

TIA - Las Vegas - May 2022

# How to Reduce Water Surcharges & Improve Wastewater Quality

An insider's view



# Your Presenters:



Trevor Schmitz



Cory Hudson

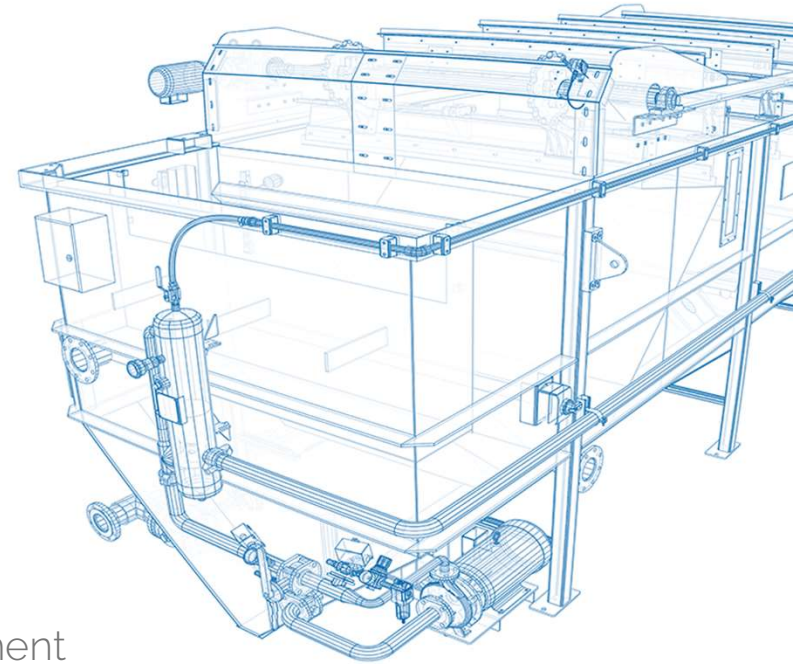
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# About VanAire

## The Wastewater Experts – Since 1995

- Manufacture and supply wastewater pretreatment equipment
- Specialize in DAF technology to maximize the removal of TSS, FOG and BOD in all industrial wastewater streams
- Focus on the food and beverage industry

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# Topics we'll cover today:

## The Water Bill

- Usage
- Billing
- Red flags

## The Challenges

- pH
- TSS
- FOG
- BOD

## The Equipment

- Mechanical
- Biological
- pH monitoring

INVOICE		SEWER BILLING	
SEWER USE CHARGE			
<b>BILL TO:</b>	Mindoro, WI 54644	Invoice #	2018-5
		Billing Date	June 7, 2018
		Due Date	June 27, 2018
<b>Month:</b>	May-18		
<b>Recorded Usage - Process Wastewater Only</b>			
Total Flow, gallons	Total BOD, lbs.	Total P, lbs.	
380,315	18,769	263	
<b>Rate Schedule</b>			
Fixed Charge	Flow per 1000 gals.	BOD per 1000 lbs.	P per 1000 lbs.
\$ 2,140.00	\$ 4.83	\$ 333.57	\$ 9,964.15
<b>Surcharges</b>			
	Peak Exceedances/day	Average Exceedances/week	
Flow, BOD	\$ 50.00	\$ 25.00	
TSS, P	\$ 10.00	\$ 10.00	
FOG	\$ 10.00	\$ 5.00	
<b>Monthly Charge</b>			
Fixed Charge	\$	2,140.00	
Flow Charge	\$	1,836.92	
BOD Charge	\$	6,260.73	
P Charge	\$	2,618.69	
	Subtotal \$	12,856.34	
Base Charge	\$	12,856.34	Minimum 25% OMR \$ 3,590.00
Sludge Hauling Reserve	\$	166.67	
Peak Surcharges	\$	790.00	
Average Surcharges	\$	240.00	
	Subtotal \$	1,196.67	
<b>TOTAL DUE AND PAYABLE \$</b>		<b>14,053.01</b>	
* Lab Analysis is directly billed and not reflected in this invoice.			
<b>Payable to:</b>			
Mindoro, WI 54644			

# It all starts with the water bill.

- Total usage – gallons per day
- pH monitoring
- TSS (total suspended solids)
- FOG (fats, oils, grease)
- BOD (biochemical oxygen demand)
- Other (e.g., TKN)
- Surcharges

**INVOICE**  
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**Payable to:**

Mindoro, WI 54644

- Plant flow – monthly
- Analytical testing
- Fixed charges
- Surcharges
- Totals

# Municipal Logging

**MONTHLY LOG  
WASTEWATER DISCHARGE  
MINDORO SANITARY DISTRICT**

Month:

LIMITS	Flow, GPD	BOD, lbs	TSS, lbs	P, lbs	FOG, mg/L	pH
Average Week	<b>12,000</b>	<b>500</b>	<b>80</b>	<b>13.0</b>	<b>100</b>	<b>6.00</b>
Peak Day	<b>15,000</b>	<b>600</b>	<b>100</b>	<b>15.0</b>	<b>240</b>	<b>9.00</b>

Date	Flow, GPD	BOD, mg/L	BOD, lbs	TSS, mg/L	TSS, lbs	P, mg/L	P, lbs	FOG, mg/L	pH
1	13,570	5,650	639	576	65	93	10.5		6.50
2	14,558	5,900	716	856	104	105	12.7	230.0	6.50
3	13,648	5,730	652	440	50	109	12.4		6.50
4	14,698		NR		NR		NR		
5	12,175		NR		NR		NR		
6	6,824		NR		NR		NR		
7	14,621	9,840	1,200	800	98	134	16.3		6.50
8	14,598	8,190	997	1,410	172	100	12.2		6.50
9	14,999	6,150	769	940	118	115	14.4	396.0	6.50
10	15,408	6,180	794	440	57	108	13.9		6.50
11	13,486		NR		NR		NR		
12	11,430		NR		NR		NR		
13	6,298		NR		NR		NR		
14	13,000	6,330	686	1,320	143	73	7.9		6.00
15	13,000	4,040	438	377	41	40	4.3		6.00
16	13,000	2,200	239	332	36	36	3.9	16.4	6.50
17	13,000	1,900	206	292	32	16	1.7		6.50
18	4,690		NR		NR		NR		
19	10,312		NR		NR		NR		
20	13,000		NR		NR		NR		

Results in **BOLD** exceed limits. "NR" = no reading.

Weekly Averages	Flow	BOD	TSS	P	FOG	pH
Week 1	14,119	669	73	12	230	
Week 2	14,622	940	111	14	396	
Week 3	11,338	392	63	4	16	
Week 4	12,400	690	95	8	30	
Week 5	12,750	634	59	9	17	
<b>LIMIT</b>	<b>12,000</b>	<b>500</b>	<b>80</b>	<b>13</b>	<b>100</b>	

**SURCHARGE CALCULATIONS**

Peak Day Surcharges	Flow	BOD	TSS	Phosphorous	FOG	pH (High)	pH (Low)	Total Peak Surcharges
Flow	1	\$ 50.00	\$ 50.00					
BOD	13	\$ 50.00	\$ 650.00					
TSS	7	\$ 10.00	\$ 70.00					
Phosphorous	1	\$ 10.00	\$ 10.00					
FOG	1	\$ 10.00	\$ 10.00					
pH (High)	0	\$ 10.00	\$ -					
pH (Low)	0	\$ 10.00	\$ -					
<b>Total Peak Surcharges</b>								<b>\$ 790.00</b>

Weekly Average Surcharges	Flow	BOD	TSS	Phosphorous	FOG	Total Weekly Average Surcharges
Flow	4	\$ 25.00	\$ 100.00			
BOD	4	\$ 25.00	\$ 100.00			
TSS	2	\$ 10.00	\$ 20.00			
Phosphorous	1	\$ 10.00	\$ 10.00			
FOG	2	\$ 5.00	\$ 10.00			
<b>Total Weekly Average Surcharges</b>						<b>\$ 240.00</b>

# Analytical Testing

How often?

- Daily
- Weekly
- Monthly

## DAVY LABORATORIES

115 6th Street S. Phone: (608) 782-3130  
 La Crosse, WI 54601 Fax: (608) 784-6611

Discharge Monitoring Report Form  
 Mindoro, WI 54644

P permit Number: WI-0029106-09-PFDM		Month: May 2018														
Sample Point Description	Effluent	Effluent	Effluent	Effluent	Sample Temperature Upon Receipt											
Parameter Name	BOD5	Suspended Solids	Phosphorus, Total as P	Oil & Grease												
MDL*	2	1	0.013	0.9												
LOQ/RL*	6	3	0.047	3.5												
Parameter Units	mg/L	mg/L	mg/L	mg/L	°C											
Monthly Average	5,916	704	83	138												
Daily Maximum	10,200	1,680	134	396												
Daily Minimum	1,900	85	15.8	16.4												
No. of Values Reported	19	19	19	5												
P permit Requirements	LIMIT	Exceeded	LIMIT	Exceeded	LIMIT	Exceeded	LIMIT	Exceeded	LIMIT	Exceeded	LIMIT	Exceeded	LIMIT	Exceeded	LIMIT	Exceeded
Monthly Average																
Daily Maximum																
Daily Minimum																
Weekly Average																
Frequency	4x week	4x week	4x week	1x week												
Sample Type	24 hr. Comp	24 hr. Comp	24 hr. Comp	Grab												
Method	SM 5210 B*	USGS 1-3765-85*	EPA 365.1 Rev 2.0	EPA 1664 A*	SM 2550 B*											
Remarks	Date															
	1	5,650	576	93	230											
	2	5,900	856	105	230											
	3	5,730	440	109												
	4															
	5															

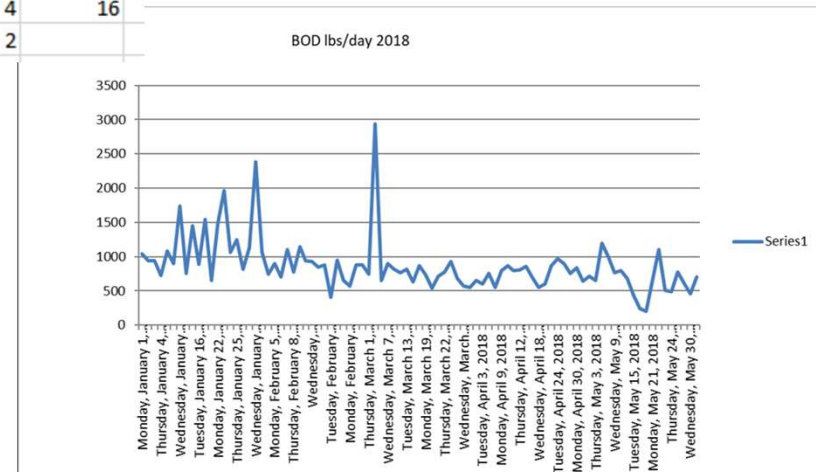
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# Internal Logging

	BOD, mg/L	BOD, lbs	TSS,mg/L	TSS,lbs	p,mg/L	P,lbs	
Monday, April 30, 2018	7430	837	684	77	173	22	
Tuesday, May 1, 2018	5650	639	576	65	93	11	
Wednesday, May 2, 2018	5900	716	856	104	105	12	230
Thursday, May 3, 2018	5730	652	440	50	109	12	
Monday, May 7, 2018	9840	1200	800	98	134	16	
Tuesday, May 8, 2018	8190	997	1410	172	100	12	
Wednesday, May 9, 2018	6150	769	940	118	115	14	396
Thursday, May 10, 2018	6180	794	440	57	108	14	
Monday, May 14, 2018	6330	686	1320	143	73	8	
Tuesday, May 15, 2018	4040	438	377	41	40	4	
Wednesday, May 16, 2018	2200	239	332	36	36	4	16
Thursday, May 17, 2018	1900	206	292	32	16	2	



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# The Challenges

pH

TSS

FOG

BOD

# pH

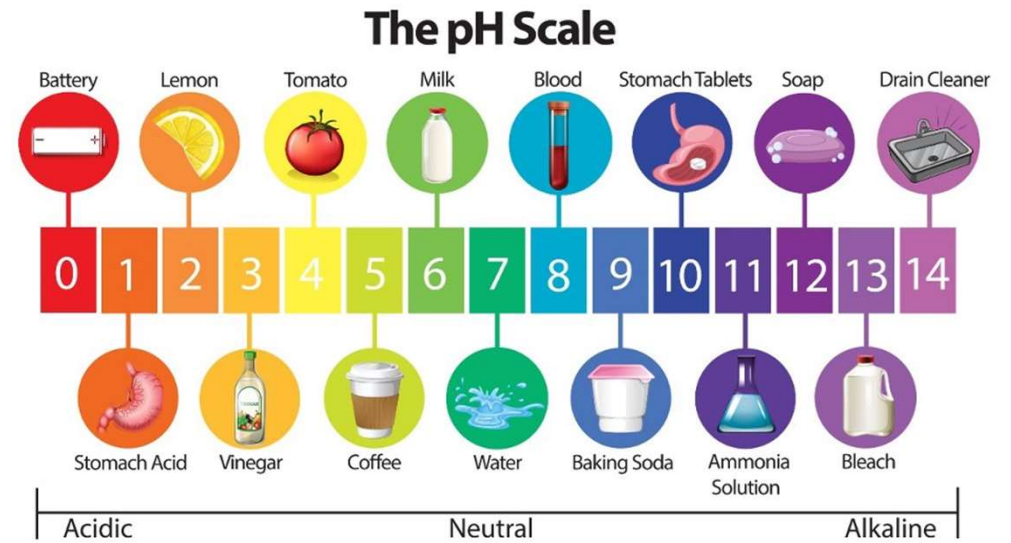
Many cities have a discharge permit range.

**What** – Cleaners

**Why** – Affects biological systems at POTW.

Bugs can handle higher pH better than lower pH.

**How** – May be able to ask for a variance on high end but most likely not on low end. PH controlled mainly by chemistry.





# Sanitation

Cleaning with various chemicals affects pH (caustic, bleaches, acids, etc.)

# TSS

**What** - Solids in water from production that go down the drain

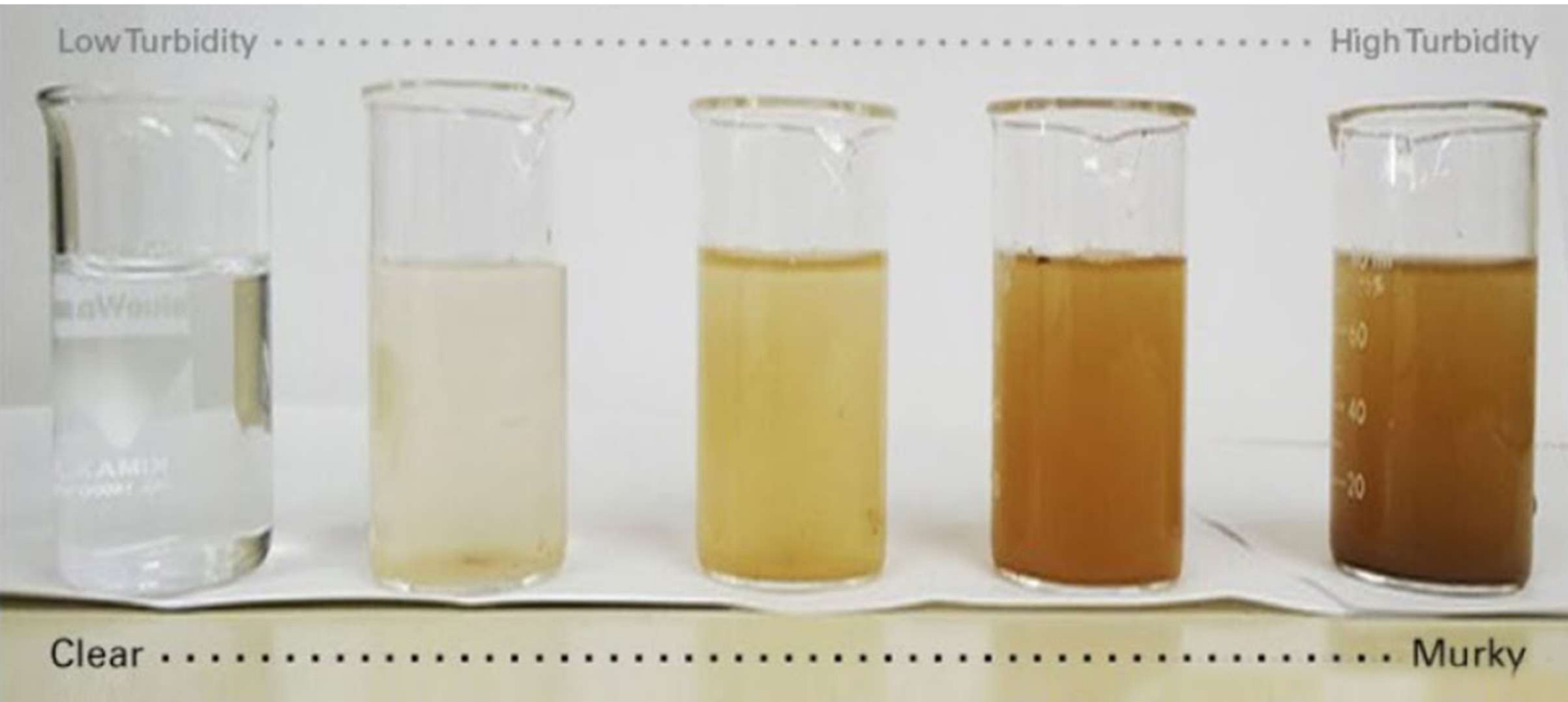
**Why** - Causes plugging, odor, etc...

**How** - Screening, Settling, Aeration, Chemical addition



# Turbidity

How much light can pass through the water?



# FOG

**What** – Fats, Oils & Grease found in water from production that go down the drain

**Why** – Causes plugging, odor, etc...

**How** – Float, Aeration and Chemical addition  
Potential Recovery = \$\$\$?

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# Know your FOG

When we wash fats, oils and grease (FOG) down the drain, they build up in pipes and create blockages that contribute to sanitary sewer overflows.



**FATS** *Solid at room temperature:* butter, shortening, margarine, peanut butter, meat trimmings, uncooked poultry skin, cheese, milk, cream, sour cream, ice cream.



**OILS** *Liquid at room temperature:* vegetable oil, canola oil, olive oil, corn oil, salad dressings, cooking oils.



**GREASE** *Liquid during cooking, solidified when cooled:* gravy, mayonnaise, melted meat fat, bacon, sausage, boiled poultry skin, salad dressings.





**Don't do this.  
Bad things will happen.**

# BOD

**What** - Biological Oxygen Demand represents the amount of oxygen consumed by bacteria and other microorganisms while they decompose organic matter under aerobic (oxygen is present) conditions at a specified temperature.




**Why** - This is becoming one of the bigger problems in all industries. Difficult to remove unless you have some type of biological system.

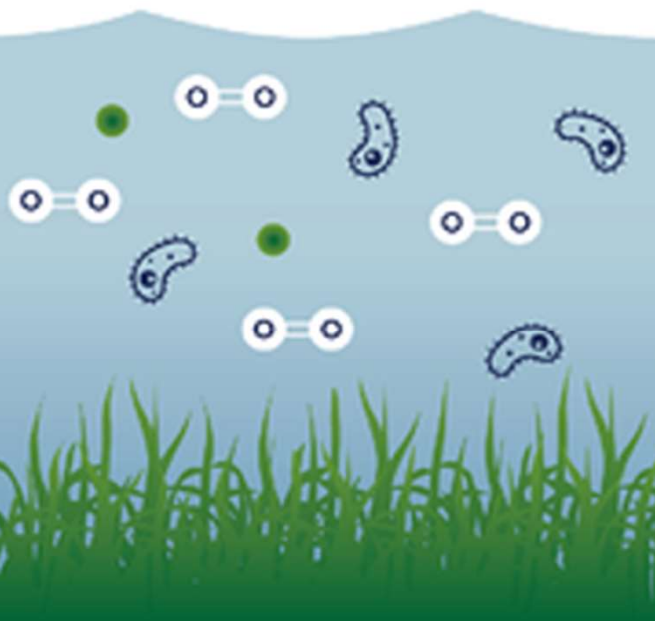
**How** - Biological and Chemical addition

# WHAT IS BIOCHEMICAL OXYGEN DEMAND (BOD)?

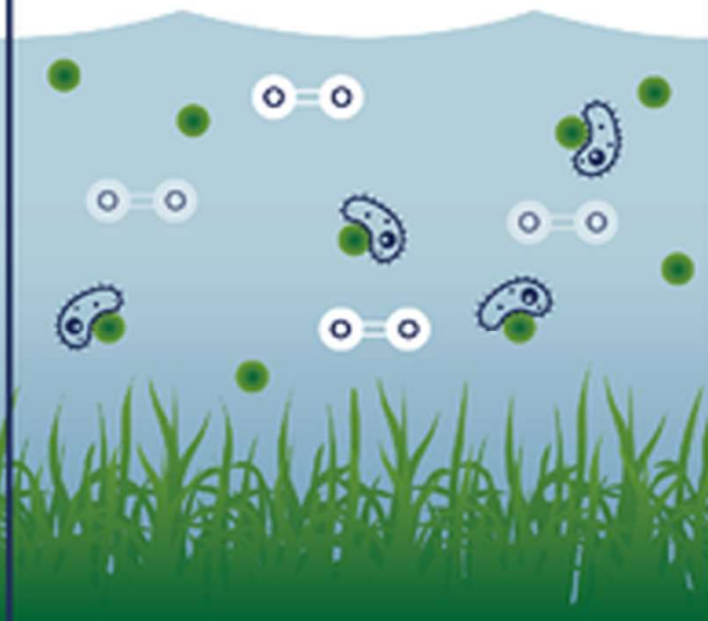
*BOD: the amount of dissolved oxygen that microorganisms need to break down organic materials in water*

Healthy water contains a balance of:

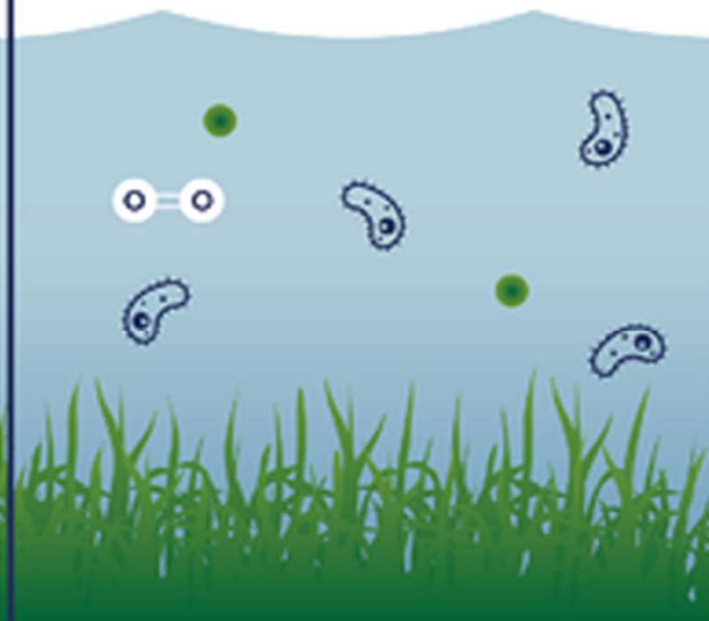
-  dissolved oxygen
-  micro-organisms
-  organic materials



When water contains excess organic materials, micro-organisms begin to break them down



As micro-organisms break down the excess organic materials, they use up dissolved oxygen, deplete  $O_2$  levels, and harm aquatic life



Fixes for:

pH

FOG

TSS

BOD

# It Starts Here: Dry Clean-up



Affects Wastewater and surcharges.

Good clean up = lower surcharges and readings.

# The Equipment

Get the right tool for the job

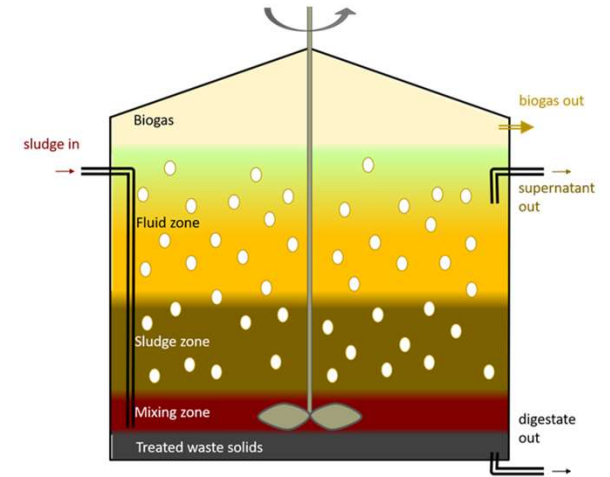
- Mechanical removal – Different types of filters, screens, DAFs
- Biological removal – MBR, MBBR, Digestors, etc.
- pH monitoring – inline – tied to chemistry or just for reading.

# Mechanical Removal



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# Biological Removal





# pH Monitoring Equipment



# A Typical Wastewater Layout

360° Virtual Reality

[vanaireinc.com/vr](http://vanaireinc.com/vr)

Booth 220

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# Conclusions

Keep a close eye on your sewer bill - don't just pay it.

There is good information that can lead to savings or force you to look at potential changes in your operation/system.

# Thank you!



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# Appendix



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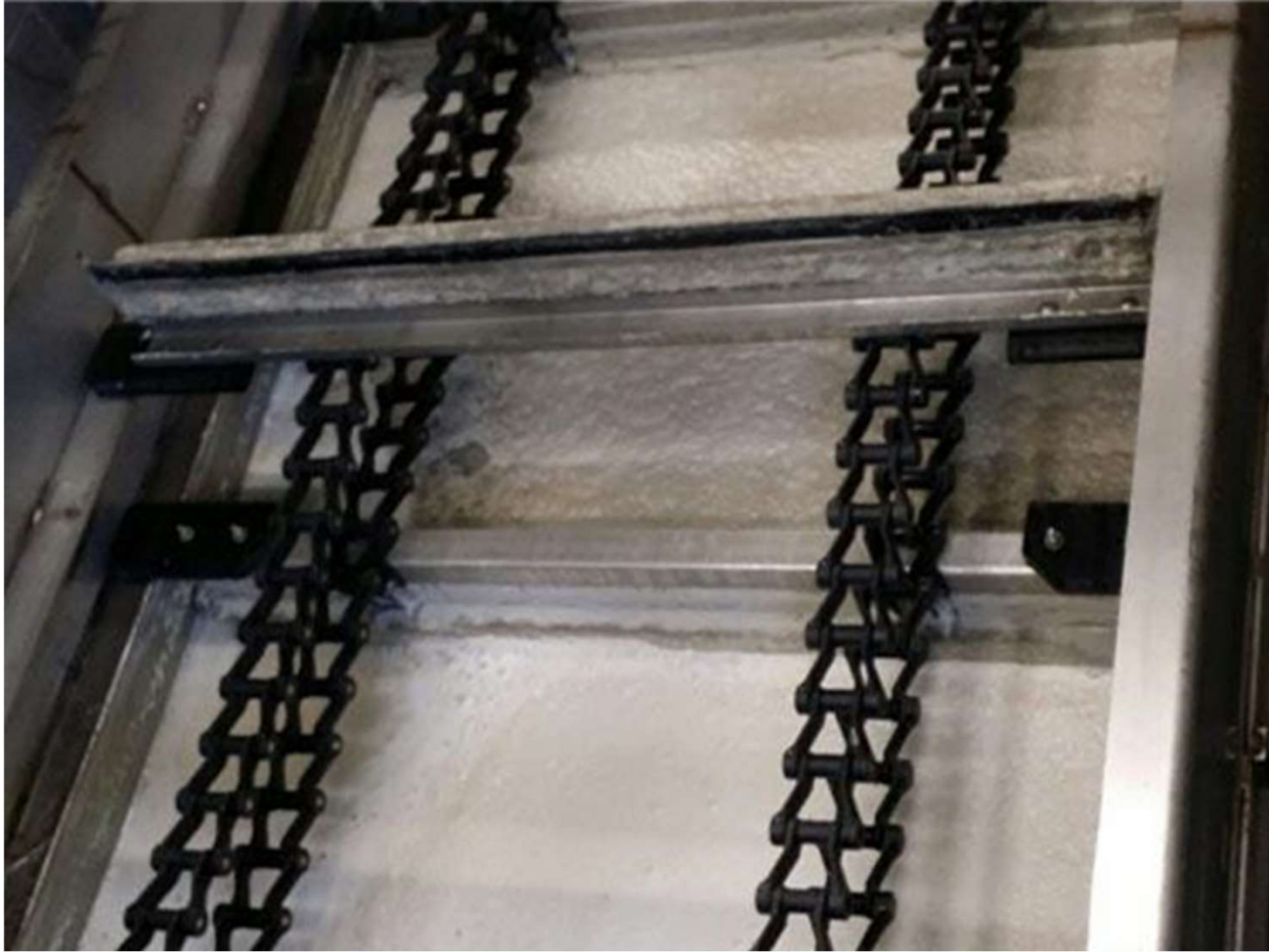


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