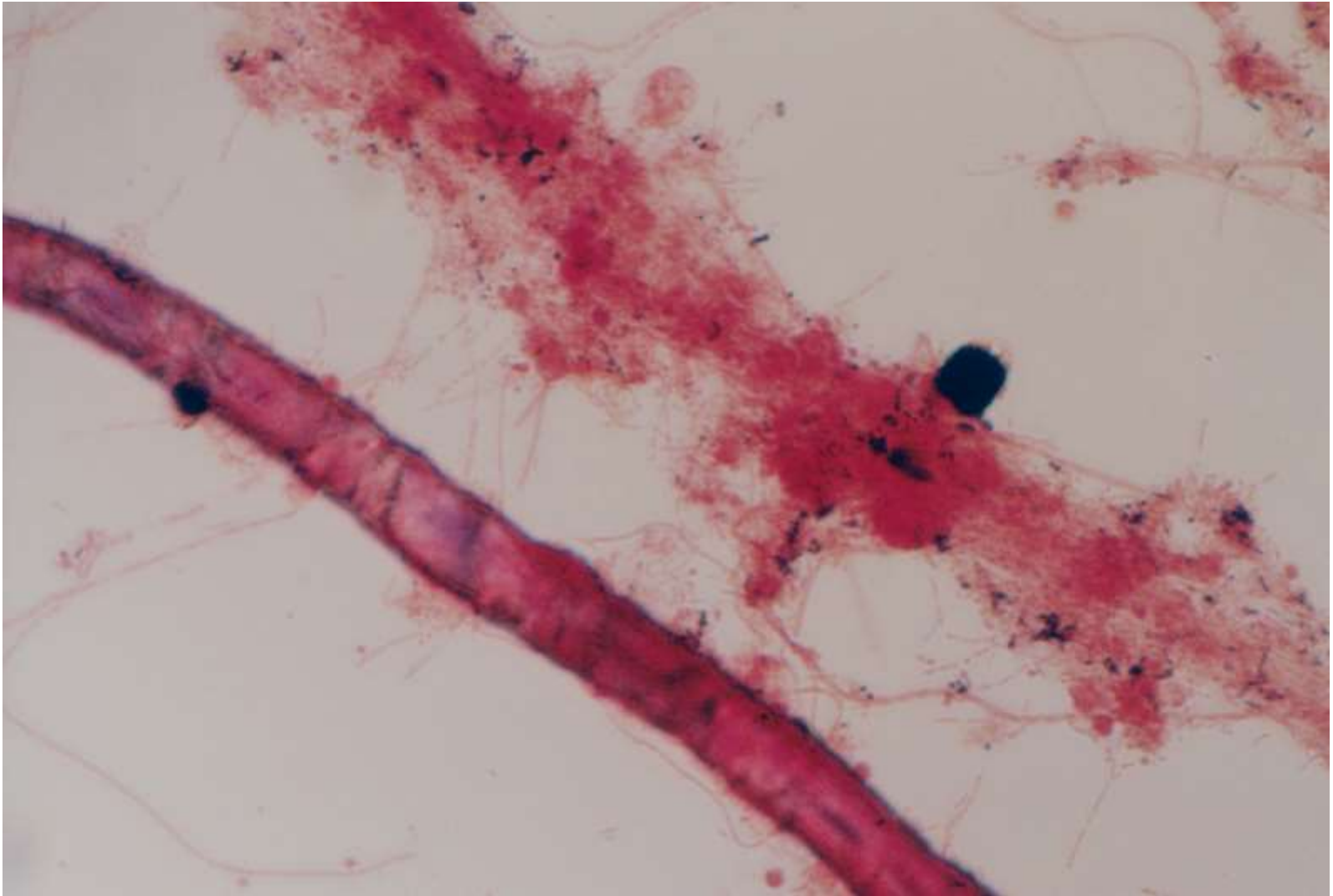
980X Filament O21N



980X *Sphaerotilus natans*



980X Wood Fibers



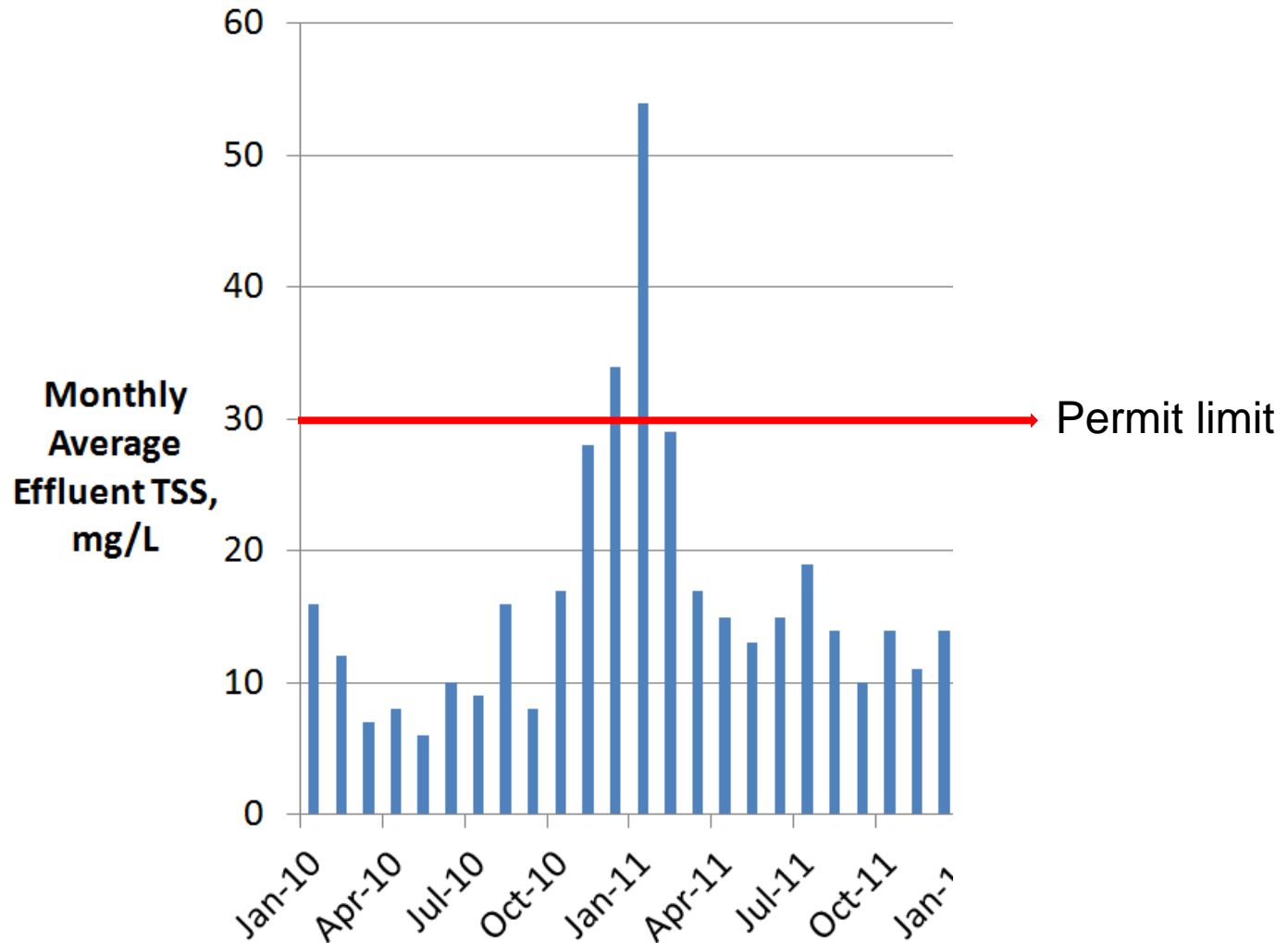
Action in 2011 to Address Filaments

- Automated Aeration - More Uniform D.O.
- Lower SRT to 5 days

Blower VFD's for D.O. Control



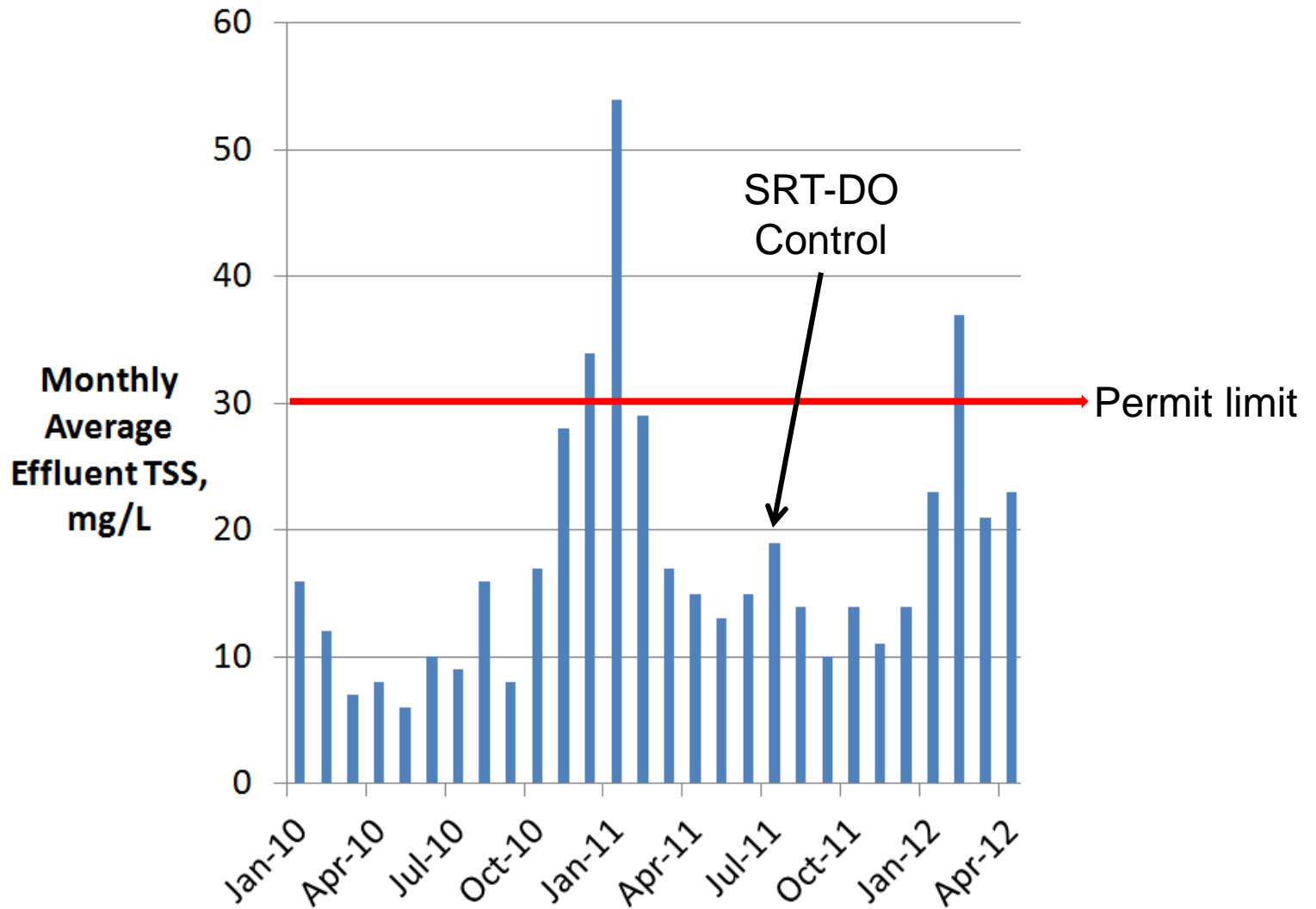
Impact of Process Changes



Data to Show Results

- Effluent Quality Improved
- College on Summer Break
- Winter of 2011-12 Poor Effluent TSS

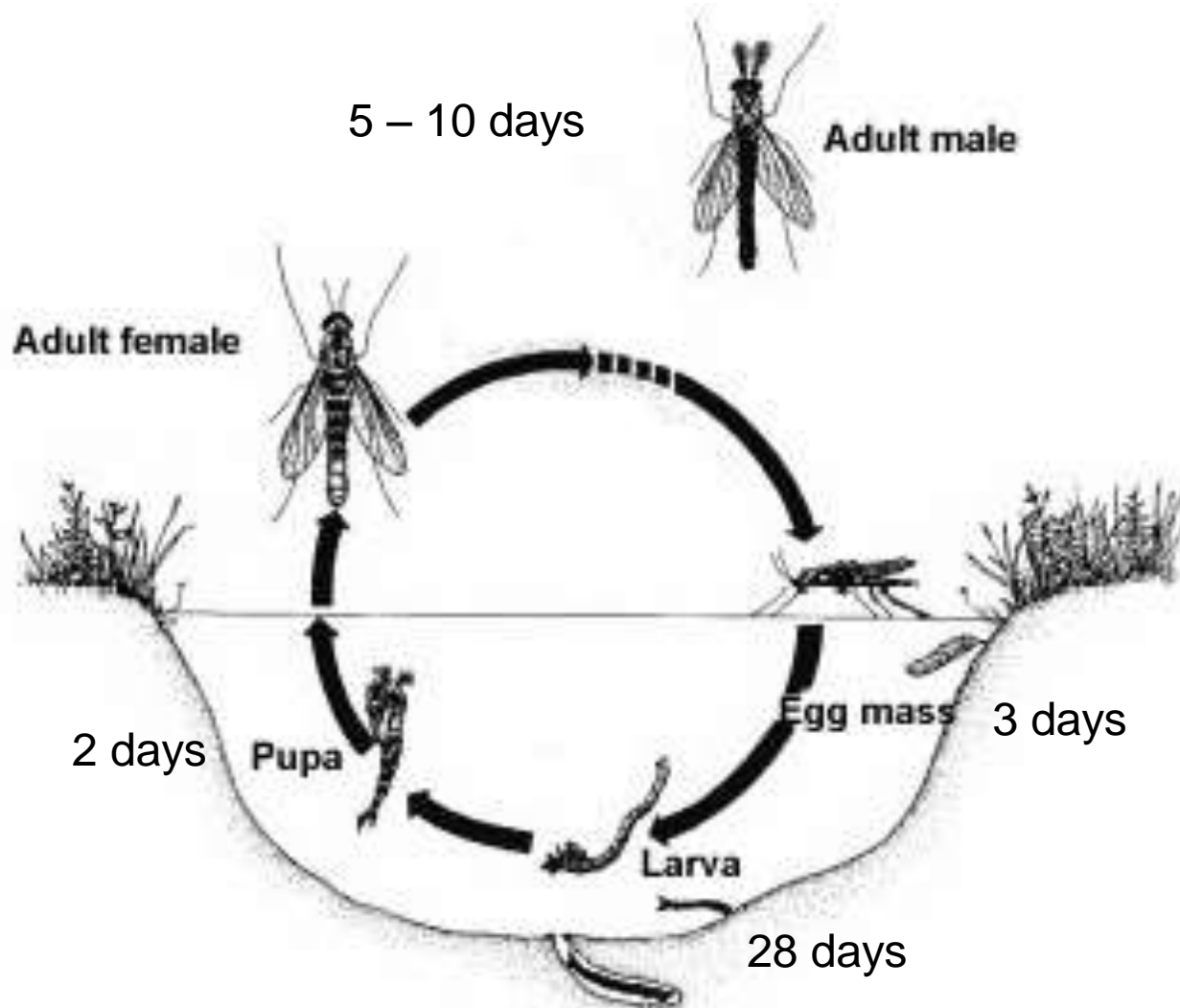
Poor Effluent Quality



The Fly

- Operator Reads TPO Magazine June 2012 –
 - “Where Have All The Solids Gone?” by Ron Trygar, Trainer, Florida TREEO
 - Relates to clarifier observations
 - Clumps
 - Gray shaggy mop heads
 - Midge Fly

Life Cycle of the Midge Fly



Biting Fly



Larvae



Larvae



Larvae



Problem

- Larvae develop sticky cocoon in sludge and walls
- Sludge in clarifier is a sticky mass
 - Anaerobic conditions
 - Filaments related to low DO and Sulfide
- Sludge in large clumps float as straggler floc

Treatment Methods

- Control Adult Fly
 - Low light
 - Keep clean
 - Fog room
- Control Larvae and Eggs
 - Bti (Bacillus thuringiensis) “Aquabac XT3” – Impacts larvae digestive system and dies
 - Methoprene “Strike” - mimics growth hormone
 - Monomolecular Film “Agnigue MMF” - reduces surface tension

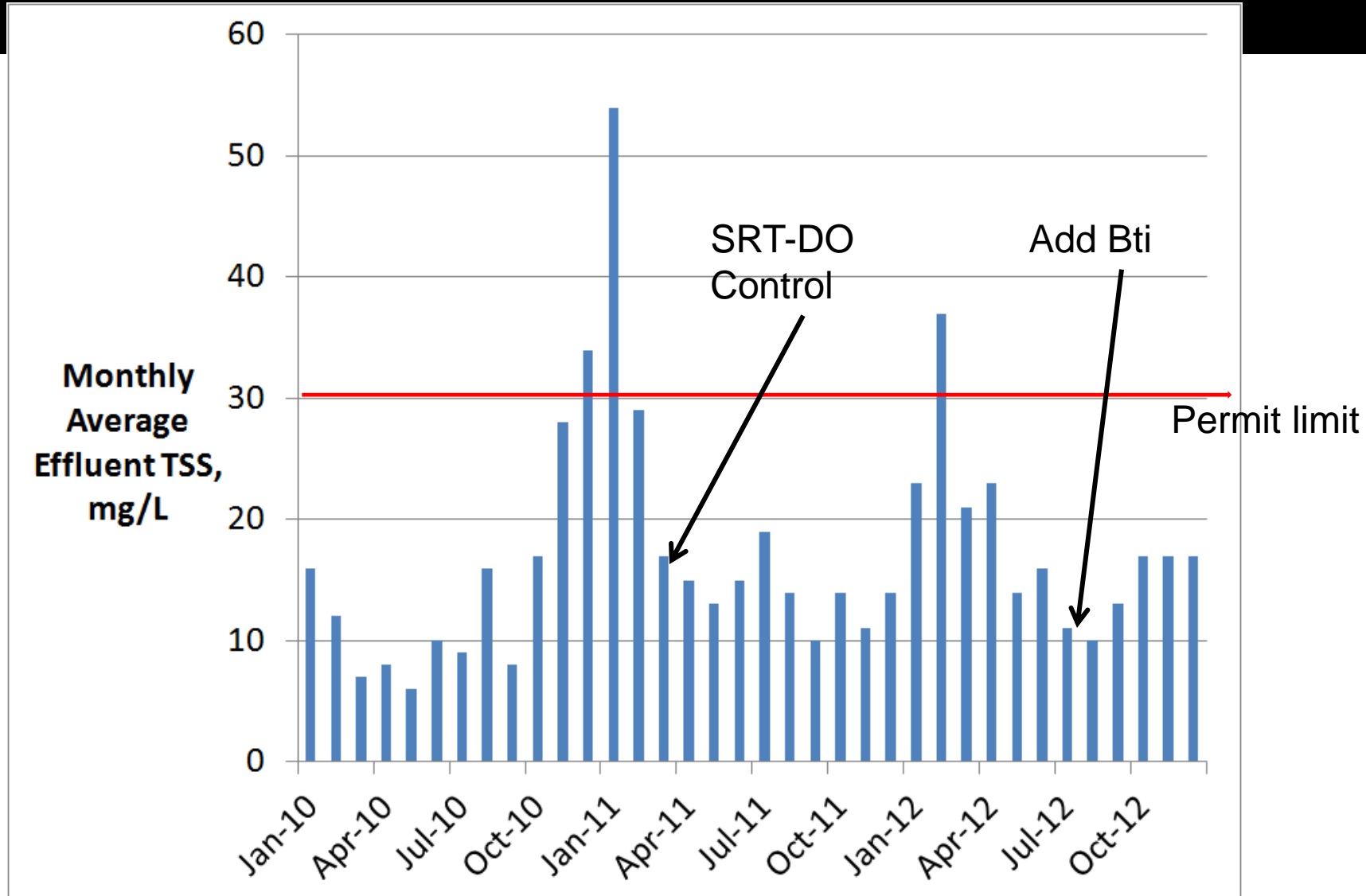
Bti

- “Aquabac XT3” – Aquafix located in Madison, WI. Phone 888-757-9577
- Registered by US EPA
 - EPA Registration Number: 62637-1
- Approved by WDNR

Bti Dosage

- Dosage
 - Initially 1 quart to aeration and one to clarifier
 - 8 to 16 oz. per day for two months in summer
- Cost \$24/day
- Added to Plant July and August 2012

Impact of Process Changes



Results

- Effluent TSS within limits
- Good settling sludge
- Bti addition again June 2013 for two weeks
- No Bti addition in 2014.

Questions

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