



STRAND
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Operator Training Committee of Ohio 2017 Pretreatment Conference

May 9, 2017

Pretreatment Program Development and Implementation

Presented By:
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Strand Associates, Inc.®



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Outline of Presentation

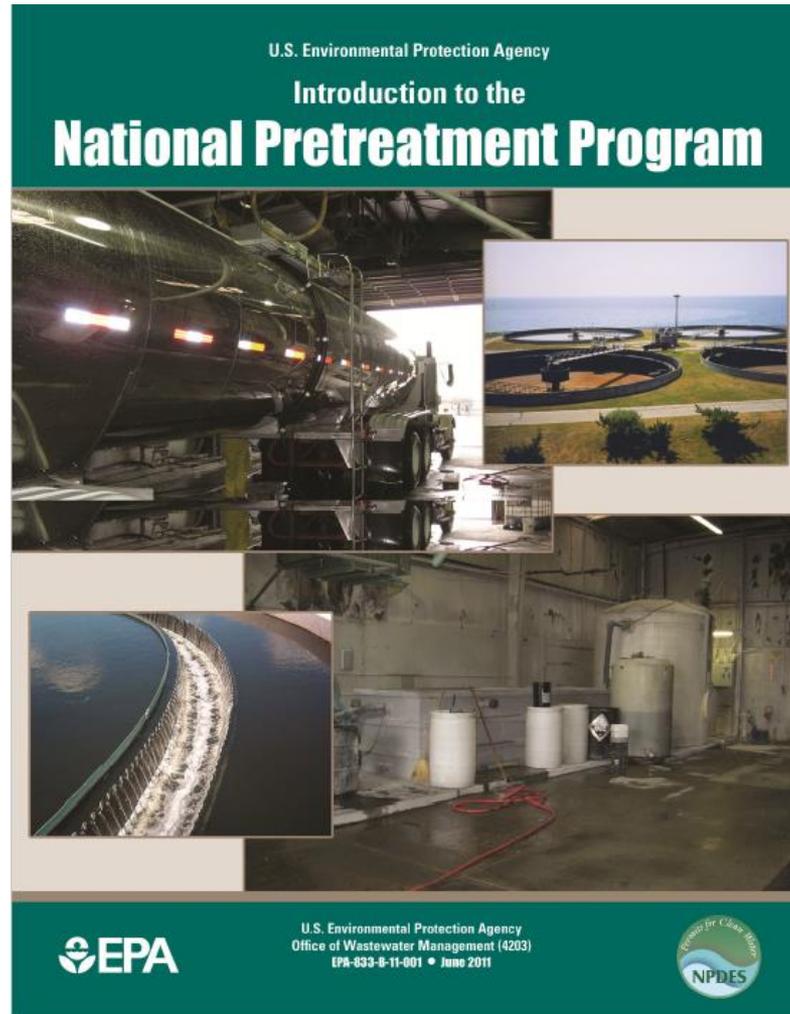
- Pretreatment programs from 30,000 feet
- Program Development Case Studies
- Reacting to Plant Upsets Case Studies

There's a Guideline for that!

- How many US EPA guidelines did I download in preparation for this presentation?

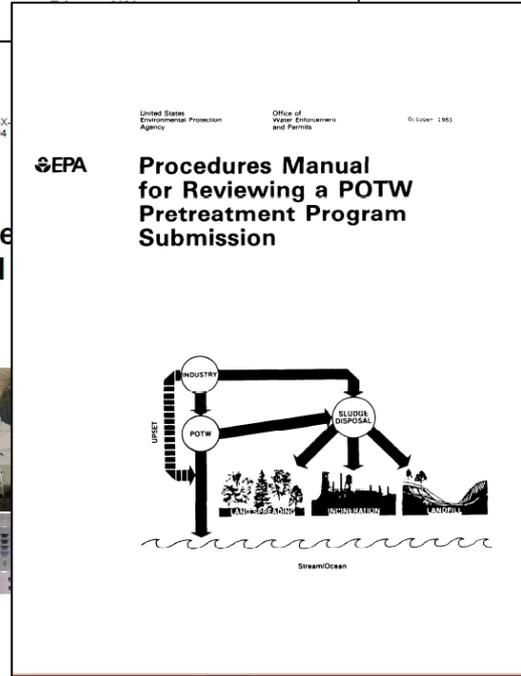
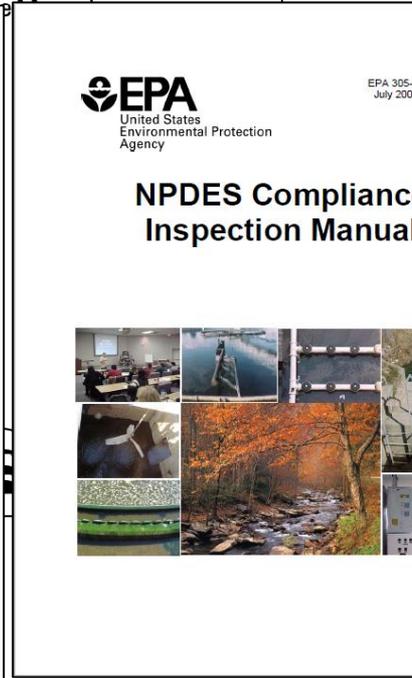
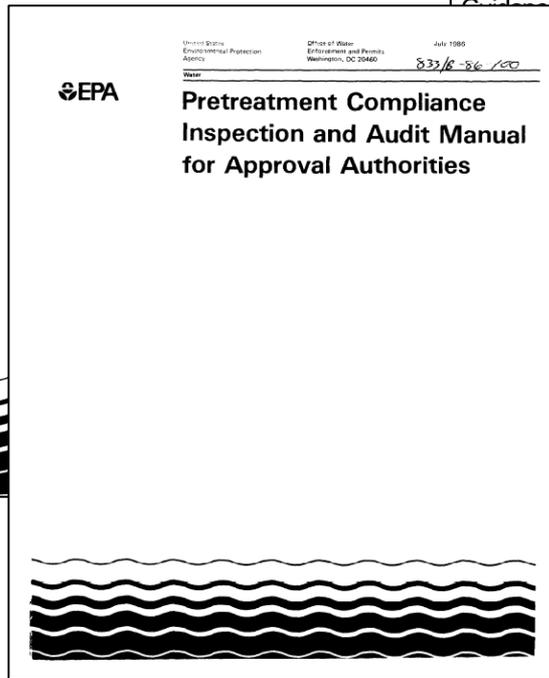
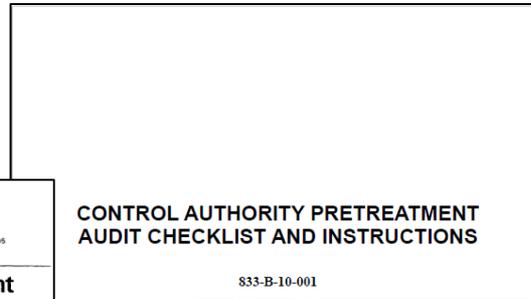
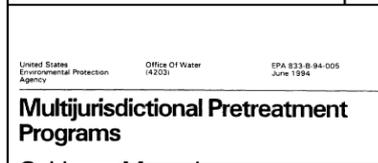
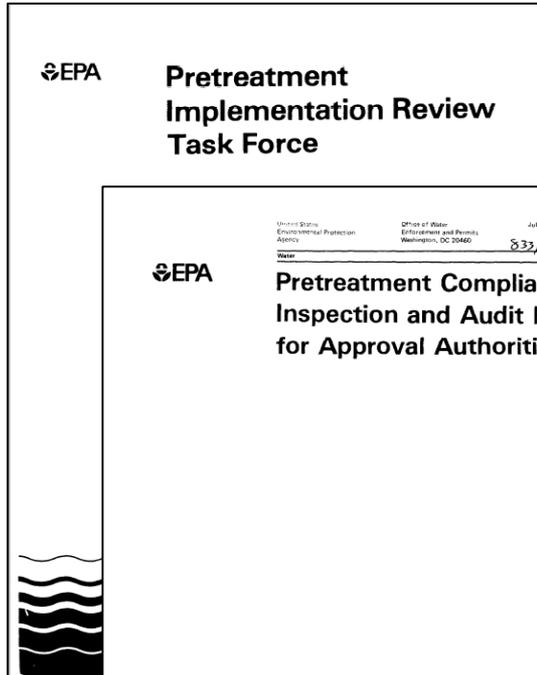
48 Documents
201 MB

There's a Guideline for that!



Courtesy of: <https://www.epa.gov/>

There's a Guideline for that!

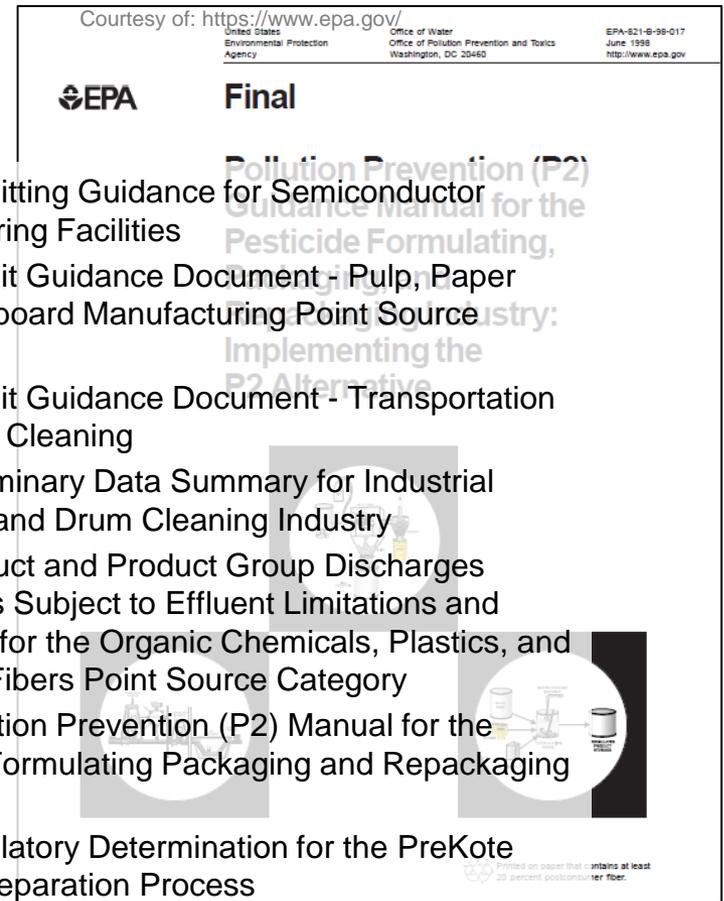


Courtesy of: <https://www.epa.gov/>

Approval Authority Guidance (6)

There's a Guideline for that!

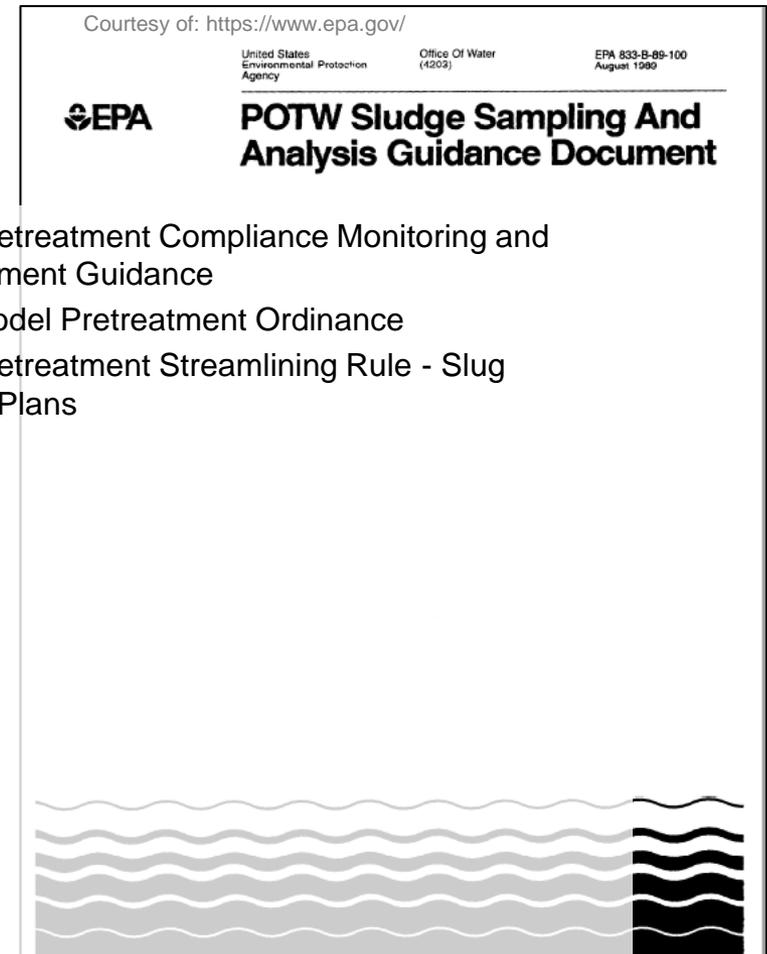
- 1989 Aluminum, Copper, and Nonferrous Metals Forming and Metal Powders Pretreatment Standards, A Guidance Manual
- 1987 Guidance Manual for Battery Manufacturing Pretreatment Standards
- 1984 Guidance Manual for Electroplating and Metal Finishing Pretreatment Standards
- 1985 Guidance Manual for Iron and Steel Manufacturing Pretreatment Standards
- 1986 Guidance Manual for Leather Tanning and Finishing Pretreatment Standards
- 1984 Guidance Manual for Pulp, Paper, and Paperboard and Builders' Paper and Board Mills Pretreatment Standards
- 1988 Implementation of Organic Chemicals, Plastics, and Synthetic Fibers Pretreatment Standards
- 1987 Implementation of the Organic Chemical Pretreatment Standards
- 2012 National Pretreatment Program Fact Sheet Controlling Fats, Oils, and Grease Discharges from Food Service Establishments
- 1998 Permitting Guidance for Semiconductor Manufacturing Facilities
- 2000 Permit Guidance Document - Pulp, Paper and Paperboard Manufacturing Point Source Category
- 2001 Permit Guidance Document - Transportation Equipment Cleaning
- 2002 Preliminary Data Summary for Industrial Container and Drum Cleaning Industry
- 2005 Product and Product Group Discharges Discharges Subject to Effluent Limitations and Standards for the Organic Chemicals, Plastics, and Synthetic Fibers Point Source Category
- 1998 Pollution Prevention (P2) Manual for the Pesticide Formulating Packaging and Repackaging Industry
- 2003 Regulatory Determination for the PreKote Surface Preparation Process
- 1984 Status of Textile Mills Pretreatment Standards
- 2006 Pretreatment Streamlining Rule - New Classifications for Categorical Industrial Users



Industry-Specific Guidance (18)

There's a Guideline for that!

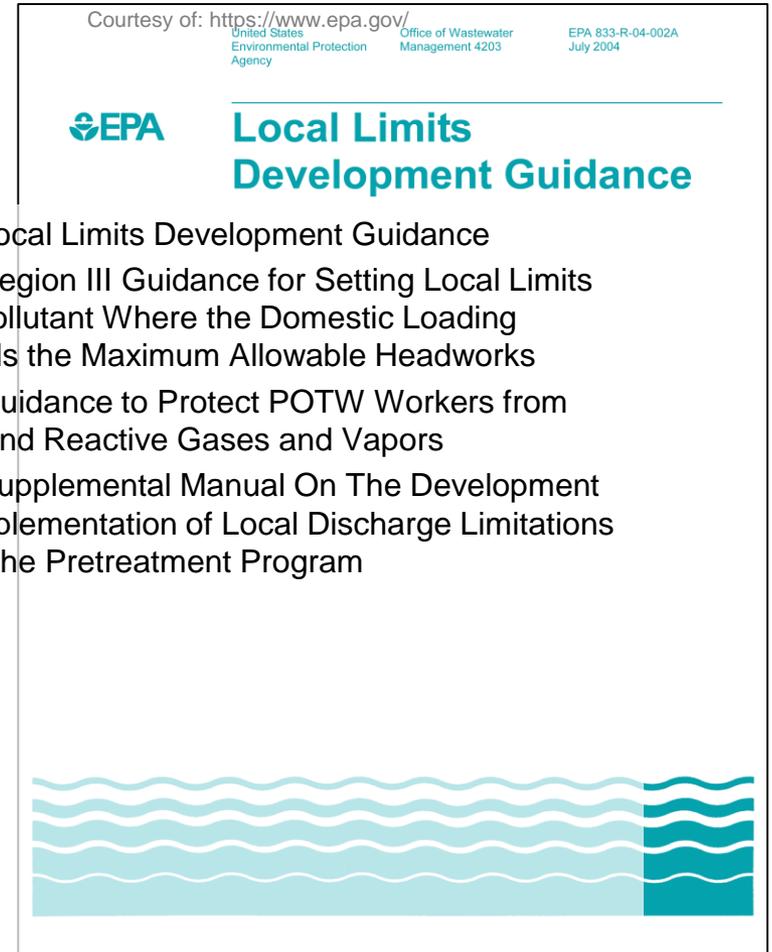
- 1990 CERCLA Site Discharges to POTWs Guidance Manual
- 1991 Control of Slug Loadings to POTWs Guidance Manual
- 1990 Guidance Manual for POTWs to Calculate the Economic Benefit of Noncompliance
- 1994 Industrial User Inspection and Sampling Manual for POTWs
- 1989 POTW Sludge Sampling and Analysis Guidance Document
- 1985 RCRA Information on Hazardous Wastes for Publicly Owned Treatment Works
- 2012 Industrial User Permitting Guidance Manual
- 1989 Guidance for Developing Control Authority Enforcement Response Plans
- 1983 Guidance Manual for POTW Pretreatment Program Development
- 1986 Pretreatment Compliance Monitoring and Enforcement Guidance
- 2007 Model Pretreatment Ordinance
- 2007 Pretreatment Streamlining Rule - Slug Control Plans



Control Authority Guidance (12)

There's a Guideline for that!

- 1985 Applicability of Categorical Pretreatment Standards to Industrial Users of Non-Discharging POTWs
- 1987 Applicability of Categorical Pretreatment Standards to Research and Development (R&D) Facilities
- 2008 Applicability of Effluent Guidelines and Categorical Pretreatment Standards to Biodiesel Manufacturing
- 1985 Guidance Manual for Implementing Total Toxic Organics Pretreatment Standards.pdf
- 1987 Guidance Manual for Preventing Interference at POTWs
- 1987 Guidance Manual for the Identification of Hazardous Wastes Delivered to Publicly Owned Treatment Works by Truck, Rail, or Dedicated Method
- 1985 Guidance Manual for the Use of Production-Based Pretreatment Standards and the Combined Waste Stream Formula
- 2004 Local Limits Development Guidance
- 1994 Region III Guidance for Setting Local Limits for a Pollutant Where the Domestic Loading Exceeds the Maximum Allowable Headworks
- 1992 Guidance to Protect POTW Workers from Toxic and Reactive Gases and Vapors
- 1987 Supplemental Manual On The Development and Implementation of Local Discharge Limitations Under the Pretreatment Program



Pretreatment Standards (11)

Pretreatment Programs from 30,000 Feet

- Prevent discharge of metals, toxic organics, solvents & other pollutants
- Prevent POTW interference and pass-through
- Prevent worker health and safety problems
- Enhance biosolids character



Courtesy of: Strand Associates, Inc. ®

Final Clarifier Failure

Program Development Components

- Legal Authority
- Procedures
- Funding
- Local Limits
- Enforcement Response Plan
- List of Significant Industrial Users (SIUs)

Pretreatment Standards

	General and specific prohibitions	Categorical pretreatment standards	Local limits
Development	Established at the federal level.	Established at the federal level.	Developed by the POTWs.
Reference	40 CFR 403.5(a) & (b)	40 CFR Parts 405–471	Requirements for development found in 40 CFR 403.5(c) & 403.8(f)(4). Local limits are often found in the local sewer use ordinance.
Applicability	All IUs	CIUs	Commonly all IUs or all SIUs, but depends on the allocation method used when developing limits.
Purpose	Provide for general protection of the POTW. Categorical pretreatment standards or local limits may be more stringent.	Minimum standards based on available treatment technology and pollution prevention measures for controlling nonconventional and toxic pollutants that could cause pass through, interference, and such at the POTW. Local limits may be more stringent.	Provide site-specific protection for a POTW and its receiving waters. Categorical standards may be more stringent.
<p>All standards are considered pretreatment standards for the purpose of CWA section 307(d), and therefore all standards, including local limits developed in accordance with 40 CFR 403.5(c), are enforceable by EPA and the state even though they might be developed at the local level. A POTW is responsible for identifying standard(s) applicable to each IU and applying the most stringent requirements where multiple provisions exist. Compliance with imposed standards can be achieved by any of the following: implementing BMPs, developing a pollution prevention program, or installing pretreatment.</p>			

Figure 3-5. Summary of standards.

Courtesy of: <https://www.epa.gov/>

Program Development and Implementation Cases

- Florence, Indiana
 - Establish Local Limits
 - Small System
- Lockport, Illinois
 - Full Plan Development
 - Complex System – but only 1 SIU
- Seymour, Indiana
 - Local Limit Review
 - Load Allocation Efforts

Florence Regional Sewer District



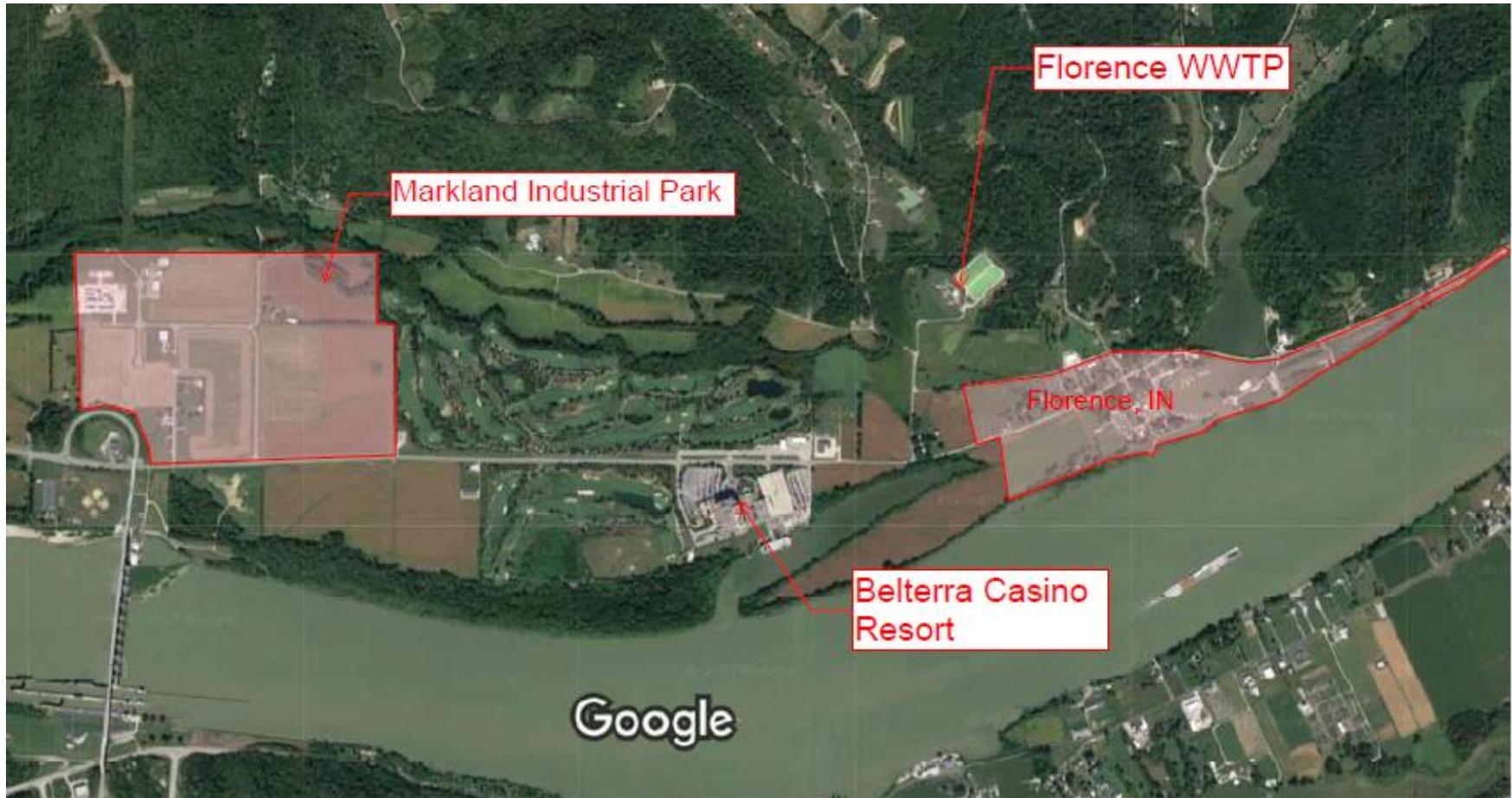
About Florence

- Population: 80

About the Plant

- 0.234 mgd design-average daily flow
- Extended aeration activated sludge with nitrification
- Aerobic sludge digestion
- Sludge holding ponds

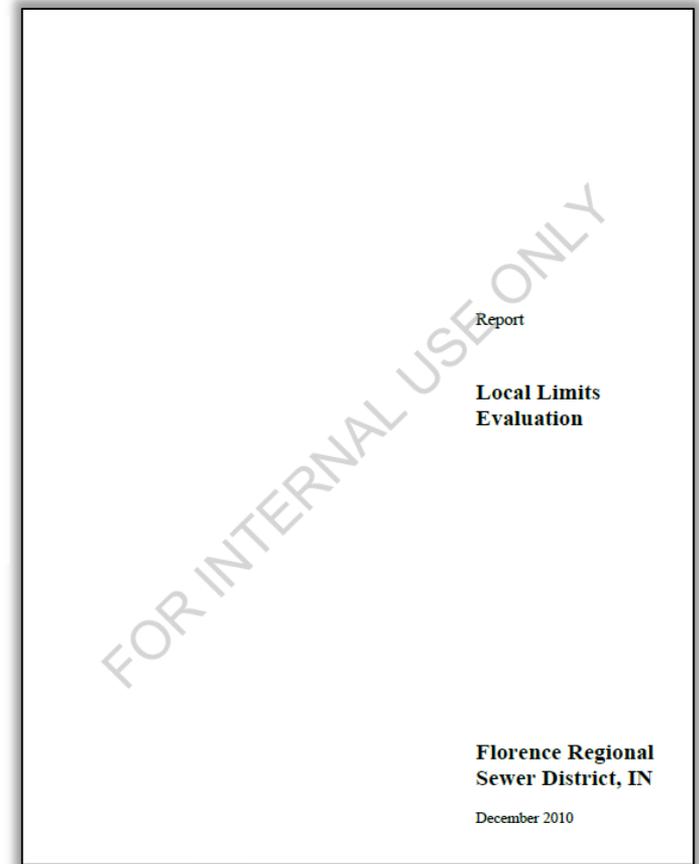
Florence Regional Sewer District



Map Data: Google, 2016

Local Limits Evaluation

- Industrial flows & loadings
- Residential & commercial flows & loadings
- WWTP flow
- Raw WW POC concentrations
- Effluent POC concentrations
- Receiving stream flow and background concentrations
- Inhibition values for sludge and nitrification



Courtesy of: Strand Associates, Inc. ®

Plant Data

- Design-average flow: 0.234 mgd
- Current average flow: 0.20 mgd
- Sludge average flow: 3,000 gallons per day
- Sludge percent solids: 0.52%
- Sludge criteria: Federal/State sludge disposal regulations
- Currently, landfill all sludge; copper and molybdenum have kept them from land applying in the past.



Courtesy of: Strand Associates, Inc. ®

Industrial User (IU) Data

- Flows calculated based on average of flows from Belterra for 2-year period + 10% = 0.221 mgd of 0.234 mgd
- Loadings calculated based on 9 days of sampling data over 2 months

Residential/Commercial User Data

- Flow is difference between IU and plant flow.
- Loadings calculated based on 9 days of sampling data over 2 months

Receiving Stream Data

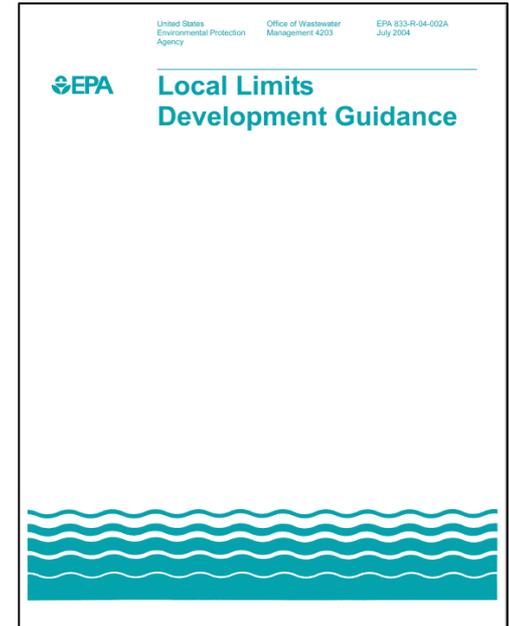
- Flow rates used for Log Lick Creek were same as those used by IDEM to develop NPDES permit limits
- 7Q10 flow of 0 mgd → No receiving water background concentrations
- Water Quality Standards from Indiana Administrative Code



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Plant Removal Efficiencies and Inhibition Levels

- Plant Influent and effluent sampling data collected over 9-day period
- Effluent sampling lagged 3 days to account for detention time in WWTP at typical flows
- Literature data from *Local Limits Guidance* was used when insufficient plant data was available
- Inhibition levels for AS and Nitrification taken from *Local Limits Guidance*

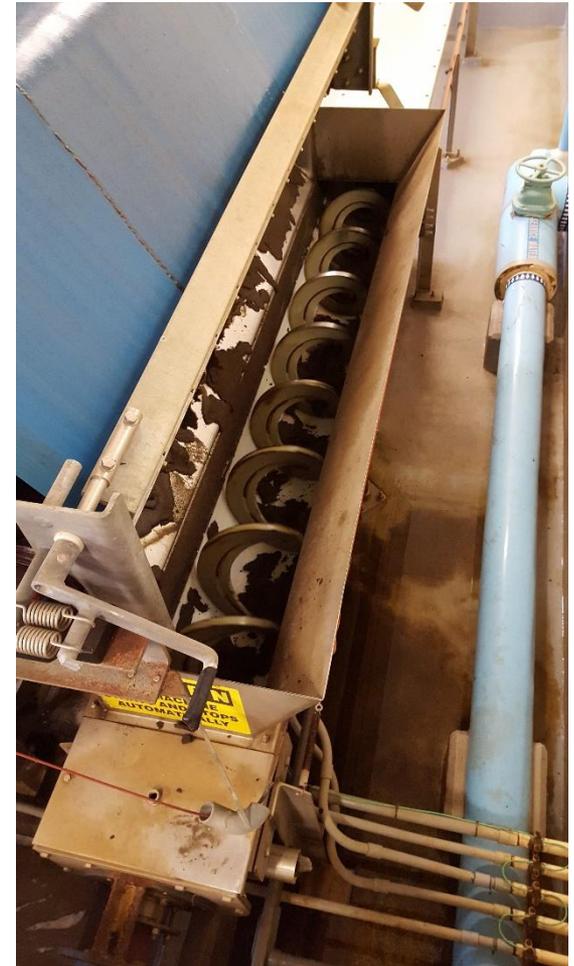


Courtesy of: <https://www.epa.gov/>

$$\text{Removal Efficiency} = \frac{\text{Influent} - \text{Effluent}}{\text{Influent}}$$

POC Selection

- The 10 Original
 - Arsenic
 - Cadmium
 - Chromium
 - Copper
 - Cyanide
 - Lead
 - Mercury
 - Nickel
 - Silver
 - Zinc
- Additional 5
 - Molybdenum
 - Selenium
 - ~~○ BOD5~~
 - ~~○ TSS~~
 - ~~○ Ammonia~~



Courtesy of: Strand Associates, Inc. ®

Limiting Criteria

- Activated Sludge Inhibition Criteria
- Nitrification Inhibition Criteria
- USEPA 503 Sludge Regulations
- State Sludge Criteria
- Chronic Water Quality Standards
- Acute Water Quality Standards
- Digester Inhibition Levels
- ~~NPDES Permit Limits~~



Courtesy of: Strand Associates, Inc. ®

- Deviations from using the lowest limit

Limiting Criteria

- Activated Sludge Inhibition Criteria – Chromium, Zinc
- Nitrification Inhibition Criteria
- USEPA 503 Sludge Regulations – Molybdenum
- State Sludge Criteria
- Chronic Water Quality Standards – Copper, Lead, Nickel
- Acute Water Quality Standards
- Digester Inhibition Levels

- No Limit Needed – Cadmium, Cyanide, Arsenic, Hexavalent Chromium, Mercury, Selenium, Silver

Results

- Proposed Copper limits are lower than existing and will impact the casino – higher at all sample points
- Existing limits for cadmium and cyanide could be removed, but were kept in place to avoid backsliding
- Molybdenum needs to be added

POC	Local Limit
Chromium	0.79 mg/L
Copper	0.19 mg/L
Lead	0.014 mg/L
Molybdenum	0.26 mg/L
Nickel	0.84 mg/L
Zinc	0.20 mg/L

Lockport, Illinois



Division St. WWTP



Map Data: Google, 2016

NPDES Permit

- NPDES Permit required IU survey
- Hired a consultant to complete the preliminary survey
- 358 surveys received (~75% response rate)
- 12 industry walkthroughs
- 1 categorical industry

SPECIAL CONDITION 19.

Schedule for Implementing the POTW Pretreatment Program

Under the authority of Sections 307(b) and 402(b)(8) of the Clean Water Act, and implementing regulations 40 CFR 403, the Permittee may be required to develop a Pretreatment Program. If it is necessary to develop a Pretreatment Program, the Permittee will be notified in writing by the Approval Authority after submittal of the industrial inventory discussed in the schedule below. This program, if required, shall enable the Permittee to detect and enforce against violations of Pretreatment Standards promulgated under Sections 307(b) and 307(c) of the Clean Water Act, prohibitive discharge standards as set forth in 40 CFR § 403.5, and state and local limits.

The Permittee should submit a copy of each activity to the IEPA and to USEPA, Region 5.

The schedule for the development of this Pretreatment Program is as follows:

ITEM

COMPLETION DATE

- | | |
|--|---|
| 1. Develop an industrial user inventory pursuant to 40 CFR § 403.8(f)(2)(i-iii), including identification of industrial users and the character and volume of pollutants contributed to the publicly owned treatment works (POTW) by the industrial users. The inventory shall include a list of all industrial users (Ius) discharging to the Permittee that are subject to categorical pretreatment standards under 40 CFR § 403.6 and 40 CFR Chapter I, Subchapter N, or would otherwise be considered significant under 40 CFR § 403.3(t). | 12 months from the effective date of this Permit |
| 2. Submit a proposed Pretreatment Program consistent with 40 CFR §§ 403.8 and 403.9(f). The proposed Pretreatment Program shall contain the following elements: | 12 months from the date of notification by the Approval Authority that development of a Pretreatment Program is necessary |

Courtesy of: <https://www.epa.illinois.gov/>

Survey Results

- *“It is our opinion that a Pretreatment Program is not necessary to regulate a single industrial user and the City should not be required to squander the limited sources available to develop an unneeded program.”*

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Courtesy of: <https://www.epa.illinois.gov/>

Which POTWs Must have a Pretreatment Program?

- The POTW has a design flow equal to or greater than 5 mgd and has SIUs

Or

- The nature or volume of the industrial influent, treatment process upsets, violations of POTW effluent limitations, contamination of municipal sludge, or other circumstances warrant development of an approved program in order to prevent interference with the POTW treatment processes or pass through

Program Development

- Deadline: 12 months from notification
- SAI proposed the schedule for completion

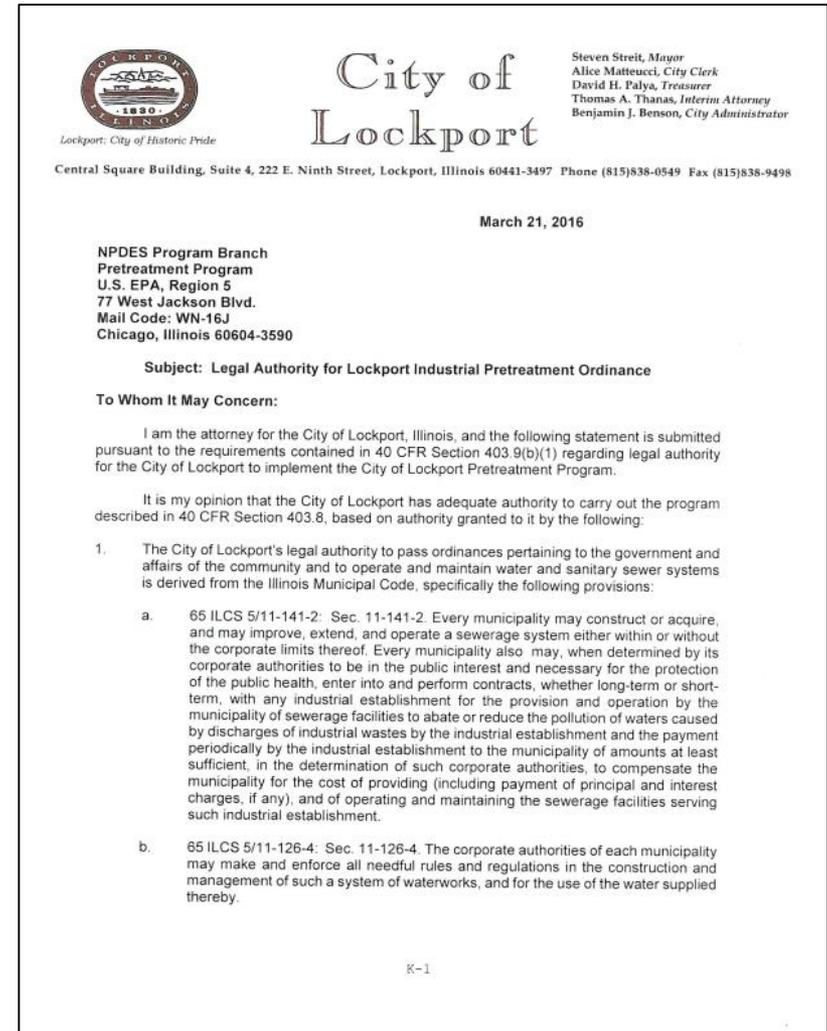
<u>Program Element</u>	<u>Submit to EPA Completion Date</u>
Industrial Waste Survey	November 29, 2013
Enactment of Legal Authority-Documentation	December 5, 2014
Local Limits Development	February 27, 2015
Description of Compliance Monitoring Program	February 27, 2015
Description of Treatment Plant, Plant Performance, and Industrial Waste History	February 27, 2015
Description of Program Implementation Procedures	February 27, 2015
Description of Program Organization, Costs, and Funding	February 27, 2015
Receive all EPA Comments	April 13, 2015
Approvable Pretreatment Program	May 1, 2015



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Legal Authority Letter

- City's Legal Counsel drafted a letter outlining a plan for a pretreatment ordinance to supplement the existing sewer use ordinance (SUO)



Courtesy of: Strand Associates, Inc. ®

Local Limits Evaluation

- Similar procedure outlined previously
- POCs include...
 - Cadmium
 - Hexavalent Chromium
 - Copper
 - Cyanide
 - Lead
 - Nickel
 - Zinc
 - Mercury



Courtesy of: Strand Associates, Inc. ®

Local Limits Evaluation

Professional

Local Limits Evaluation

Table 7 Summary of Individual Criteria (Preliminary)

	Local Limit as Determined by Table Number (mg/L)						Controlling Factor	Controlling Value (mg/L)	Proposed Limit (mg/L)
	B-1	B-2	B-3	B-4	B-5	B-6			
	Permit and QBELs (Daily)	Permit and QBELs (Monthly)	AS Inhibition	Nitrification Inhibition	Sludge	Digestion Inhibition			
Cadmium	4513.278	283.348	140.138	1877.086	21.152	41.48	Sludge	21.15	None
Hexavalent Chromium	2361.33	1623.18	162.44	661.06	-	109.42	Digestion Inhibition	109.42	None
Copper	81.5	81.5	140.5	30.3	565.1	32.5	Nitrification Inhibition	30.3	None
Cyanide	2674.32	631.83	15.9	130.3	-	0.6	Digestion Inhibition	0.6	None
Lead	408.0	85.5	276.9	152.6	115.8	390.8	Permit & QBELs (Monthly)	85.5	None
Mercury	0.66	0.33	16.7	29.8	11.3	0.2	Digestion Inhibition	0.2	None
Nickel	81.7	4.68	139.9	51.1	99.4	19.5	Permit & QBELs (Monthly)	4.7	None
Zinc	125.6	125.58	44.5	40.9	1642.2	727.4	Nitrification Inhibition	40.9	None

Report
City of
Lockport, Illinois
March 22, 2016



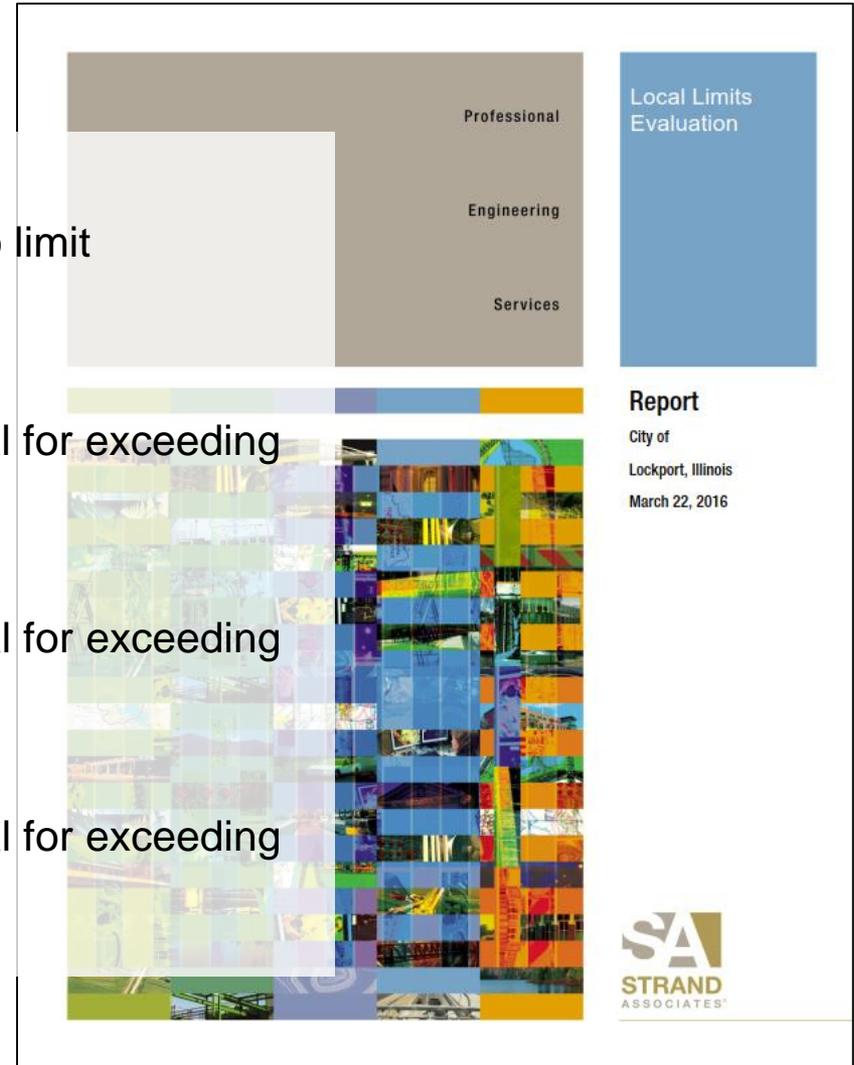
Courtesy of: Strand Associates, Inc. ®

1 Categorical IU

- Plastics molding and forming process
- Does not typically generate metals in the manufacturing process
- Large volumes of cooling water

Local Limits Evaluation

- Cadmium, Chromium, Cyanide
 - Influent below non-detect levels – No limit
- Copper, Zinc
 - Nitrification inhibition limited
 - Single IU has no reasonable potential for exceeding
- Lead, Nickel
 - Monthly WQBEL limited
 - Single IU has no reasonable potential for exceeding
- Mercury
 - Anaerobic digestion
 - Single IU has no reasonable potential for exceeding
- Only categorical limits will apply.



Courtesy of: Strand Associates, Inc. ®

Seymour, IN



Local Limits Reevaluation

- Part of SUO streamlining revisions required by IAC
- Evaluated sampling data from existing manufacturing facilities



Map Data: Google, 2016

New/Lowered Limits Recommended

- Nitrification inhibition
 - Chromium
 - Copper
- State sludge criteria
 - Lead
 - Zinc
 - Molybdenum
 - Nickel

Pollutant of Concern	Existing Limit (mg/L)	Technically Based Potential Limit (mg/L)	Proposed Local Limit (mg/L)	Impact	Standard Driving Limit
Arsenic	1.0	0.05	1.0	No change recommended	1, 2
Cadmium	1.0	0.06	1.0	No change recommended	1, 2
Chromium	10.0	2.48	2.48	Lower limit	Nitrification Inhibition
Hexavalent Chromium	-	2.57	none	No change recommended	1, 2
Copper	5.0	1.25	1.25	Lower limit	Nitrification Inhibition
Cyanide	1.0	1.01	1.0	No change recommended	Backsliding Prevention
Iron	-	-	none	No change recommended	-
Lead	1.0	0.62	0.62	Lower limit	State Sludge Criteria
Mercury	0.5	0.03	0.5	No change recommended	2
Molybdenum	-	0.11	0.11	New limit	State and Federal Sludge Criteria
Nickel	5.0	0.74	0.74	Lower limit	State and Federal Sludge Criteria
Selenium	-	0.29	none	No change recommended	1, 2
Silver	-	6.24	none	No change recommended	1, 2
Zinc	10.0	3.45	3.45	Lower limit	State Sludge Criteria

1-Insufficient data to support changing limit at this time.
 2-No pressing need to set/change limit, limit should be revisited if pollutant loadings from industry increase.

Table 3 Comparison of Proposed Local Limits and Existing Limits

Courtesy of: Strand Associates, Inc. ®

Impact of Proposed Limits

- Copper 2 IUs' average discharge exceeds limit
- Molybdenum 1 IU's average discharge exceeds limit
- Nickel 1 IU's average discharge exceeds limit
- Uniform allocation will not work for this community without push-back.

Pollutant of Concern	Proposed MAIL (lb/day)
Arsenic	3.73
Cadmium	3.73
Chromium	9.28
Hexavalent Chromium	none
Copper	4.66
Cyanide	3.73
Iron	none
Lead	2.33
Mercury	1.87
Molybdenum	0.40
Nickel	2.78
Selenium	none
Silver	none
Zinc	12.9

Table 5 Proposed Maximum Allowable Industrial Loadings

Courtesy of: Strand Associates, Inc. ®

Allocation Options

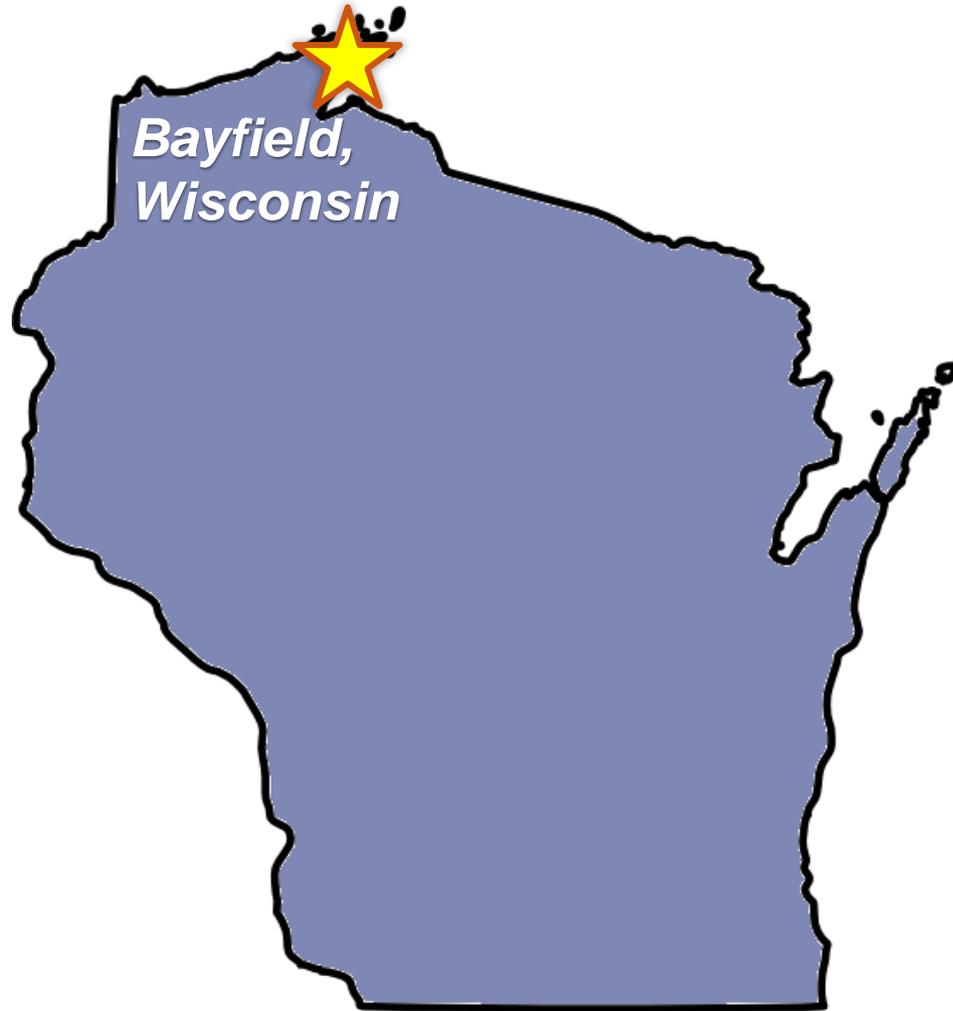
Method	Pros	Cons
Uniform Allocation in SUO (current)	<ul style="list-style-type: none"> • Clarity • Easy to Monitor 	<ul style="list-style-type: none"> • SUO change to update limits • Inflexible • Overly stringent?
Uniform Allocation, not in SUO	<ul style="list-style-type: none"> • Flexible • Easy to Monitor 	<ul style="list-style-type: none"> • Not clear to IUs/public
Unique Allocation, not in SUO	<ul style="list-style-type: none"> • Flexible 	<ul style="list-style-type: none"> • Permit to all IUs
Maximum allowable industrial loadings (MAILs) in SUO, weighted allocation based on flow or mass proportion basis	<ul style="list-style-type: none"> • Easily justifiable allocation • Avoids excessive stringent or unattainable limits 	<ul style="list-style-type: none"> • Requires IU knowledge • SUO change to update MAILs • Permit to all IUs • May penalize IUs that are pretreating
MAILs in SUO, case -by- case allocation	<ul style="list-style-type: none"> • Easily justifiable allocation • Avoids excessive stringent or unattainable limits • Flexible 	<ul style="list-style-type: none"> • Requires IU knowledge • SUO change to update MAILs • Permit to all IUs



Reacting to Plant Upsets Case Studies

- Bayfield, Wisconsin
- Fond du Lac, Wisconsin
- Comments on Biological Upsets (as time allows)

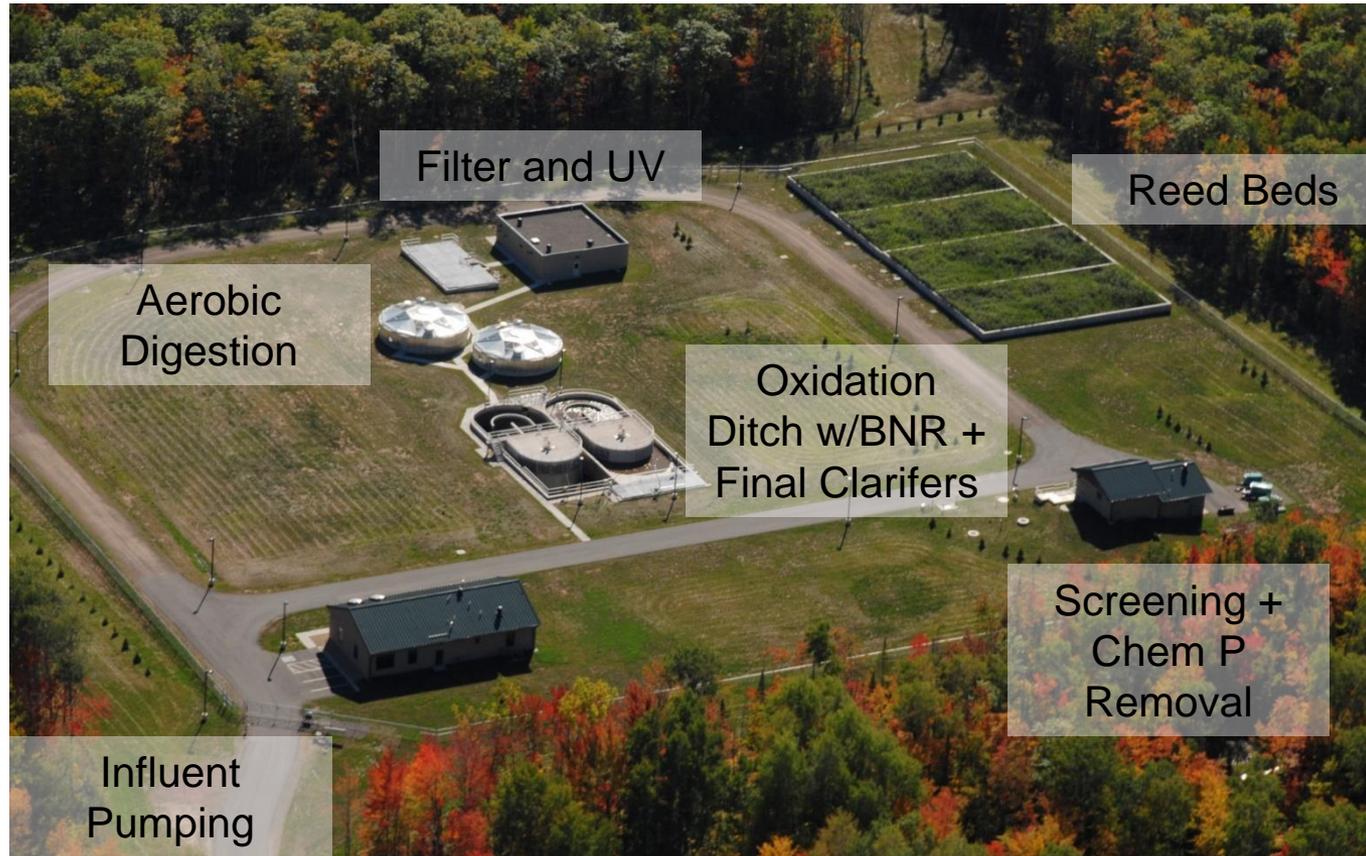
Bayfield, Wisconsin



Greater Bayfield WWTP

- Source of Community Pride
- Award Winning
 - Engineering Excellence – Best of State - ACEC
 - Project of the Year – Environment - APWA
 - Top Projects of 2006 – The Daily Reporter

Bayfield WWTP



(Off Site)

Courtesy of: Strand Associates, Inc. ®

Greater Bayfield WWTP

- Root Killer
 - Product Contained Metham Sodium
 - Dose was miscalculated by contractor
 - Activated sludge was killed

Local Newspaper Headlines

Contractor's error leads to wastewater problems

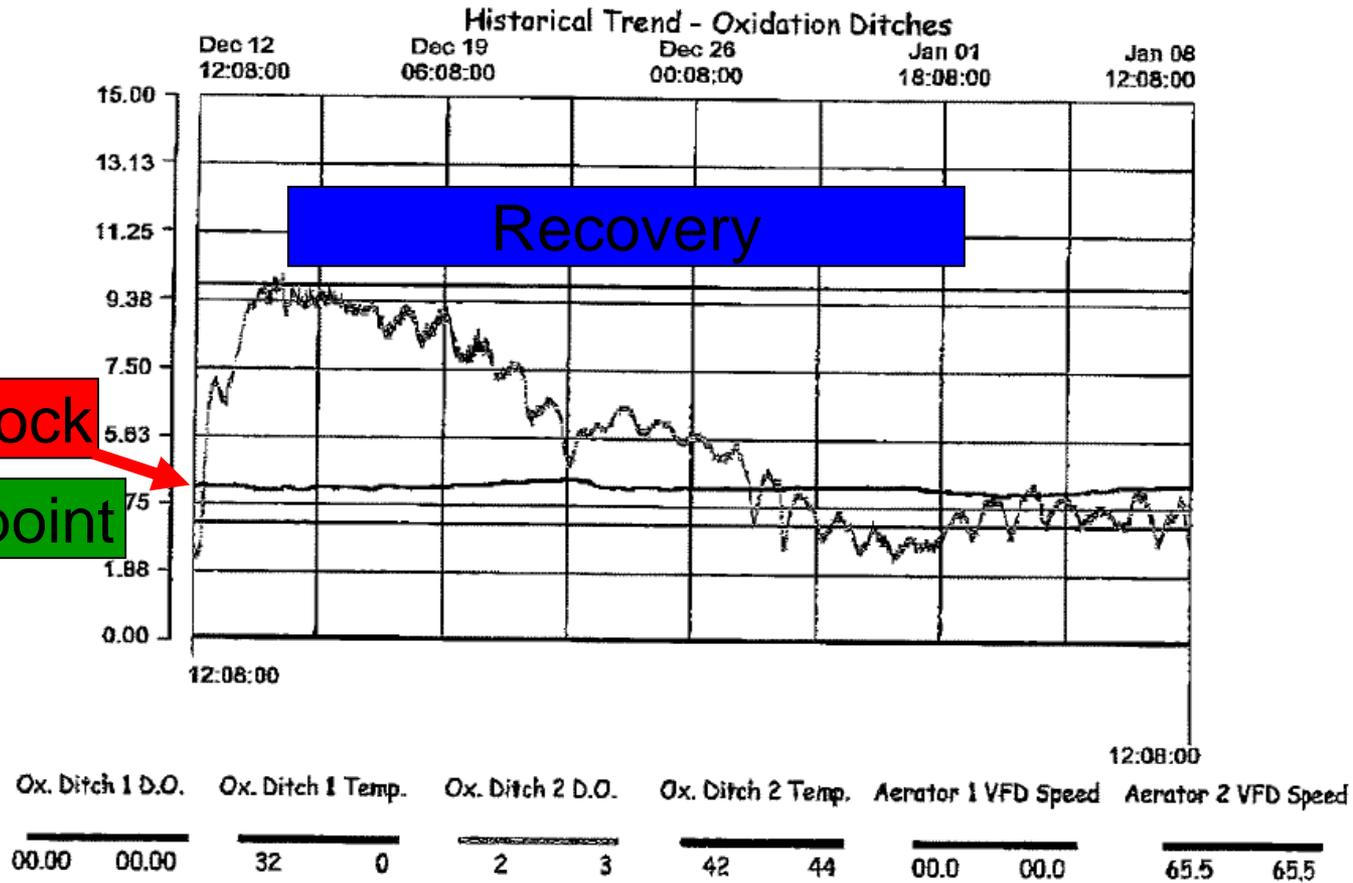
Herbicide kills off needed bacteria at treatment plant

By Rick Olivo Dec 21, 2007  0

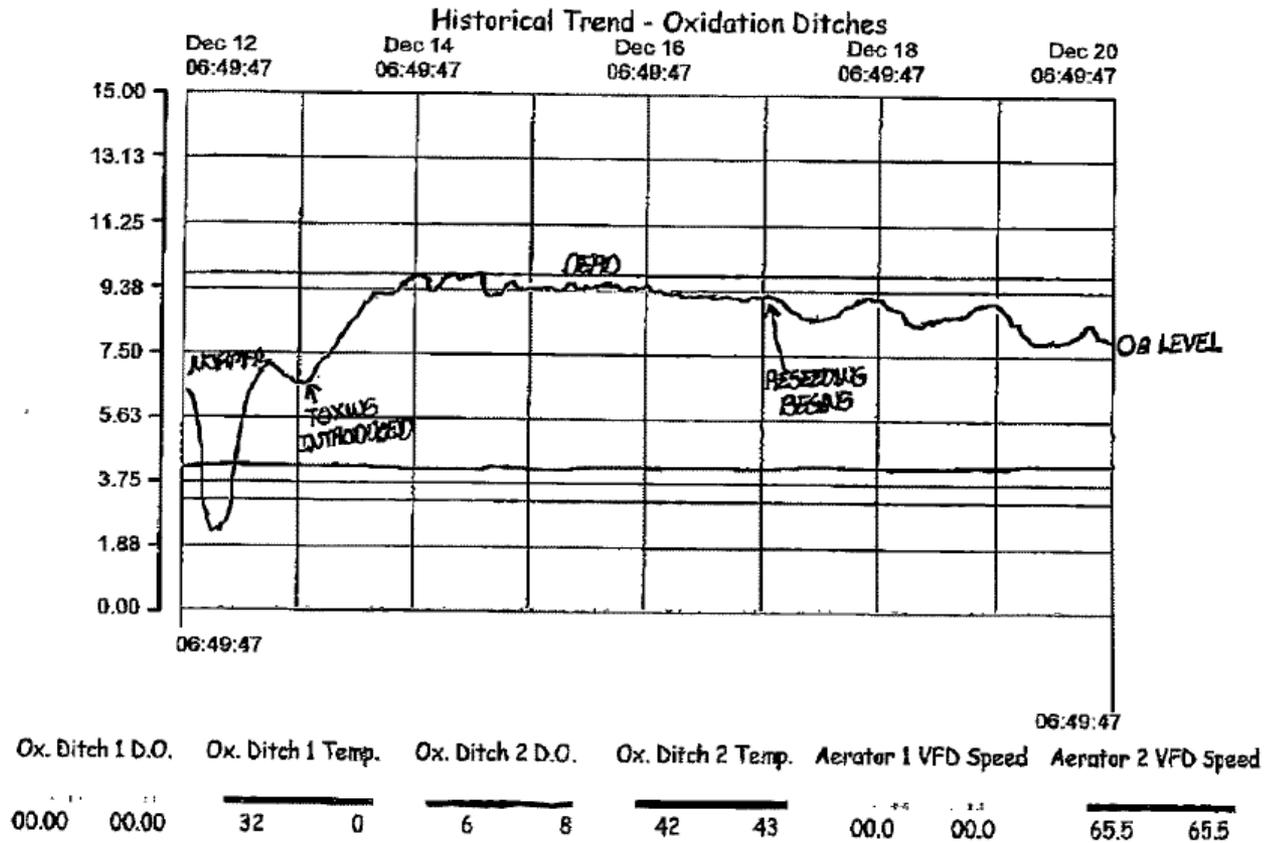
Bayfield wastewater treatment plan back to normal

By Rick Olivo Dec 28, 2007  0

Monitoring Plant Trends

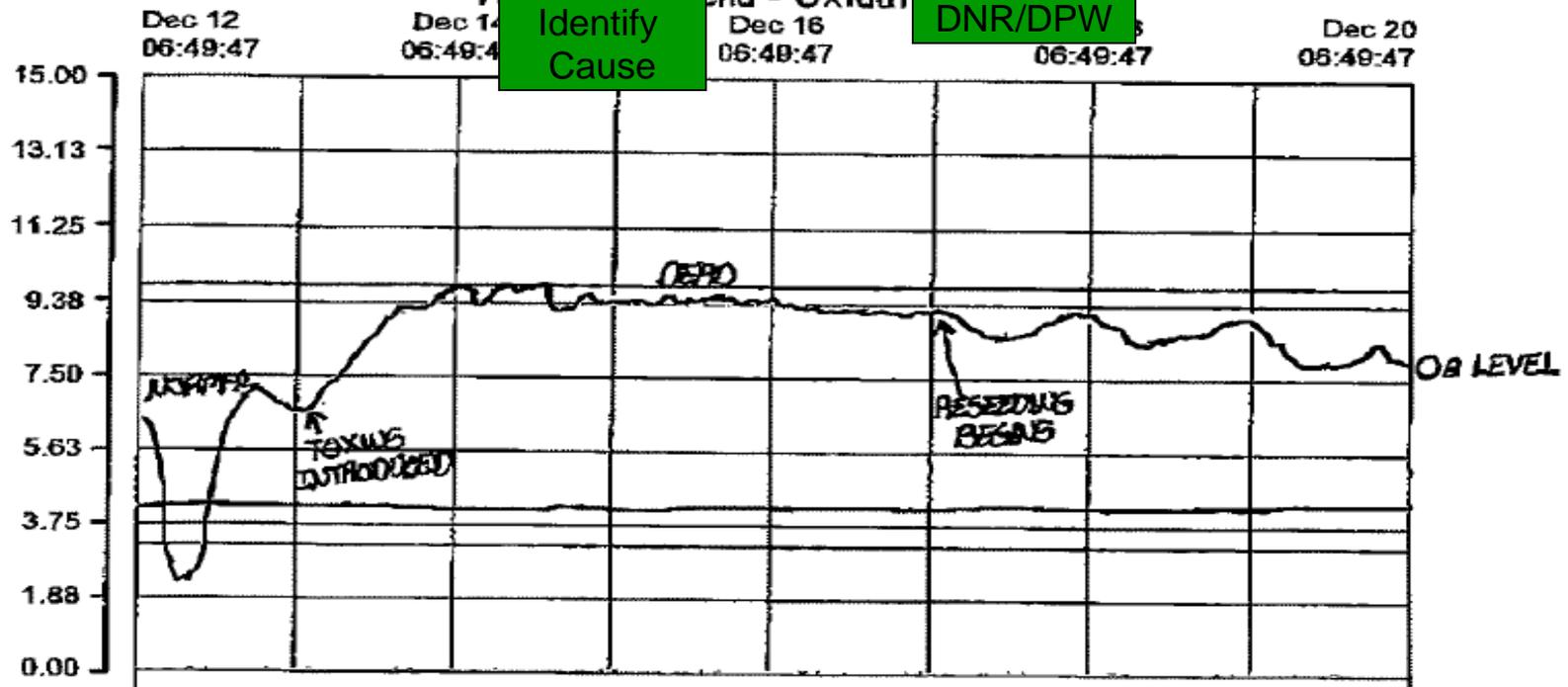


Documentation – Use Charts

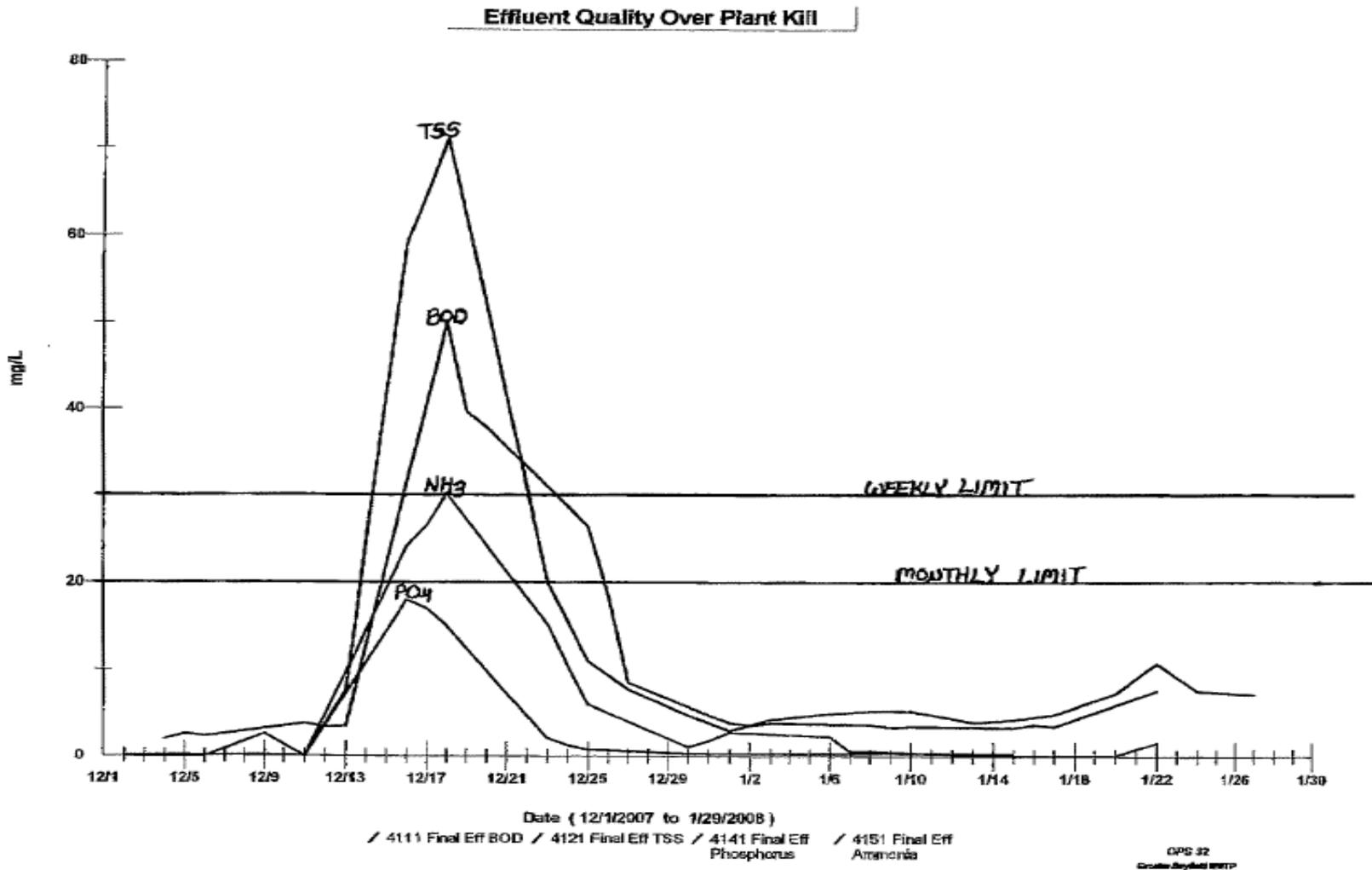


Documentation – Keep Notes

Observed Contractor	Observed Mild Stress	Confirm Stress	Monitor Weekend	Assess Long Term Impacts	Added Seed	Added Seed
Discussed Activities		Contact DNR		Discovered Error	Observed Life	Monitored Recovery
		Contact DPW		Continued Monitoring		
		Contact Strand		Added Seed		
		Identify Seed		Updated DNR/DPW		
		Identify Cause	end - Oxidat			



Document – Demonstrate Problem



Credit to Bayfield Operations Staff

- From the Mayor:

"We are impressed with our staff, that they were able to work with engineers and the DNR to be part of the solution, to get things going in the right direction. They knew how to take care of it; their training paid off. I think that's a bright spot in this."

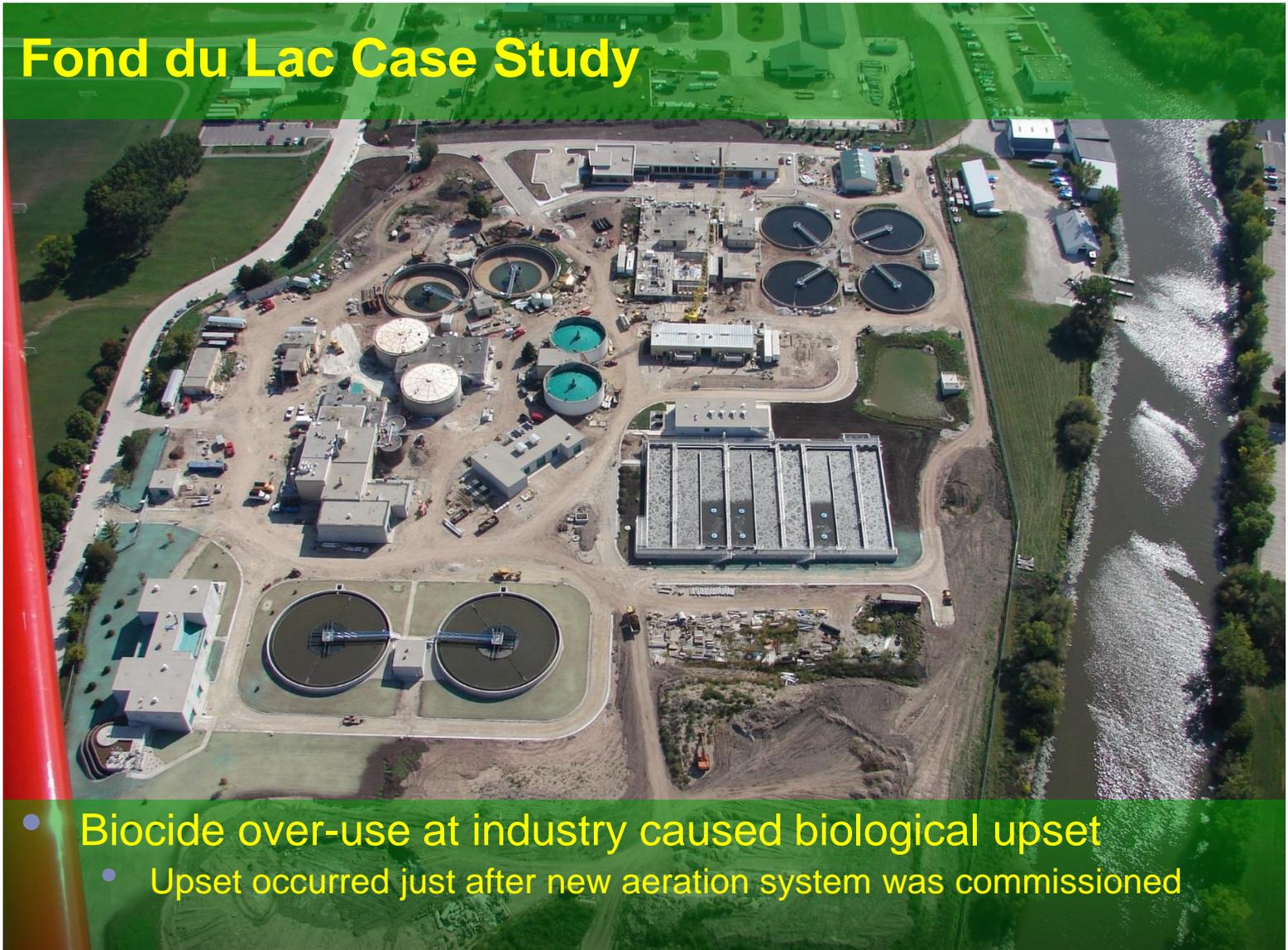
- From WisDNR (OEPA equivalent)

"If there is any good news in this, if it had to happen somewhere, it definitely happened somewhere where it is going to be taken care of quickly."

Fond du Lac, Wisconsin



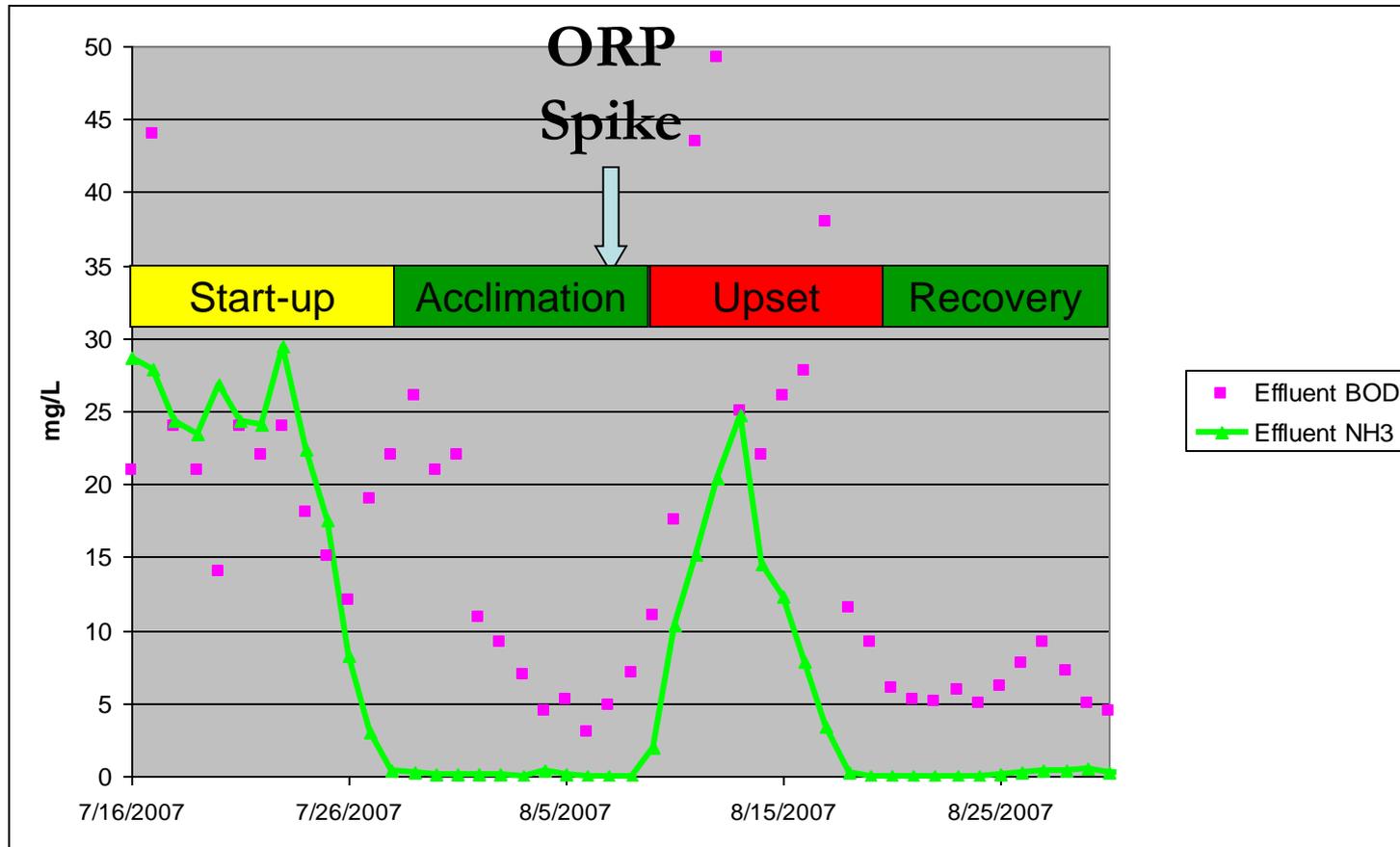
Fond du Lac Case Study



- Biocide over-use at industry caused biological upset
 - Upset occurred just after new aeration system was commissioned

Courtesy of: Strand Associates, Inc. ®

Sequence of Events

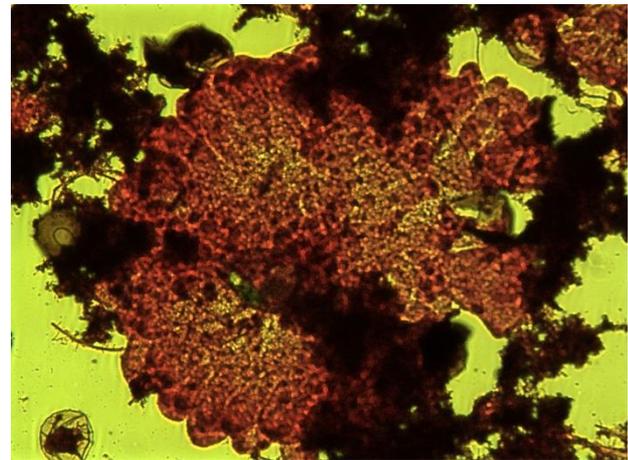
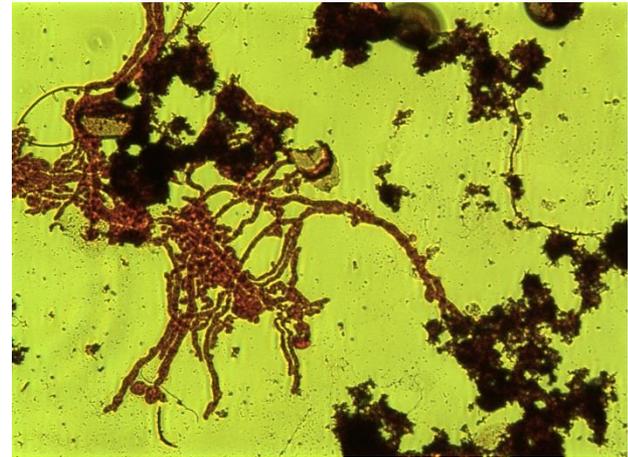


Investigation of Plant Upset

- Plant Observations
 - Rapid increase in ORP from -30 to +100 mV
 - “Murky” supernatant/effluent
 - Increased Effluent P
 - Duration of upset 12 days (one sludge age)
- External Investigation
 - Similar events at Fond du Lac (2002), Milton, others
 - Plant staff questioned industries
 - Dairy close to plant used larger than normal quantity of cleaner – **Quaternary amine**

Monitoring - Microscopy

- Fond du Lac
 - Large Amounts of Zoogloeal Growth
 - High amoeba populations
 - Fractured Floc Formation



Fond du Lac – Lessons Learned

- Quaternary Amine Use
 - WWTP Impacts Described to Industry
 - Communication Increased Pertaining to Use
- Microscopy Review Increased
- In Situ Feedback Monitored



Biological Upset

- A biological upset can be characterized as the symptoms limiting the biological processes from completing their intended tasks
 - Changes in BOD Removal
 - Loss of Ammonia and/or Phosphorus Removal
 - Changes in Settling Characteristics
 - Changes in Dewatering
- Discussion to focus on outside causes

Identify Potential Causes

- Cleaners
- Disinfectants
- Biocides
- Concentrated Products
- Surfactants
- Emulsifiers ←
- Acids/Bases
- Boiler Treatments

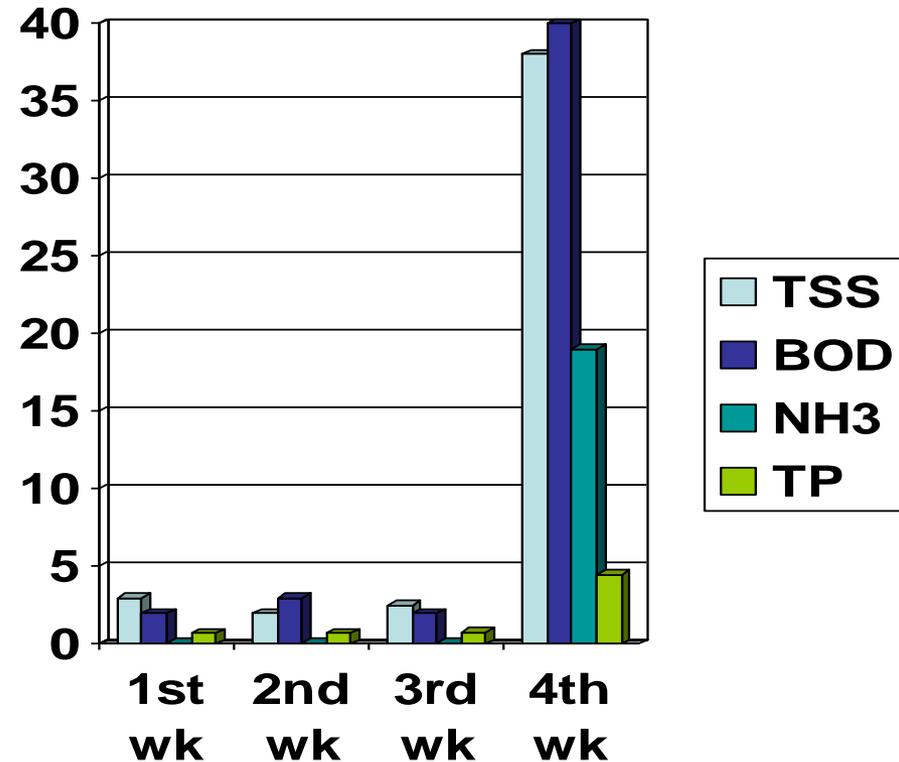
What is xanthan gum?

Potential Users

- Food Industries
 - Meat Packers
 - Dairy
- Hospitals
- Haulers
- Schools
- Cooperatives
- Other...

Identification of a Biological Upset

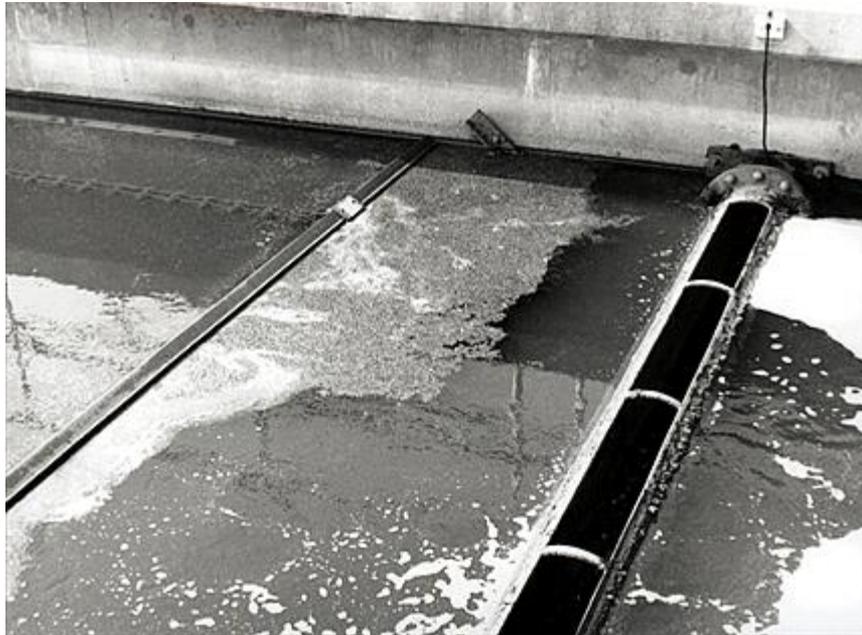
- Effluent Quality
 - Best Indication that an Upset Occurred
 - Too Late



Courtesy of: Strand Associates, Inc. ®

Identification of a Biological Upset

- Visual Observation of Influent
- Observed Odors at Influent
- Review of Primary Clarifier Performance



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Identification of a Biological Upset

- Visual Observation at the Final Clarifier
 - Might be too late
- Visual Observation of Settleometer
 - Settling Rate
 - Supernatant Clarity



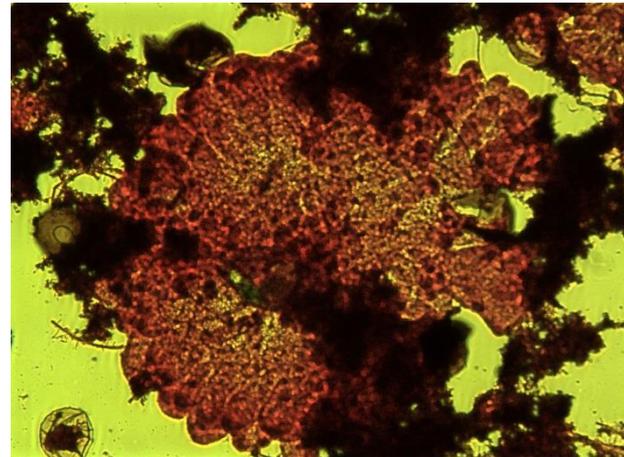
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Identification of a Biological Upset

- Microscopy Observation
 - Might be too late



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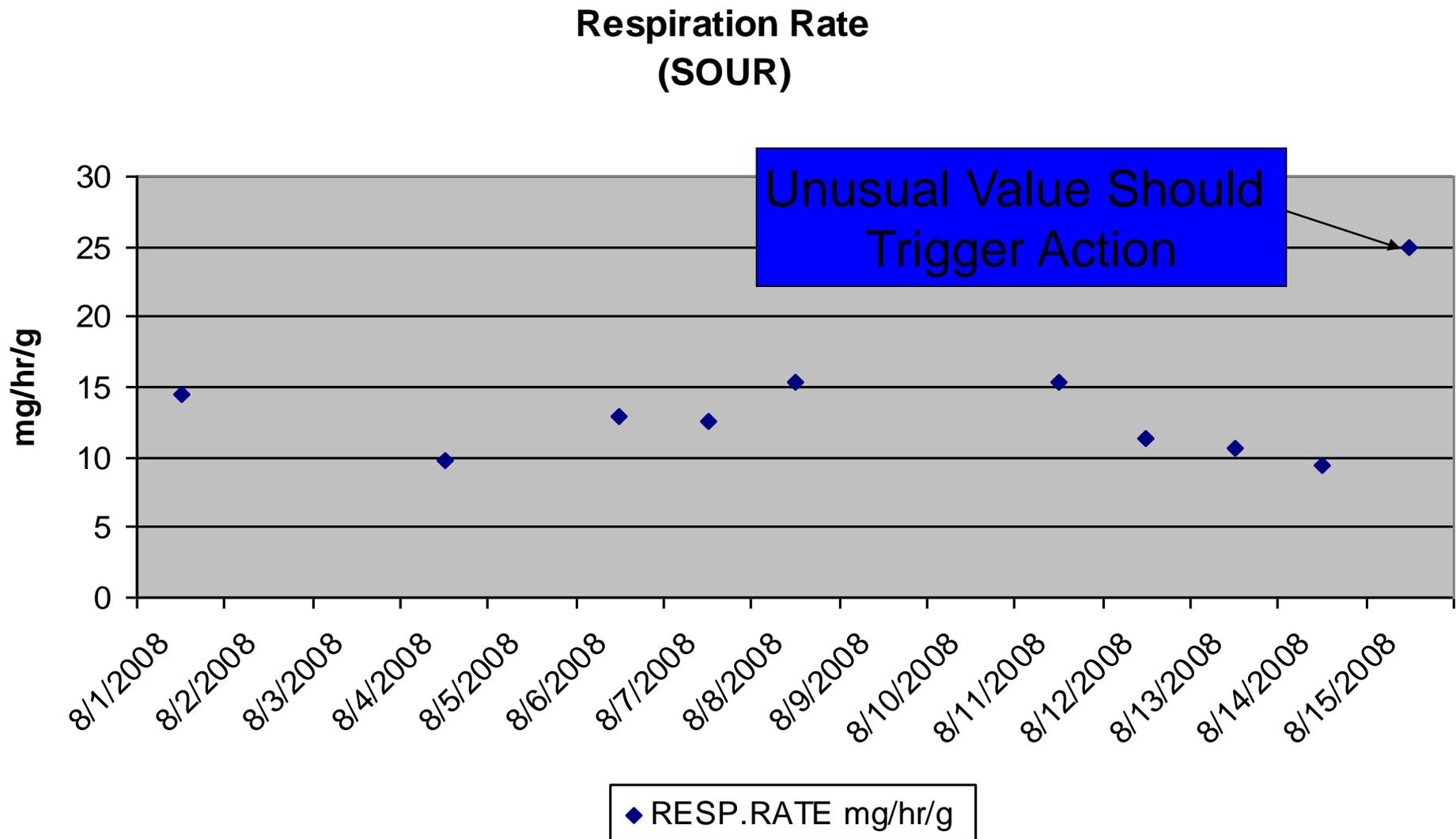
Identification of a Biological Upset

- In Situ Feedback
 - Dissolved Oxygen
 - ORP
 - pH
 - Effluent Transmittance
- Can alert of a problem
 - Can document timing of a problem



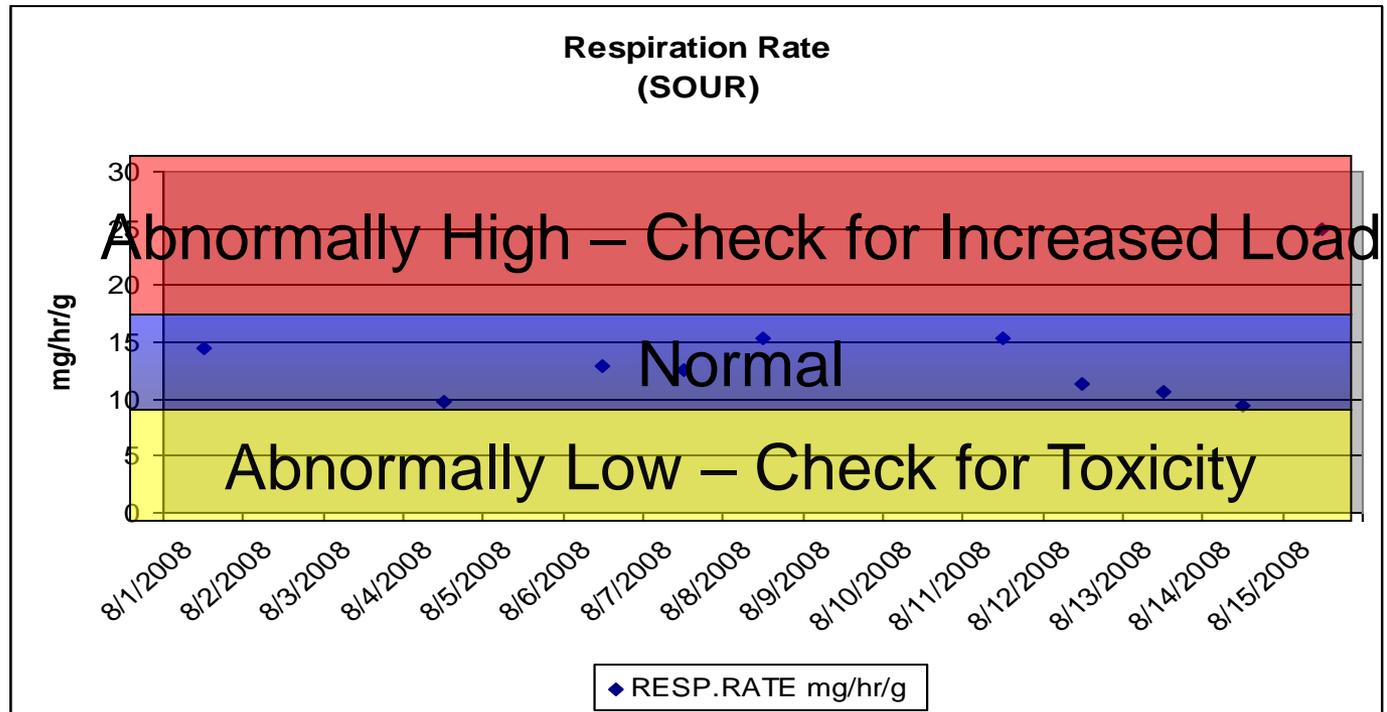
Courtesy of: Strand Associates, Inc. ©

Identification of a Biological Upset



Action - Before

- Develop Baseline Information



Action - During

- Isolate Impacted Influent (if possible)
 - Excess Flow Facilities
 - Out of Service Tanks
- Contact Appropriate Entities
 - Regulators (OEPA)
 - Management
 - Politicians
 - Public
- Document Your Activities

Action - During

- Adjust Process
 - Have Appropriate Number of Units in Service
 - Settleability Issues – Add Clarifiers
 - Overload Issues – Add Aeration Tanks/Primary Clarifiers
 - Underload Issue
 - Waste More
 - Remove Tanks from Service
 - Add or Increase Phosphorus Removal Chemical
 - Provide Adequate Aeration
 - Consider Disinfection – Higher Dose Likely Required
- Document Your Activities

Action - During

- Consider Minimizing/Halting Hauled Wastes
 - Septage BOD can exceed 5,000 mg/L
 - May Impact Revenue Streams
- Document Your Activities



Courtesy of: Strand Associates, Inc. ®

Action - During

- Increase Monitoring
 - Microscopy
 - Influent
 - pH
 - Observed Foam, Color, etc.
 - Effluent
 - Ammonia
 - Total Phosphorus
 - Total Suspended Solids
 - pH
 - Process Respiration
 - SOUR or OUR
 - In Tank D.O. Concentrations
 - Other In Situ Monitoring

 Document Your Activities

Action - During

- Consider Re-Seeding
 - Activated Sludge – Neighboring WWTP
 - If nitrification is required get seed from nitrification WWTP (same for BPR if available)
 - Truck the thickest **fresh** material that is available
 - Review seed for problems such as filamentous organisms
 - Confirm that the seed is performing well
 - Bio-Augmentation Products
 - During an upset is a hard time to shop
 - Document Your Activities

Action - During

- Attempt to Identify Source
 - Save Influent Samples
 - Collect on Off Sample Days
 - Contact Industries
 - Discuss with Personnel, Other Departments
 - Sample Industries
 - Open Manholes
 - Televisе Sewers
- Document Your Activities

Actions - After

- Document
 - Include Notes
 - Data
 - Charts
 - Photos
 - Compile in File
- Implement Lessons Learned

Fool me once, shame on you,
fool me twice, shame on me.

Chinese Proverb

Summary

- Communicate Effectively
 - Keep Everyone Informed: Demand to be Informed
- Remain Aware
 - Develop Methods to Identify Stress
- Treat Your System as a Living Thing
- Use Upsets as Learning Opportunities
- Get Help as Needed
 - Increase Efforts if Problem Threatens to be Chronic

Questions?

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Thank you!



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