Process Wastewater

John Haslett
Wastewater
12TH & MAPLE WINE CO.

Grape & Wine processing Presentation Outline

1. Wastewater Makeup & Chemicals
2. 12th & Maple Wastewater Treatment
3. BioGill Trial
4. Wastewater Testing
5. Wastewater Process Data Tracking
6. Process Equipment
7. Industry Vendor Recordation's

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Wastewater Makeup & Chemicals

Wastewater Makeup

1. Grape Juice & pulp
2. Wine, Sugar, other wine additives
3. Wine lees, sediments from wine & wine tank settling
4. Grape skins & seeds

Wastewater Chemicals

1.Mg(OH) Magnesium Hydroxide, pH 10.5 (Mag), Acid Neutralizer
2. NaOH Sodium Hydroxide 25% Caustic , Acid Neutralizer
3. Citric Acid 100%, pH Decrease
4. Polymer, Cationic/ negative charge, food grade
5. Defoamer, Soy based

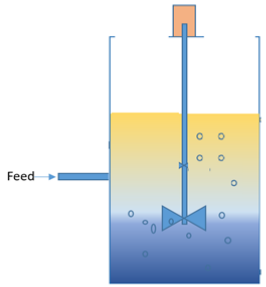
Wastewater Chemicals

Magnesium hydroxide

Magnesium hydroxide is a nutrient in the form of magnesium. It's readily available to the microorganisms. Magnesium hydroxide provides more CaCO3 equivalent alkalinity on an equal weight basis.

It has non-hazardous and non-corrosive properties. Environmentally friendly buffering to a maximum pH of 10 in most wastewater streams. This pH adjustment is non damaging to biomass in wastewater systems.

Polymer, Cationic



Wastewater Polymers separate solids from liquids through a process called flocculation. These water-soluble polymers are polymer flocculants.

The negative charge around each particle keeps them from coming together, creating colloidal dispersion. Negatively charged particles will not come together and can float in liquid suspension for hours, weeks, and even years.

The pressure in the CAF head box & the flocculation floats the particles in the wastewater

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Process Flow Averages

5,000 – 6,000 5 Days / Week Bottling
12,000 – 22,000 7 Days / Week Harvest

Primary Daily Goals

Post Treatment

pH 6.5 - 7.5
BOD EFF < 300
TSS EFF < 100

Floatation

CAF
Solids Removed > 92%

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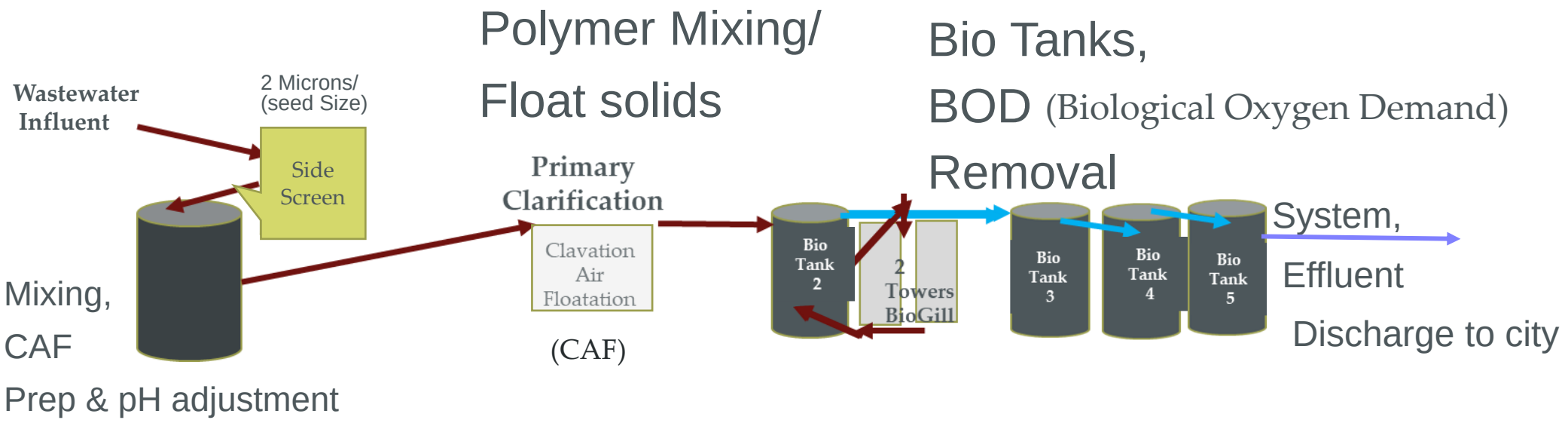
Wastewater Treatment Process



BOD is the amount of oxygen consumed by bacteria and other microorganisms while they decompose organic matter under aerobic conditions in a defined time.

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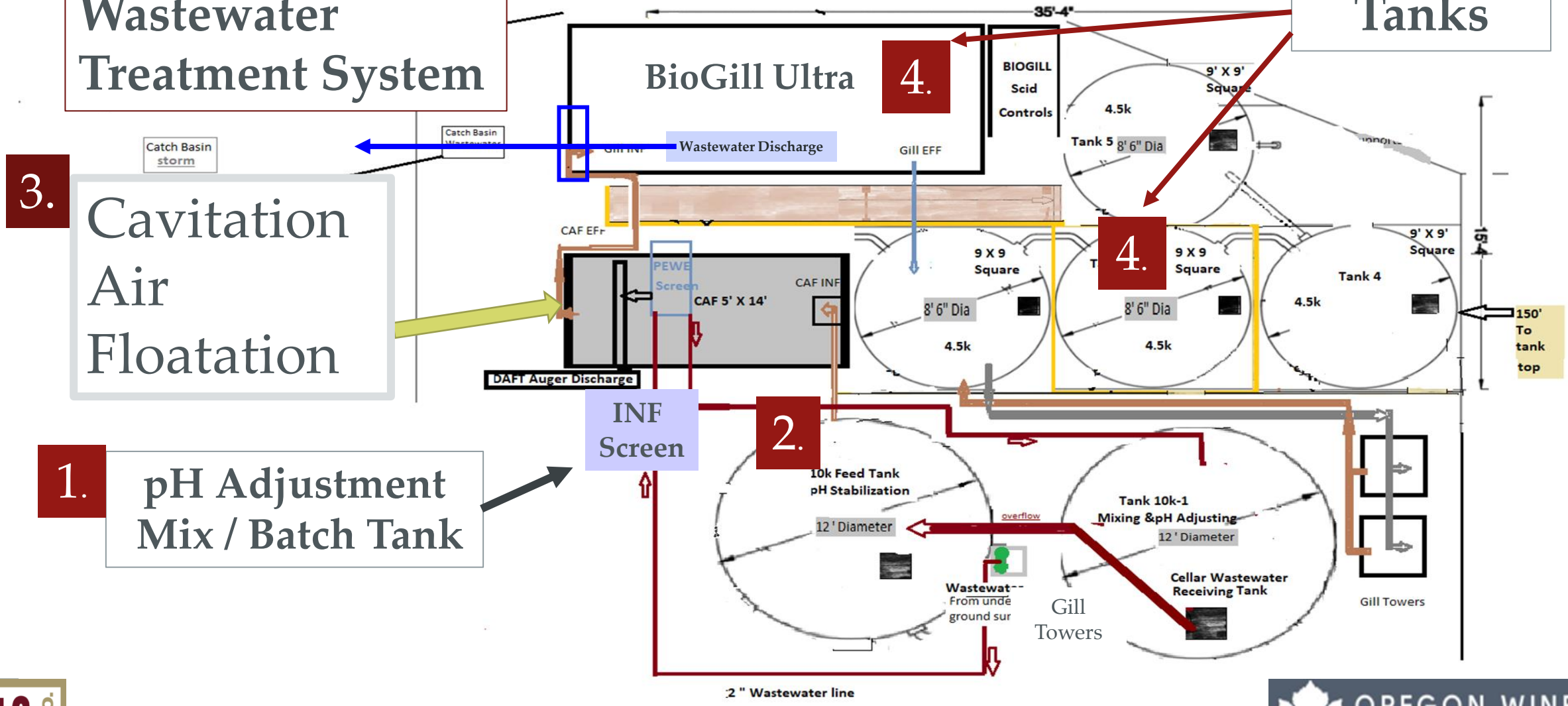
12th & Maple Wastewater Treatment System



3. Cavitation Air Floatation

1. pH Adjustment Mix / Batch Tank

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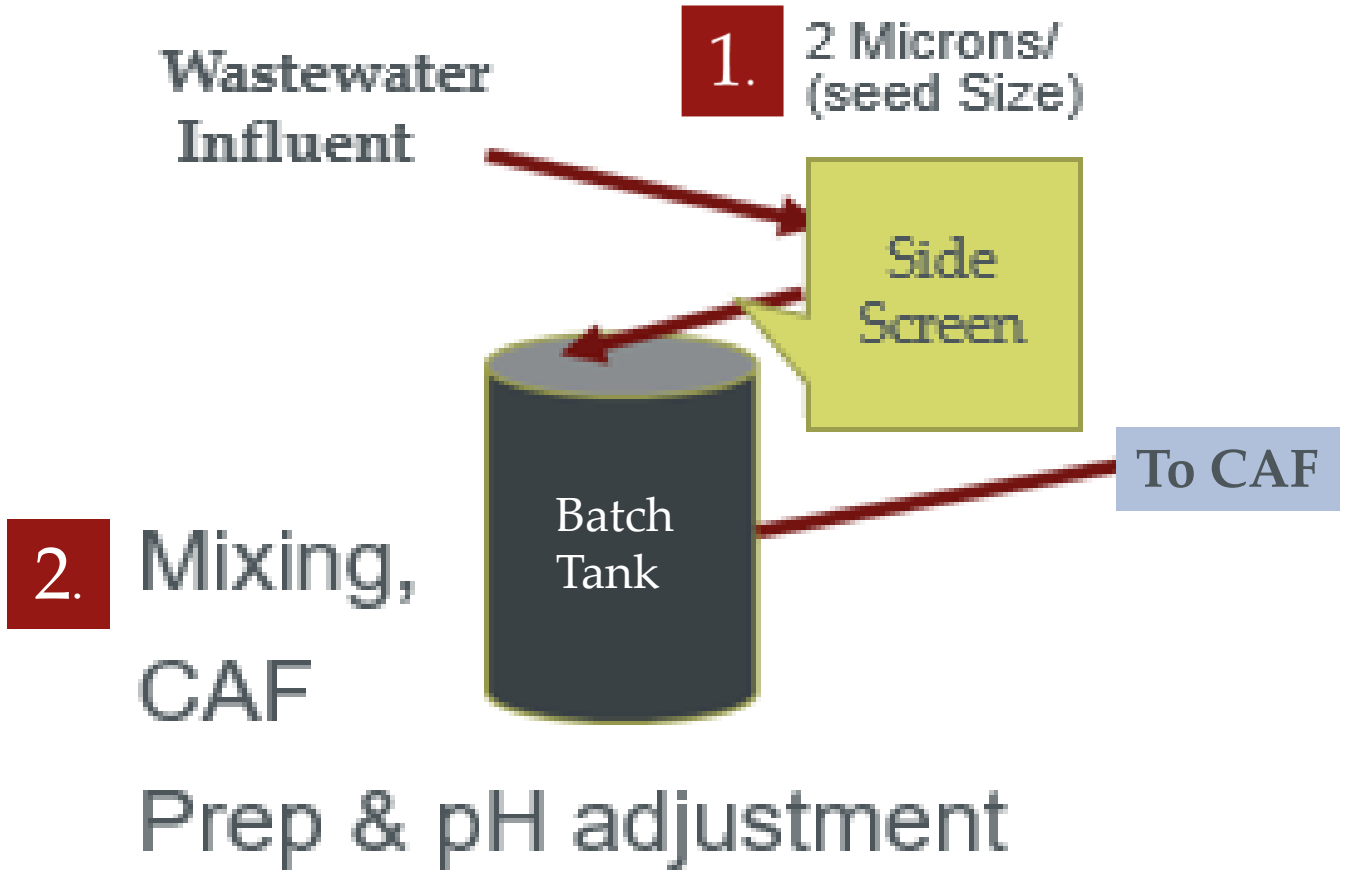
Screen & Batch Prep Wastewater



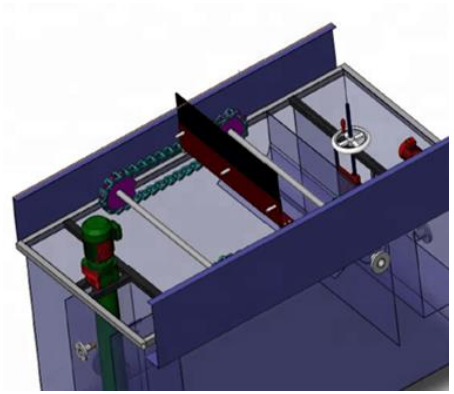
Side Hill screen

Wastewater Floatation/ Primary Clarification

- Hydro Cal, economical and fully integrated CAF is a "plug in and operate" system
- This system removes fats, oils, greases, colloidal and suspended solids, as well as the BOD and COD associated with these contaminants, from industrial and municipal effluents. It automatically separates these materials from the liquid waste for disposal.
- Our machine uses 480v and < 12 amps, very efficient. No Compressed air.

Cavitation Air Floatation

CAF



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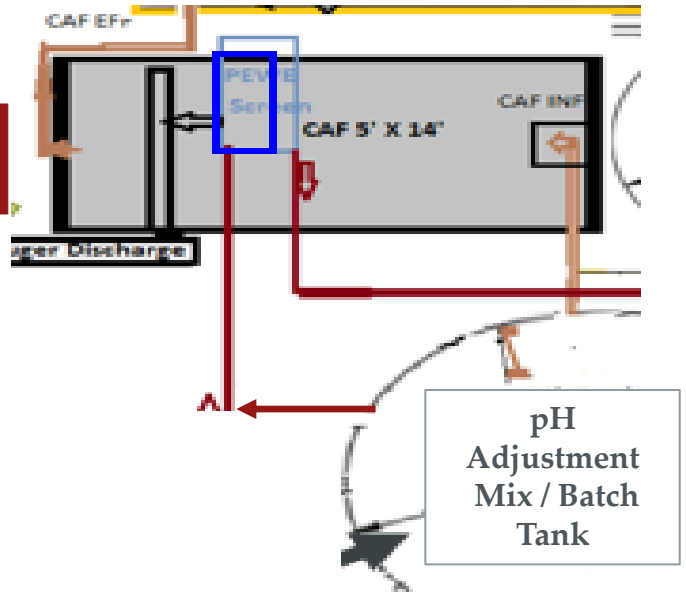

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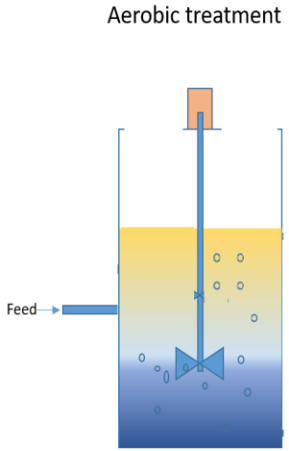
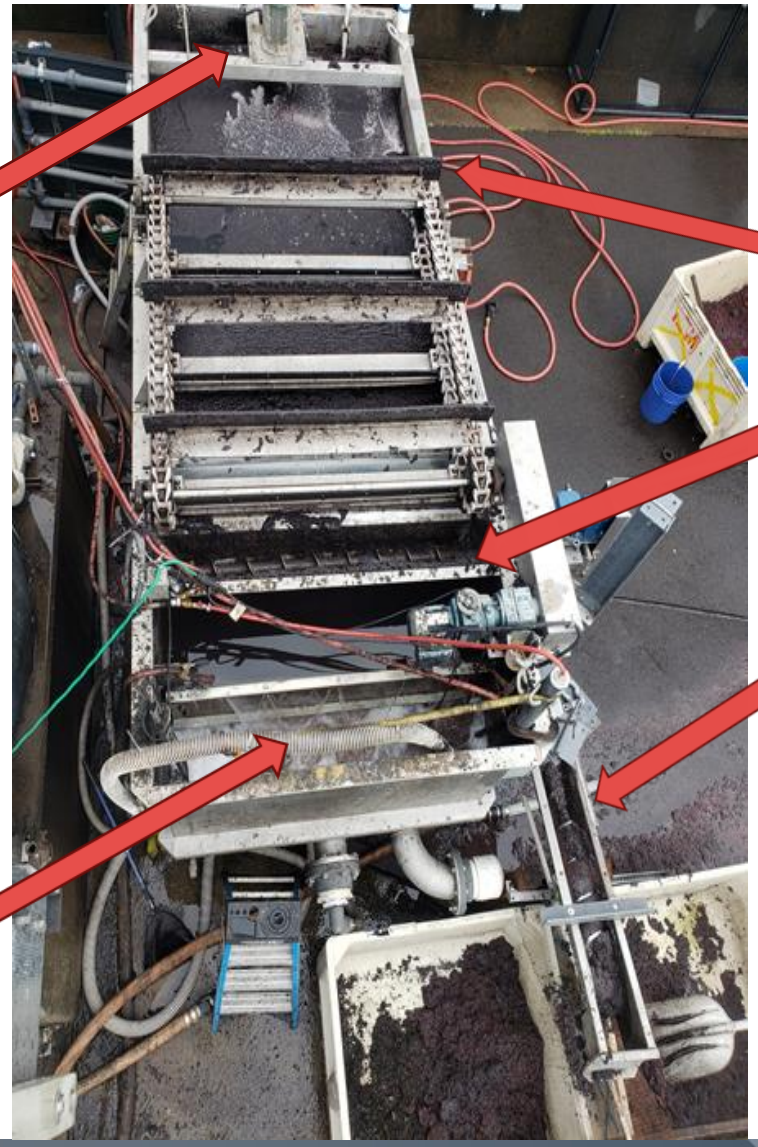
Wastewater Floatation/ Primary Clarification





1. This Head Box Adds micro bubbles, adds polymer mixed with wastewater to bottom of chamber.

2. Solids float to top. Paddles scrape solids int o

3. Auger

4. Solids then go up dewater screw & into bin

5. Clarified water (mostly Dissolved BOD) goes over weir into Bio-system.

This removes 90-97% of BOD

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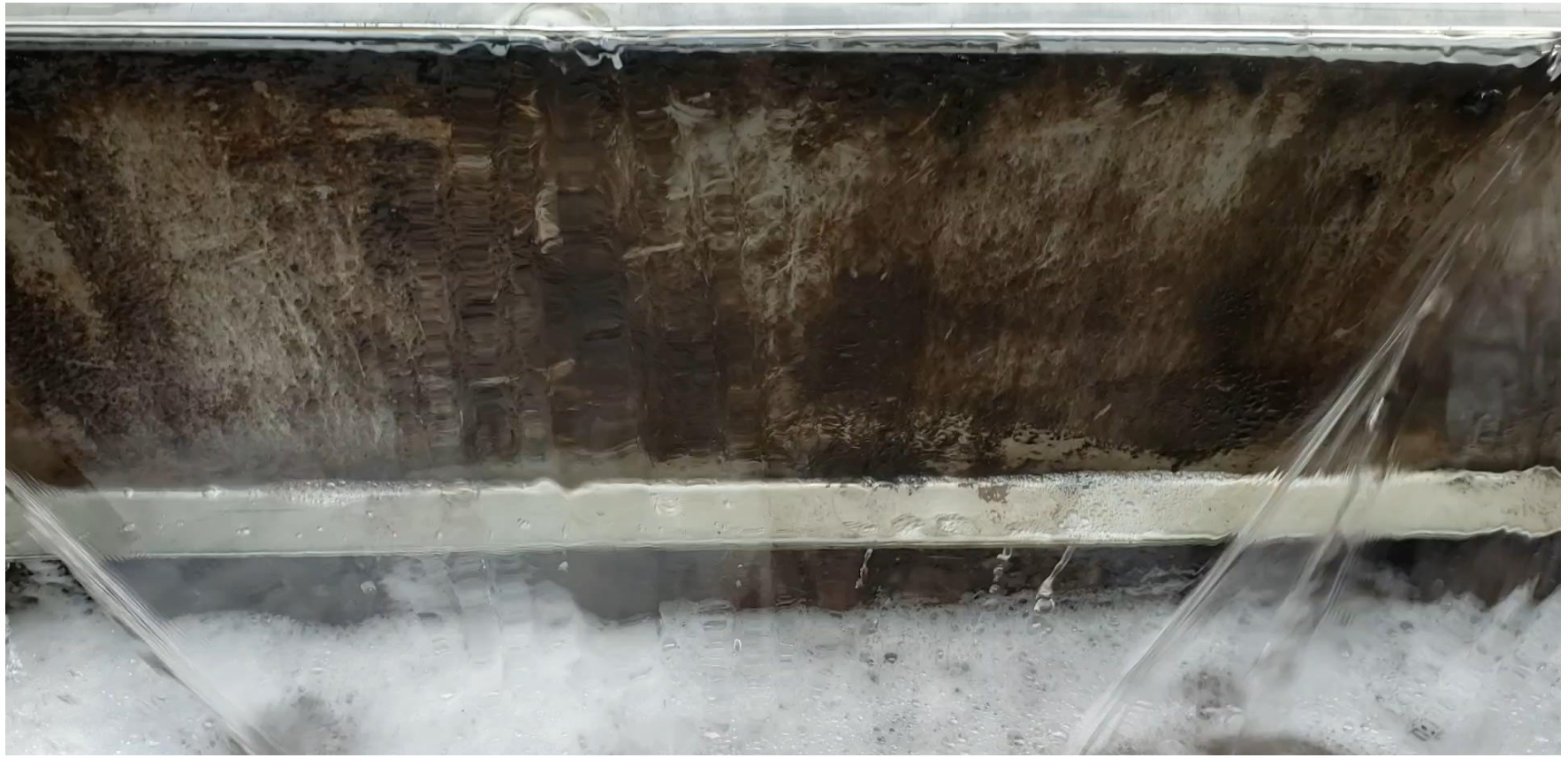
3.

Primary Clarification
Cavitation Air Floatation (CAF) Effluent



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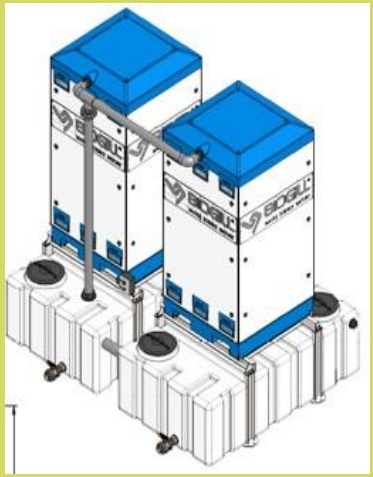
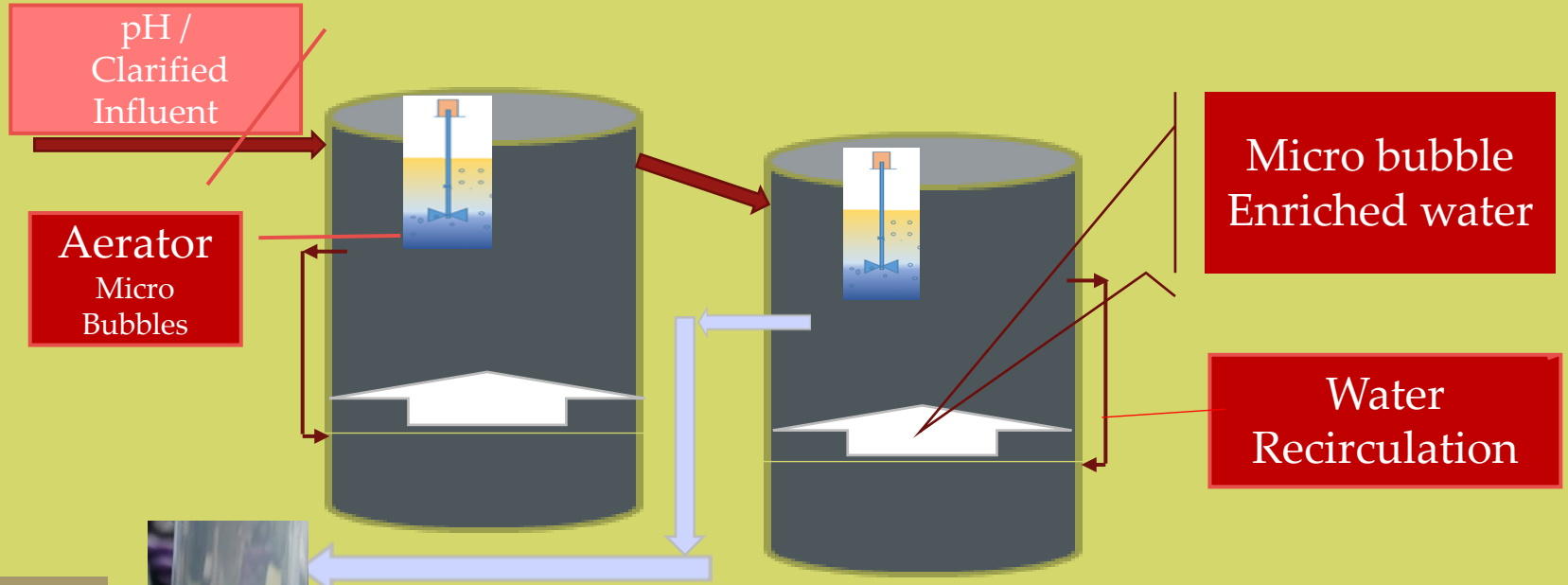
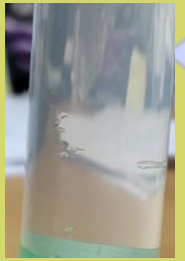
Bio Tanks / BioGill Towers

These Tanks reduce dissolved and residual solid BOD, using aerobic microorganisms to digest remaining nutrients in the wastewater.

This past year we trialed BioGill Towers and are adding them to our system







Creates an environment that microbes can live in consuming nutrients in the wastewater.

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Healthy Microbe Population

There are many sources for increasing microbe populations
Clearblu and Aquafix are a couple I use.

ClearBlu ENVIRONMENTAL
www.ClrBlu.com

Almost all commercially available bacteria blends only contain Bacillus strains. While Bacillus is an excellent treatment bacteria, it is best suited for treating fats, oils, greases, and proteins.

That is why they are primarily used in wastewater treatment plants. Brewery, winery, and food processing waste contain sugars and carbohydrates in very high concentrations. This makes their waste vastly different than sewage treatment plants.

The best bacteria for breaking down sugars and carbohydrates are Pseudomonas. Pseudomonas will digest these very effectively and will reduce BOD levels far more rapidly.

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BioGill Trial

We ran 7,200 GPD (5 gpm) per day through the BioGill towers during the 8-week trial

We expected the Bio Gill system would remove at least 29.25 lbs. of BOD

Process Design Summary

Job Name:	12th & Maple Custom Crush
Document Author:	Sheldon Sapoznik

Design Inputs

Design Parameter	Value	Units
Wastewater Type	Winery	-
Inlet sBOD	1590	mg/L sBOD
Outlet sBOD Required	300	mg/L sBOD
Daily Flow*	13250	gal/day
Temperature	78	°F
Recirculation Flow Rate For Each BioGill Cartridge	1060 to 2650	gal/BioGill Cartridge.hr
Number of Stages	1	-

Figure 1. BioGill Tower module

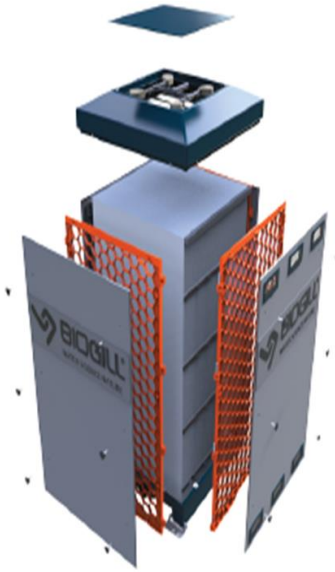

Figure 2. Exploded BioGill Tower module

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BioGill Trial

72% of the system flow through was Bio Gill units

- Recirculated wastewater from T5 Running 24/7
- Processed wastewater from CAF EFF

1. The flow rate was set a higher than typical through the BioGill units to improve biomass generation to downstream treatment processes.
2. Improved downstream performance increased microorganisms in the activated sludge process
3. This aspect was also highly effective as demonstrated in the 2019 vs 2021 comparison
   - We had 86.3% BOD removal through the treatment system in 2019
   - The overall system performance improved to a 94.2% BOD removal in 2021 (This is with a 10% increase in flow)
   - The BioGill contributed to all aspects of the system performance, removal & seeding system

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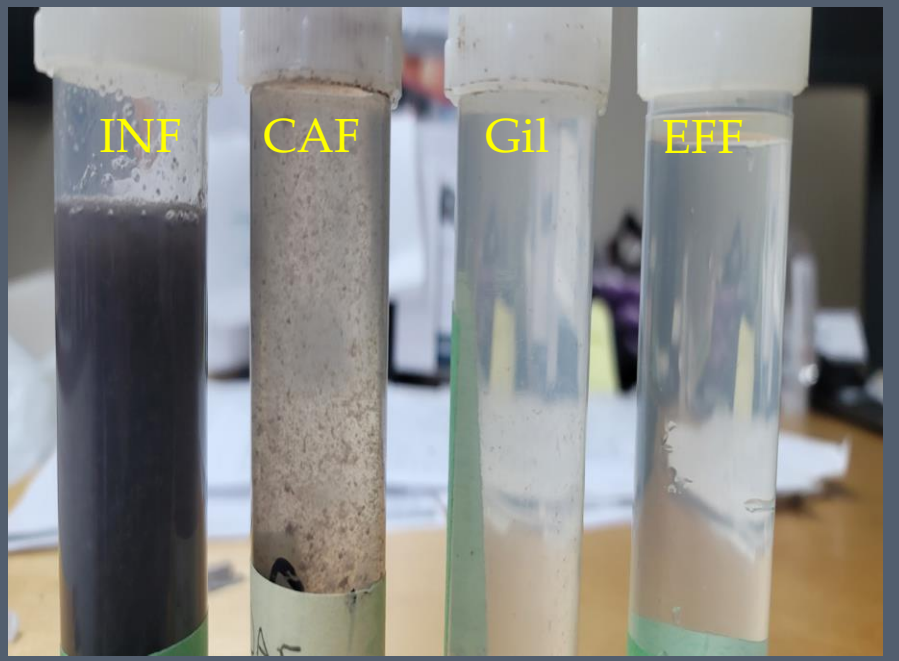
BioGill Trial

Results

- Lowest TSS Ever
- Effected Overall system pH stability
- 3-day pH recovery pH upset (seasonal swing)
- The BIO GILL used no added DO & Pumps are small



2 BioGill towers removed 42.3 lbs of BOD,

This means that the treatment plant removed more than twice what it would have without BIOGILL treating a head bio-tanks

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Wastewater Testing

1. Biological Oxygen Demand (BOD)
2. Chemical Oxygen Demand (COD)
3. Total Suspended Solids (TSS)
4. TDS (Total Dissolved Solids)
5. pH
6. Dissolved Oxygen

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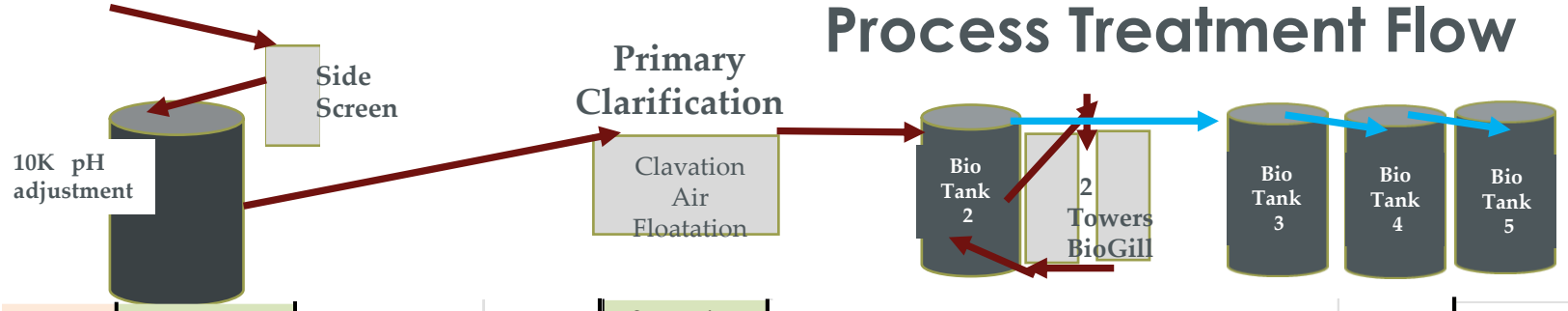
Wastewater Testing

1. COD Chemical Oxygen Demand
2. BOD Biological Oxygen Demand
3. TSS Total Suspended Solids
4. **pH Tests**
5. TDS Total Dissolved Solids
6. Pounds of TSS
7. Pounds of BOD
8. Dissolved Oxygen

Process Treatment Flow



Tests	Waste water Influent
Tare wt.	0.0982
Volume	8
Final wt.	0.1366
ConcMg	4800
	1
pH	6.25

Tests	Cavatation Floating CAF EFF
Tare wt.	0.0988
Volume	28
Final wt.	0.1096
ConcMg	386
	2
pH	7.01

Tests	Waste water Effluent
Tare wt.	0.0981
Volume	40
Final wt.	0.1010
ConcMg	73
	3
pH	7.49

mg/L (milligrams / Liter)

1/5/2022

DATA BASE TRANSFER NUMBERS

Wastewater Plant Data

Sample Date	Time of Sample	pH (SU)	COD (mg/l)	BOD (mg/l)	TSS (mg/l)	Weekly Flow	Daily Flow	Average pH (SU)	BOD LBS	TSS LBS
1/5/2022	7:00 AM	7.49	320	273	73	1,600	320	7.06	0.52	0.14

Wastewater Building 5 Data

Sample Date	Time of Sample	pH (SU)	COD (mg/l)	BOD (mg/l)	TSS (mg/l)	Weekly Flow	Daily Flow	Average pH (SU)	BOD LBS	TSS LBS
1/5/2022	9:00 AM	6.56	4941	4795	1611	1,128	226	6.56	6.44	2.17

Wastewater Plant Data

DATE	Flow, gallons	Flow, MGD	BOD.mg	TSS, mg/l	BOD LBs	TSS LBS	Days
1/5/22	229	0.00023	273	73	0.52	0.14	7

Wastewater Building 5 Data

DATE	Flow, gallons	Flow, MGD	BOD.mg	TSS, mg/l	BOD LBs	TSS LBS	Days
1/5/22	161	0.00016	4795	1611	6.44	2.17	7

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Wastewater Reporting

III MONTHLY WASTEWATER SELF-MONITORING REPORT 2022

Month	January	2021										
								Gallons				
Wastewater Plant Monthly Reading (Gallons)								1,600				
Building 5 Monthly Reading (Gallons)								1,128				
Monthly Total Reading (Gallons)								2,728	**Process Plant**			
Daily A	Lbs Discharged for the Month				BOD 1.9		TSS 0.6		**Daily Lbs BOD**			
	Lbs Discharged for the Month				BOD 9.7		TSS 3.2		0.15			
Daily Average						Total Discharge		546				
						Average Building 1		320				
						Average Building 5		226				

Plant EFF Weekly Report

Week	Sample Date	Time of Sample	pH (SU)	COD (mg/l)	BOD (mg/l)	TSS (mg/l)	Weekly Flow	Daily Flow	Average pH (SU)	BOD LBS	TSS LBS
1	1/5/22	7:00 AM	7.49	320	273	73	1,600	320	7.06	0.73	0.19
2											
3											
4											
5											
										Month Average	

Building 5 EFF Weekly Report

Week	Sample Date	Time of Sample	pH (SU)	COD (mg/l)	BOD (mg/l)	TSS (mg/l)	Weekly Flow	Daily Flow	Average pH (SU)	BOD LBs	TSS LBS
1	1/5/22	9:00 AM	6.56	4941	4795	1611	1,128	226	6.56	6.44	2.17
2											
3											
4											
5											
										Month Average	

	Name	Date	pH buffer 4	pH buffer 7	pH buffer 10	Calabration % Slope	Calabration Sucessful Y/N
1	HASLETT	1/5/21	4.01	7.00	10.01	90	YES
2							

- Pounds of TSS
- Pounds of BOD

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Wastewater Data Base

Waste Water Database 2022

Date	Tank TSS Tests				TDS			pH Tested Results				Discharge		BOD Tested Results				COD Tested Results			
			Plant	A57		mg/l						Plant	A57							Plant	A57
	Waste water Influent	Cavatation Floating CAF EFF	Waste water Effluent	Bld 5 Effluent Comp	Waste water Influent	CAF EFF	Plant EFF	INF	CAF EFF	Waste water Effluent	Bld 5 Effluent Comp	7 Day Period Gallons	7 Day Period Gallons	Waste water Influent	Cavatation Floating	Waste water Effluent	Bld 5 Effluent Comp	Waste water Influent	Cavatation Floating	Waste water Effluent	Bld 5 Effluent Comp
1/1/22																					
1/2/22																					
1/3/22																					
1/4/22																					
1/5/22	4800	386	73	1611	1200	399	232	6.25	7.01	7.49	6.56	1,600	1,128	4603	343	273	4,795	5634	571	320	4,941
Average	**4800**	**386**	**73**	**1611**	**1200**	**399**	**232**	**6.25**	**7.01**	**7.49**	**6.56**	**1,600**	**1,128**	**4603**	**343**	**273**	**4,795**	**5634**	**571**	**320**	**4,941**
Year Total Wastewater Flow												1,600	1,128								4,941
Max Values	4800	385.7143	73	1611.11	**1200**	399	232	6.25	7.01	7.49	6.56	1,600	1,128	4,603	343	273	4,795	5,634	571	320	4,941

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Vendor Resources

Inland Environmental Resources
P.O. Box 18978 Spokane, WA 99228

Pete Leber pleber@inlande.com
800-331-3314 Wastewater:
Polymer/ Mag/ Equipment

Owens Pump & Equipment

Rich Owens <rich@owenspump.com>
Canby, OR 97013
(503) 420-8390 Ext. 222
BIOGILL/ Wastewater Equip. Rep.

ClearBlu ENVIRONMENTAL

Tim Rose
PNW Account Manager / Wastewater
541-246-0478 www.ClrBlu.com
Wastewater Products/ Equipment/Micro bes

NORTHSTAR CHEMICAL
Sherwood Or
Layne Hancock 503.407.9501
Area Manager
Chris Allen **503.519.6278**
Industrial Account Manager
Wastewater

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Building a Wastewater Process System's & Resources

Compost / Wastewater solids
S & W Landscape
Dayton Or 971-201-2887

Furrow Pump
Wilsonville Or
https://furrowpump.com

1. **Basic pH Adjustment Tank**
   (Diffuser Mixing or Pump recirculation)
   LMI controller
2. **Polymer make down system**

503.628.4411
jb@furrowpump.com.

Basic Bio Tank U*Build

Plastic tanks

Oxygen

Stone diffusers

Plastic Diffusers

Pump Cavitation

Ridgway Supply Co

Lafayette Or.
503-864-8256

Wastewater Tests

Alexin Analytical Lab Inc.
Tigard Or 503-639-9311
http://alexinlabs.com

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Complete Wastewater Systems

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Inland
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PROCESS ENGINEERED WATER EQUIPMENT

LIQUID/SOLID SEPARATION SYSTEMS

SCREENING, GRAVITY, FLOTATION, DEWATERING & ACCESSORIES

ASO® Mobile! Package Plant MBBR

PEWE *ASO® Mobile! MBBR AM-50*

PEWE Mobile Innovative

The new ***ASO® Mobile! MBBR*** bioreactor is a continuous flow wastewater treatment system utilized for the reduction of soluble organics and nutrients. The key to the system is the Patented media which provides a "home" for biological colonies of bacteria and protozoa to grow and flourish. The technology utilizes a single flow through design with no need for activated sludge recycling or backwashing. The media are contained within the vessel and submerged in the tank. A pump moves the wastewater to the ***ASO® Mobile! MBBR*** system where a coarse air dispersal system evenly applies the wastewater to the media. The aeration grid provides for continuous application of oxygen to the bio-colony. Simple monitoring of DO, organic and nutrient levels are all that is required for efficient operation of the system.

ASO® Mobile! MBBR System Controls

The ***Command Control®*** PLC provides control of the system. A phase protector is installed in the panel to protect downstream electronics and motors from "single" phasing problems. A level pressure transmitter on the incoming EQ tank to allow the PLC to send water to the treatment plant as needed. A variable frequency drive may be incorporated into the MBBR blower motor to provide speed control while maintaining optimal DO levels.

ASO® Mobile! MBBR Operation & Maintenance

Each day the system operator will perform a simple check of the dissolved oxygen and nutrient levels. A DO meter in each MBBR reactor will continuously register the levels throughout the day. An automated timer will dose the appropriate amount of Alkalinity, Nitrogen and Phosphorous required in the system.

Custom Mobile MBBR Only With PEWE!

ASO® Mobile! MBBR

MODEL	GPD	FOOTPRINT
AM-5	5k	4.8 x 12 x 12.5
AM-10	5k	4.8 x 16 x 12.5
AM-15	15k	4.8 x 16 x 12.5
AM-25	25k	6.8 x 16 x 12.5
AM-50	50k	8.8 x 24 x 12.5
AM-75	75k	8.8 x 28 x 12.5
AM-100	100k	12.8 x 32 x 12.5

All models designed for :
1500 BOD reduced to 250 BOD
250 TSS ; nil FOG
Avg @ 70F

Industrial Portable Wastewater Treatment System

PEWE's patented ***ASO®*** media technology provides a reliable, portable alternative for wastewater treatment. Whether dessert or arctic conditions, the ***ASO® Mobile! MBBR*** can be configured for the world's most remote places.

ASO® Mobile! Benefits:

- Applications flows; 5k to 100k GPD
- Mobile and portable; Ship by truck, rail, sea
- Self-contained piping and wiring; Simple plumbing and electrical connections
- Modular; MBBR tanks installed singly or serially
- Versatile: Many industrial effluent applications
- Easy to operate and maintain
- High energy efficiency
- Reuse compatible effluent

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P: 360-798-9268 F: 360-735-9347 www.pewe-usa.com

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Poly Tanks for Wastewater Storage
CAF-3 Cavitation Air Floatation Unit
Magnesium Hydroxide (Mag)
Mag Delivery system 75 Gallon Tank with Mixer, Jesco 2.8 GPH Dosing Pump
MBBR disc media for BOD reduction of plant effluent Added to bio tank for microbe media.

NORTHSTAR CHEMICAL
Sherwood, OR 97140
(503) 625-3770

https://teamaquafix.com/

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Conclusion

12th & Maple Wine Company
1242 SE Maple Street
Dundee Or 97115
503-538-7724

Product and supply vendors I have used are primary in this area

This will provide ideas and resources for wine facilities & vineyards.

Making them able to develop or purchase equipment that will be efficient & cost effect at treating industry process wastewater.

The growing importance of discharging clean water is becoming vital to the future of all in the wine industry