# **BIOFILTRO** REVITALIZE WATER

# Worm Powered Treatment

REVITALIZE WATER

"Method and system for inoculating bacteria in contaminated water using earthworm humus"

US Patent 7,540,960

- Biodynamic Aerobic (BIDA<sup>®</sup>) System
- Percolating biofilter
- Physical and biological filtration

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## Why The Wriggle?



#### California Redworm

- Break down solids
- Burrow aerate and saturate
- 6-8 years average lifespan
- Have 400 600 hatchlings a year
- Produce microbe rich castings

#### Industry Specific Microbes

- Target soluble and dissolved solids
- Billions of colonies

Symbiotic relationship forms <u>biofilm</u>, a dynamic external digestive layer, across the system medias for rapid bioremediation of waste.



### How Does the BIDA<sup>®</sup> System Work?



4 Hour Continuous Batch Process



Converts contaminants into nutritious soil amendment



<95% less energy demand than traditional WWT technology



High quality effluent for irrigation of cash crops

#### BIOFILTRO REVITALIZE WATER

Aonair Wines - Saint Helena, CA (2016) Boutique Winery 1,000 GPD Vineyard Irrigation

# Case Study - Aonair Wines





## Case Study - Aonair Wines

#### Aonair Wines - Saint Helena, CA (2016) Boutique Winery 1,000 GPD Reuse for drip irrigation in vineyard





Monthly Report Plant #131 March 2019



Monthly Report Plant #131 March 2019

#### **Aonair Wines**



BIDA	B System Specifications
Flow Design:	1,000 Gallons Per Day
System Size. Start Up Date:	August 29, 2016
System Purpose:	Deliver effluent with biological oxygen demand below 160 mg/L and total suspended solids below 80 mg/L.
Report Preface:	Days which have less than 50 GPD (5% of the Flow Design) of irrigation not will count as "days irrigated."

#### **Monthly Flow**



	Monthly Water Analysis Samples									
	BIDA in	BIDA out	Removal							
BOD	810	12	99%							
TSS	1,700	27	98%							

				25 - 101011	1	
	Troat	ad Water		26 - Tue	0	
	ITEau			27 - Wed		355
	Month	Year	Lifetime	28 - Thu		
				29 - Fri	1	
Total Gallons:	7,606	57,349	453,518	30 - Sat	1	
Days Irrigated:	17	60	579	31 - Sun	1	
Average GPD:	447	956	783			
Peak Flow:	1,332	5,278	5,684			

	0	50	00	1,000		1,500
1 - Fri		277				
2 - Sat					1,086	
3 - Sun	0					
4 - Mon		3	95			
5 - Tue		253				
6 - Wed						1,332
7 - Thu		35	4			
8 - Fri	0					
9 - Sat	1	28				
10 - Sun	0					
11 - Mon			600	)		
12 - Tue		261				
13 - Wed			450			
14 - Thu			491			
15 - Fri	1					
16 - Sat	0					
17 - Sun	0					
18 - Mon	1	32				
19 - Tue	0					
20 - Wed		198				
21 - Thu	0					
22 - Fri		278				
23 - Sat		297				
24 - Sun	0					
25 - Mon	1					
26 - Tue	0					
27 - Wed		35	5			
28 - Thu				716		
29 - Fri	1					
30 - Sat	1					
31 - Sun	1					

**Daily Flow** 

#### **Aonair Wines**

12 Month Water Analysis Data								
	Biologica	l Oxygen Dei	mand	Total S	Suspended S	olids		
Grab Date	BOD in	BOD out	Removal	TSS in	TSS out	Removal		
4/6/2018	340	39	89%	250	350	-40%		
5/2/2018	1,300	6.0	99%	2,800	21	99%		
6/7/2018	1,300	38	97%	920	38	96%		
7/11/2018	320	64	80%	3,400	21	99%		
8/23/2018	3,300	ND	99%	420	ND	99%		
9/20/2018	2,600	10	99%	1,000	12	99%		
10/11/2018	1,800	6.0	99%	1,800	7.5	99%		
11/13/2018	7,700	2.0	99%	37,000	ND	99%		
12/7/2018	2,800	13	99%	2,700	9.0	99%		
1/10/2019	1,900	5.0	99%	8,100	6.0	99%		
2/11/2019	1,400	5.0	99%	5,200	12	99%		
3/5/2019	810	12	99%	1,700	27	98%		
Average	2,131	17	99%	5,441	50	99%		

Note: ND = None Detected. All water analysis data is taken from grab samples.



Lifetime Water Analysis Overview										
	Biologica	I Oxygen Dei	mand	Total Suspended Solids						
	BOD in	BOD out	Removal	TSS in	TSS out	Removal				
Average	1,893	38	97%	2,307	21	92%				
Peak	7,700	280	99%	37,000	350	99%				

IMPORTANT: As noted in the November 2017 through April 2018 lab analyses, the contaminant data for said months were sampled after passing through one BIDA® System. This was due to the piping maintenance. Additionally, in April 2018 the systems were tilled to bring the second pass online, which resulted in higher TSS passing through the system.



**Fetzer Vineyards, Hopland, CA (2016)** 100,000 GPD Winery

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Case Study - Fetzer Vineyards

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## Case Study - Fetzer Vineyards



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Water Quality Data Past 12 Months

	Large Winery										
	Biologica	al Oxygen [	Demand	Total S	Suspended	Solids					
Grab Date	BOD in	BOD out	Removal	TSS in	TSS out	Removal					
4/18/2018	7,900	800	90%	3,900	92	98%					
5/2/2018	3,100	1,700	45%	460	220	52%					
6/7/2018	4,400	170	96%	5,700	480	92%					
7/11/2018	2,300	6.0	99%	1,700	80	95%					
8/23/2018	1,200	2.0	99%	620	36	94%					
9/27/2018	7,100	1,500	79%	17,000	170	99%					
10/27/2018	10,000	3,600	64%	5,500	200	96%					
11/15/2018	11,000	2,000	82%	6,000	190	97%					
12/27/2018	10,000	990	90%	13,000	410	97%					
1/10/2019	7,600	440	94%	2,600	160	94%					
2/19/2019	4,200	41	99%	5,800	62	99%					
3/4/2019	2,400	120	95%	12,000	84	99%					
Average	5,933	947	86%	6,190	182	93%					

Medium Winery								
	Biologica	al Oxygen [	Demand	Total S	uspended	Solids		
Grab Date	BOD in	BOD out	Removal	TSS in	TSS out	Removal		
4/6/2018	660	26	96%	1,500	26	98%		
5/3/2018	2,800	40	99%	800	78	90%		
6/7/2018	3,000	8.0	99%	1,900	76	96%		
7/16/2018	25,000	160	99%	4,500	45	99%		
8/29/2018	6,500	10	99%	5,700	13	99%		
9/25/2018	4,700	1,600	66%	3,800	160	96%		
10/15/2018	3,000	270	91%	180	72	60%		
11/16/2018	4,000	31	99%	3,300	17	99%		
12/17/2018	3,000	120	96%	4,200	180	96%		
1/17/2019	4,600	130	97%	7,800	340	96%		
2/13/2019	52	23	56%	390	90	77%		
3/5/2019	5,000	36	99%	4,600	120	97%		
Average	5.193	205	96%	3.223	99	97%		

Boutique Winery									
	Biologica	al Oxygen I	Demand	Total S	uspended	Solids			
Grab Date	BOD in	BOD out	Removal	TSS in	TSS out	Removal			
4/6/2018	340	39	89%	250	350	-40%			
5/2/2018	1,300	6.0	99%	2,800	21	99%			
6/7/2018	1,300	38	97%	920	38	96%			
7/11/2018	320	64	80%	3,400	21	99%			
8/23/2018	3,300	ND	99%	420	ND	99%			
9/20/2018	2,600	10	99%	1,000	12	99%			
10/11/2018	1,800	6.0	99%	1,800	7.5	99%			
11/13/2018	7,700	2.0	99%	37,000	ND	99%			
12/7/2018	2,800	13	99%	2,700	9.0	99%			
1/10/2019	1,900	5.0	99%	8,100	6.0	99%			
2/11/2019	1,400	5.0	99%	5,200	12	99%			
3/5/2019	810	12	99%	1,700	27	98%			
Average	2,131	16	99%	5,441	49	99%			

Large Fruit Processor									
	Biologica	al Oxygen [	Demand	Total Suspended Solids					
Grab Date	BOD in	BOD out	Removal	TSS in	TSS out	Removal			
4/3/2018	830	22	97%	1,000	53	95%			
5/4/2018	690	12	98%	76	37	51%			
6/11/2018	570	12	98%	1,300	47	96%			
7/3/2018	1,400	160	89%	620	84	86%			
8/8/2018	4,700	1,400	70%	3,000	110	96%			
9/3/2018	5,300	51	99%	8,400	220	97%			
10/3/2018	2,500	350	86%	640	170	73%			
11/5/2018	570	23	96%	120	110	8%			
12/19/2018	2,200	140	94%	2,000	140	93%			
1/2/2019	210	34	84%	75	150	-100%			
2/11/2019	590	27	95%	120	92	23%			
3/6/2019	1,100	2.3	99%	170	14	92%			
Average	1,722	186	89%	1,460	102	93%			

Sanitary Waste									
	Biologica	al Oxygen [	n Demand Total Suspended Solids						
Grab Date	BOD in	BOD out	Removal	TSS in	TSS out	Removal			
4/3/2018	540	17	97%	330	22	93%			
5/4/2018	700	13	98%	720	20	97%			
6/13/2018	380	12	97%	650	24	96%			
7/9/2018	270	22	92%	970	63	94%			
8/10/2018	450	15	97%	610	34	94%			
9/21/2018	5,300	40	99%	11,000	28	99%			
10/30/2018	370	7.0	98%	280	22	92%			
11/5/2018	880	8.0	99%	570	22	96%			
12/3/2018	460	8.0	98%	760	21	97%			
1/4/2019	1,400	56	96%	3,700	15	99%			
2/11/2019	2,700	6.0	99%	2,300	18	99%			
3/8/2019	710	6.2	99%	1,300	34	97%			
Average	1,393	19	97%	2,388	29	96%			

Large Dairy									
	Total Suspended Solids			Total Nitrogen			Total Phosphorous		
Grab Date	TSS in	TSS out	Removal	TN in	TN out	Removal	TP in	TP out	Removal
4/27/2018	10,380	646	94%	1,655	227	86%	213	39	82%
5/21/2018	16,560	1,080	93%	1,842	231	87%	246	35	86%
6/1/2018	16,360	996	94%	1,709	244	86%	284	45	84%
7/2/2018	20,580	1,392	93%	2,192	541	75%	357	55	85%
7/31/2018	36,820	792	98%	2,621	444	83%	523	47	91%
9/5/2018	11,000	1,500	86%	1,700	350	79%	190	53	72%
10/25/2018	33,560	420	99%	1,907	743	61%	274	34	88%
12/14/2018	19,320	2,000	90%	2,493	814	67%	302	66	78%
1/4/2019	12,000	532	96%	2,228	541	76%	284	42	85%
2/1/2019	6,000	1,685	72%	1,947	620	68%	156	44	72%
2/21/2019	16,200	1,451	91%	2,412	618	74%	256	47	82%
3/11/2019	11,040	1,652	85%	2,400	913	62%	256	78	70%
Average	18,502	1,269	90%	2,211	620	72%	289	52	80%

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Thank You www.biofiltro.com