Introduction to BlueMorph for WEA

September 7th, 2016

BlueMorphUV Science Team

Alex Farren

Chief Executive Officer

Alex is a professional **scientist** with a diverse experience in **biochemistry** and **environment toxicology** who has developed numerous novel applications within the field of food science. Prior to founding BlueMorph LLC, Alex worked as a chemist and research associate for both McGill and the Royal Victoria Hospital.

Alex has a **Master in Science in Toxicology** and a **Bachelors in Science in Biochemistry** from McGill University.

Noah Bareket

VP of engineering

Noah is an **optical scientist** and **former director of research and development** at Abbott Labs with over 30 years of R&D experience. Over his prolific career he has developed instruments and systems for the aerospace, semiconductor and bio-medical industries. He holds 21 issued patents and 14 pending for a variety of optical systems and instrumentation.

Noah has a **PhD in Optical Science** from the University of Arizona and a **Master in Science** from the Weizmann Institute of Technology.

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My first “Entry Level” Job in the Wine Industry

There has to be a better way!

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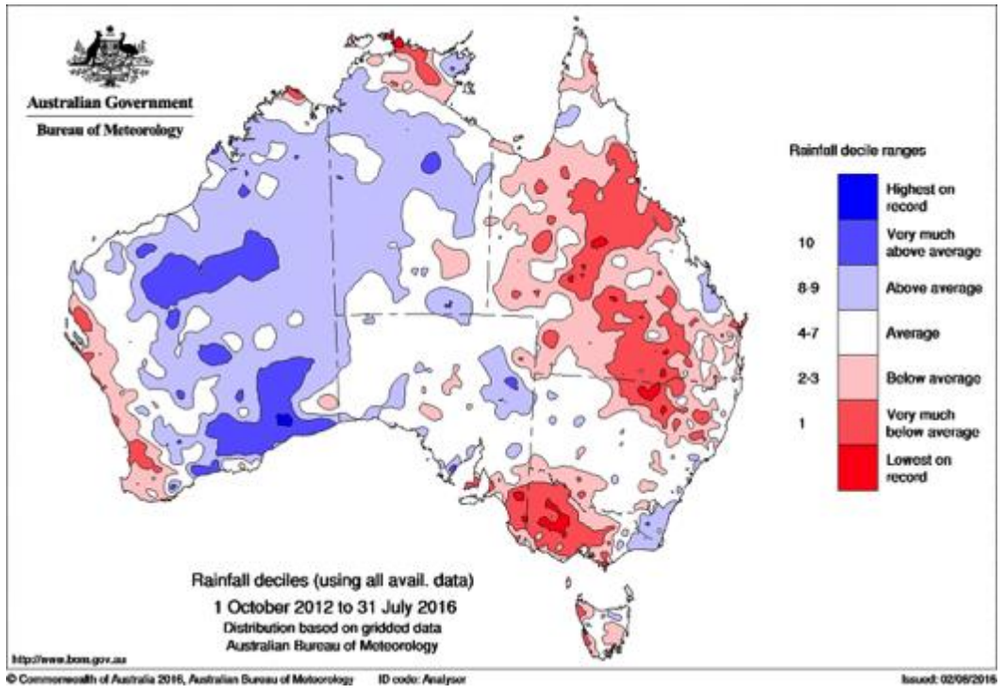
The Problems

“Wastewater mainly comes from washing tanks…,”
(source: , Sheldon Sapoznik, Napa land use supervisor)

Up to a 6:1 ratio of wastewater to wine *(source SF gate)*

Best in Class appears to require a nearly 3:1 wastewater to wine ratio.



Droughts. Severe and widespread droughts in the next 30–90 years over many land areas resulting from either decreased precipitation and/or increased evaporation.
(source Nature)

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The Problems - Water

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The Problems - Chemicals

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The Problems - Electricity

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The Problems - Labour

The Problems – Effectiveness/Reproducibility

Sanitize ⇨ Sterilize

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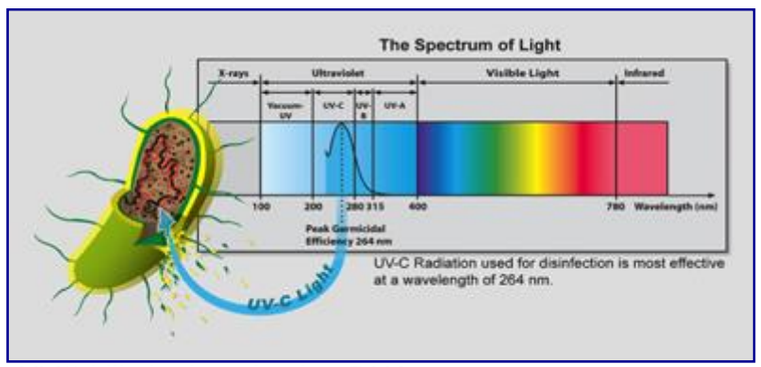
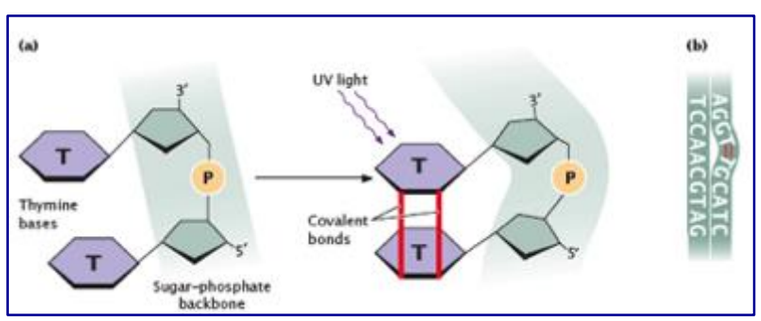
The Solution - **UVC**



UVC kills by inactivating DNA

DNA optimally absorbs UV light at around 260nm. The lamps used in our units emit UVC light at around 254nm.



DNA forms two photoproducts, one being a cyclobutane ring between adjacent pyrimidines.

First use of UVC on drinking water was in Marseilles, France in 1910. Now used worldwide,over 6000 water treatment plants in Europe, used in HVAC systems and hospitals.

Germicidal UVC (FDA approved!) Proven sanitization technology in water medical, medical services and laboratories

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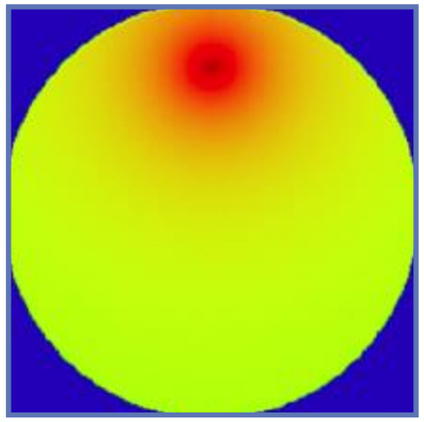
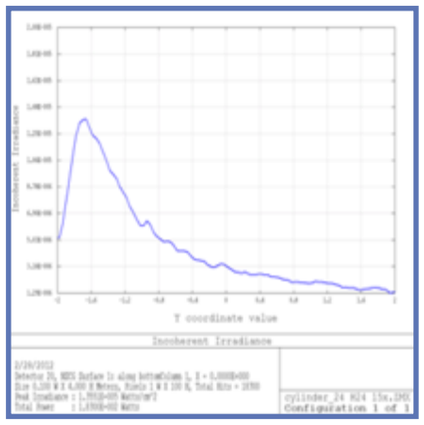
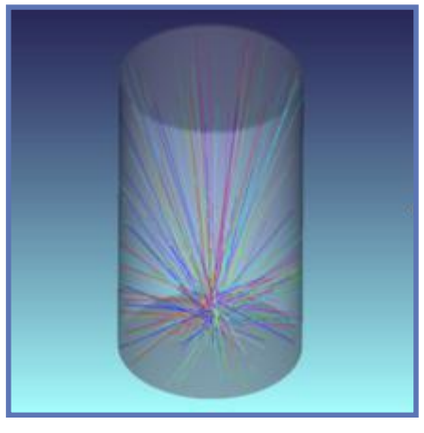
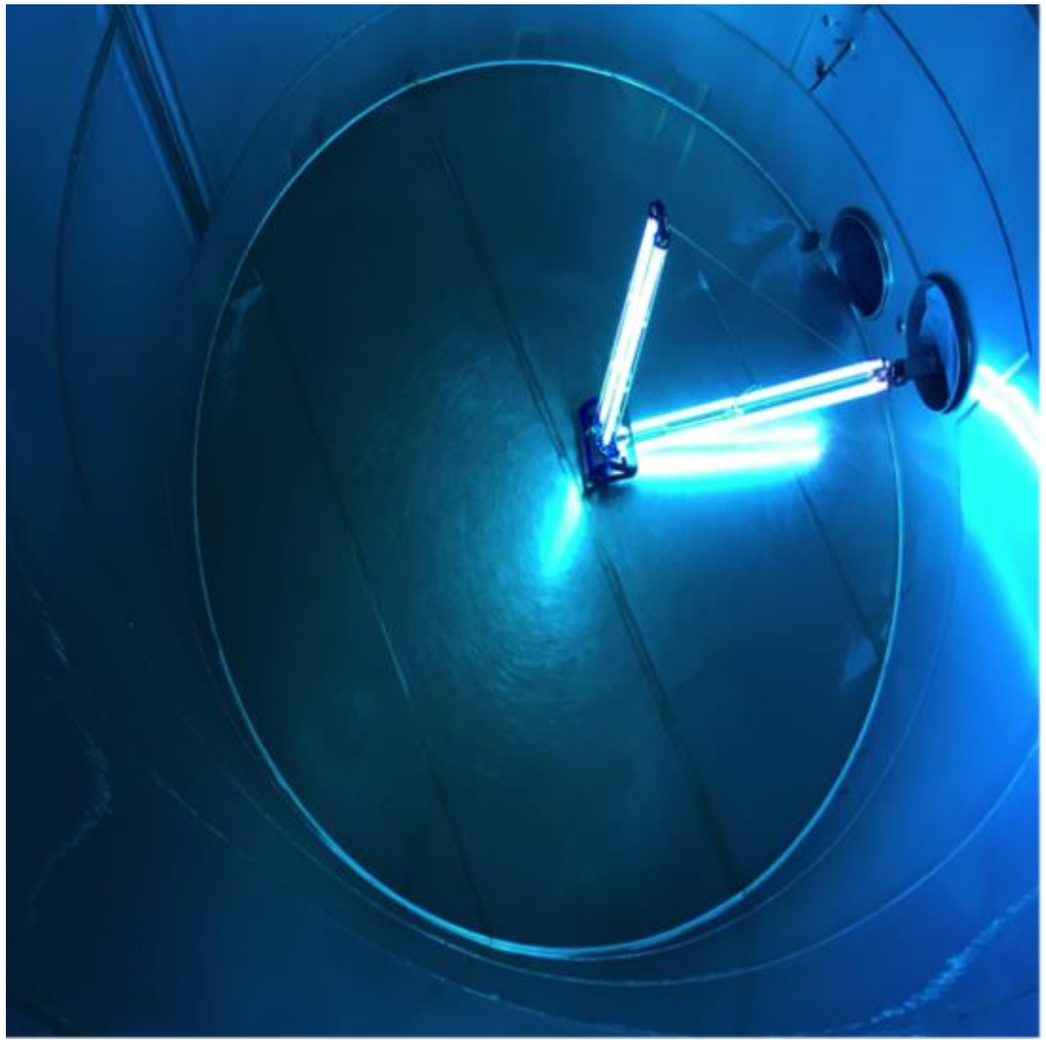
BlueMorphUV's Innovation









A patented method using advanced software & proprietary algorithms to determine UVC dose requirements for any shaped container or vessel.

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Mission Statement

« BlueMorph LLC seeks to use **technology** to **reduce the environmental footprint** of industrial/manufacturing processes while having a **positive long term impact on the bottom line** of the businesses that use them. »

Alex Farren
Inventor & Chief Executive Officer

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The Benefits

UV Tank Systems

Commercial germicidal UVC systems compatible with 99% of tanks in the market.

The Results

50-70%

100%

50-60%

Up to 70%

99.999%

Significant

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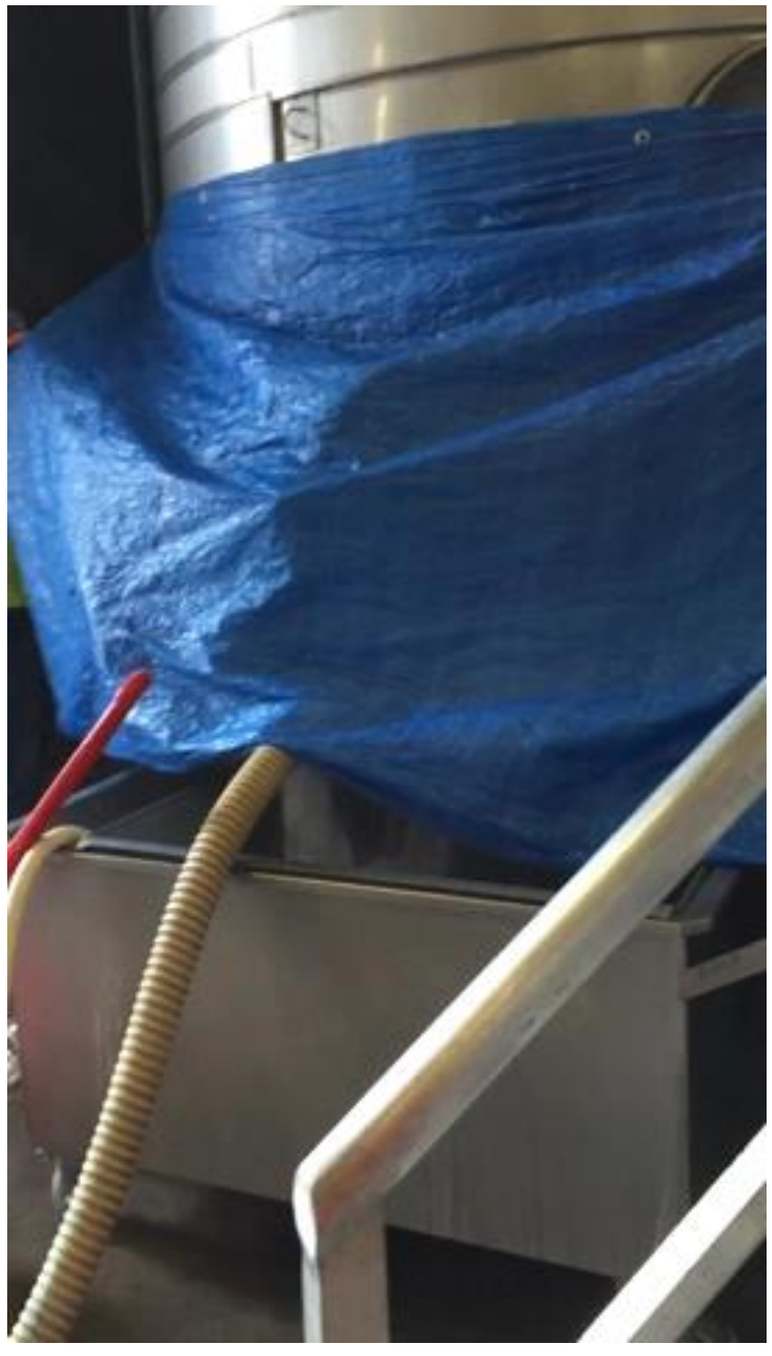
The Benefits – Set-Up and Break-Down



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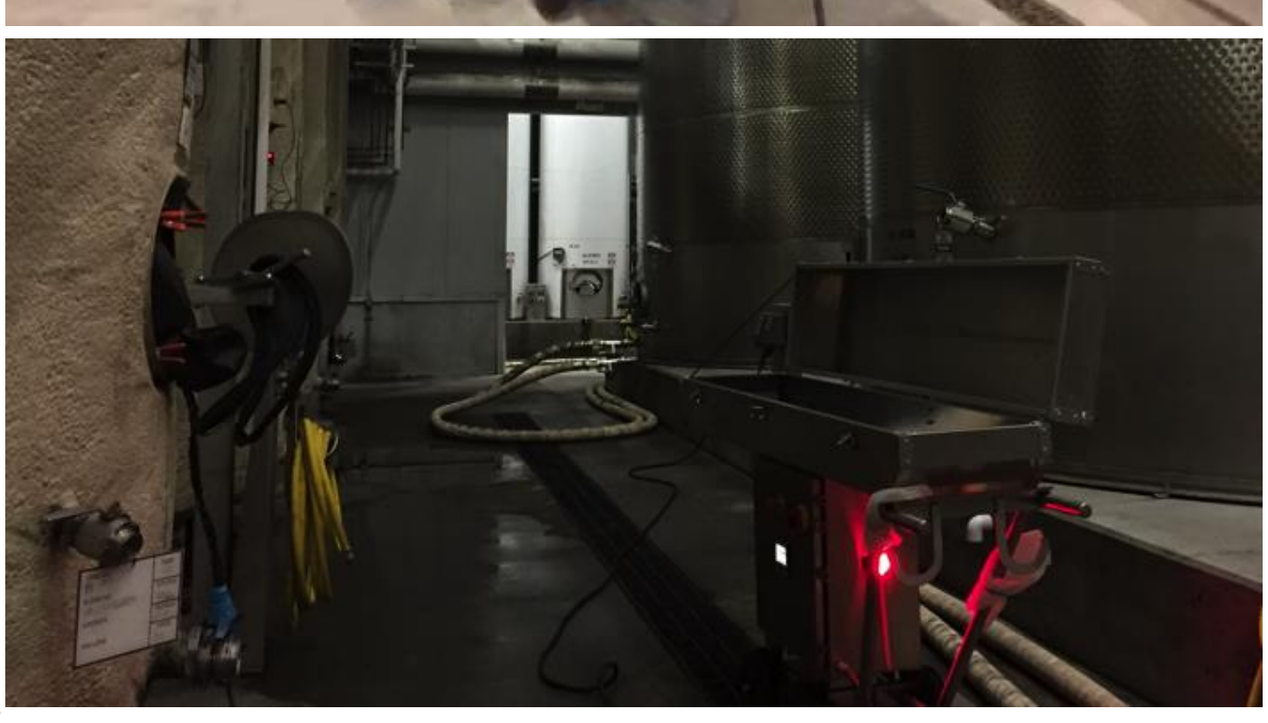
The Benefits – Set-Up and Break-Down



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Safety concerns and Maintenance

UVC is **not** an ionizing form of radiation therefore there are **NO** regulations found in U.S. OSHA or Australia WHS.

Lamps **are sleeved in a Teflon**, therefore in case of breakage, all contents of the lamps are contained and **guaranteed not to spill in tank**.

Lamps can be replaced by cellar hands in about 15 minutes.

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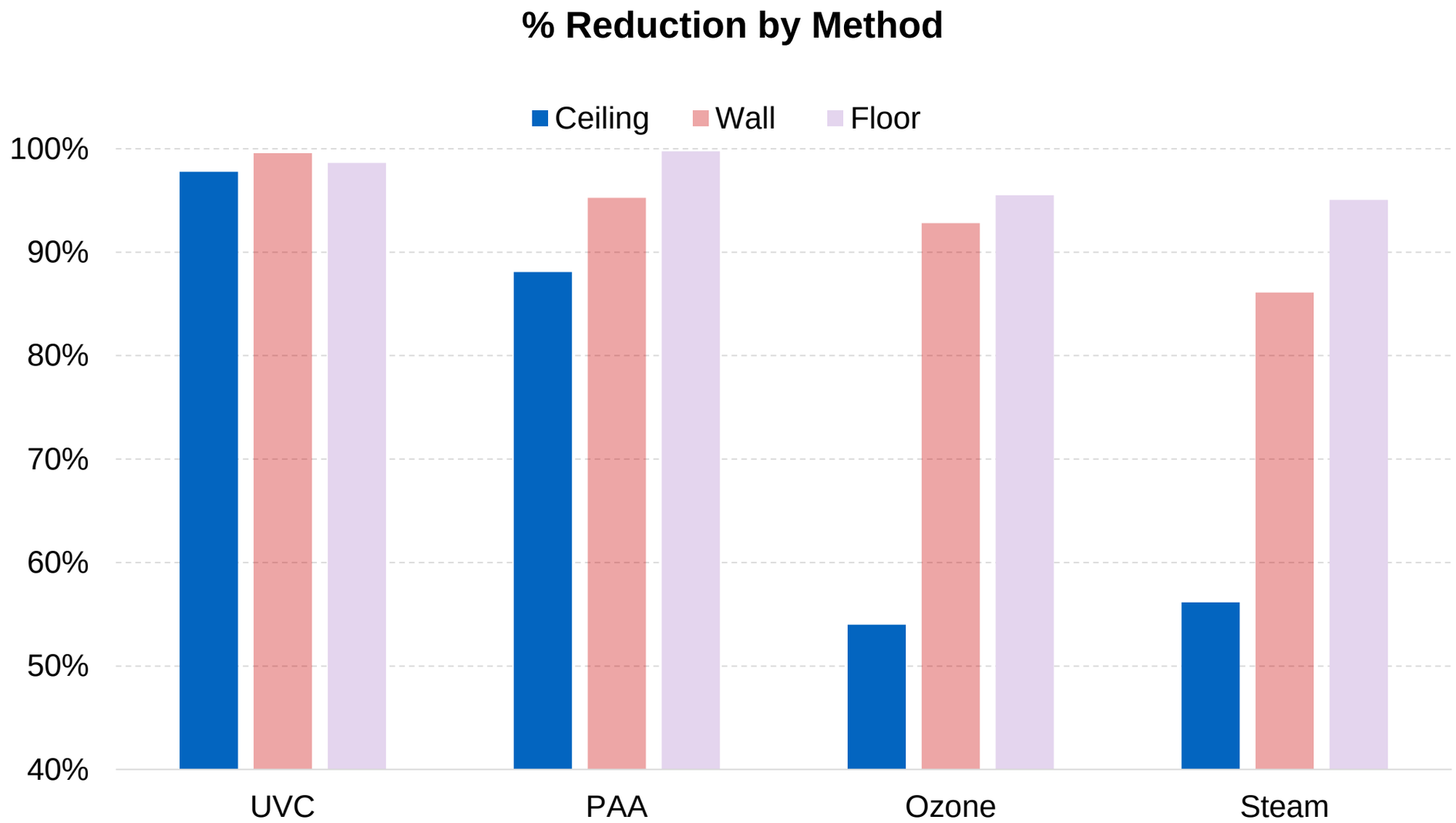
Results: More Effective and Reproducible

Third party tested on Ceiling, Wall and Floor



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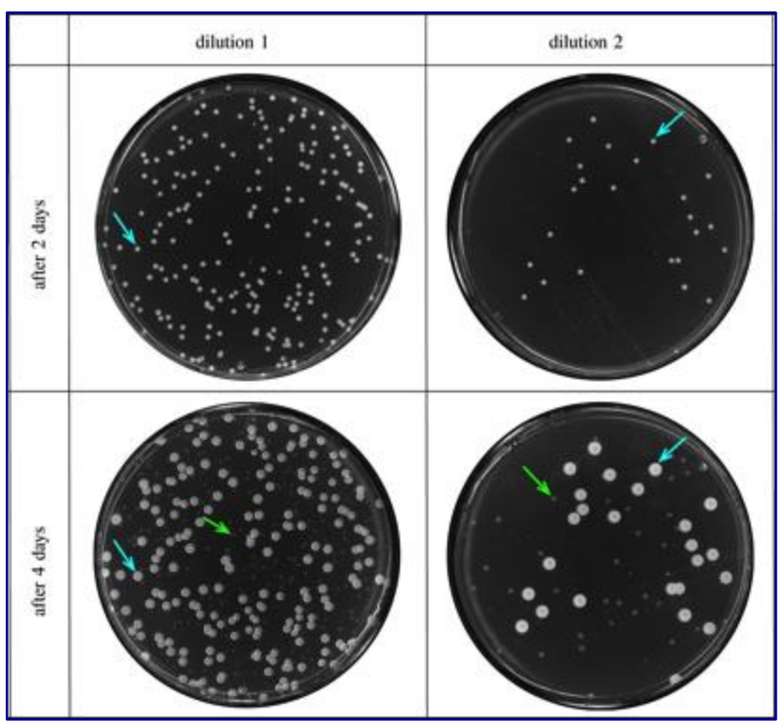
Validation

Bioluminescence based studies can yield false positives.

There has been NO correlation between ATP levels and Colony Forming Units (CFU's).

Determines solely the absence of organic material containing ATP.



Plating/CFU studies are the only truly reliable way to track viability of contaminating microorganisms within tanks/containers.

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Performance Guarantee

BlueMorphUV guarantees that our units will effectively sanitize stainless steel tanks (not valves and fittings). The tanks must be visibly clean and free of debris and film prior to UVC exposure. If your facility is not satisfied with the performance we can adjust irradiation levels to meet or exceed your current sanitization levels achieved by the existing protocol. If you are still not satisfied with the results or for any other reason within 90 days of installation, we will take the unit back and give a full refund*

**The unit must be undamaged and the amount of the refund is limited to the actual price paid for the unit in question and shall not include any other costs associated with installation or operation of the subject unit.*

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Payback Study: Hall Wines (100,000 cases yearly)

Current SOP			BlueMorphUV	
Time	Water	Steps	Time	Water
5 min	40 L	1	5 min rinse	40 L
35 min set up	0	2	5 min set up	0
15 min Caustic	230 L	3	10 min UVC	0
5 min rinse	300 L	4	5 min break down	0
10 min PAA	230 L	5		
5 min rinse	300 L	6		
15 min break down	0	7		
90 minutes	**1100 L**	Total	**25 minutes**	**40 L**

Payback			
	BlueMorphUV Model	UVT200K	UVT6K
	Number of Units	1	2
	Payback in Years	**0.8**	**0.8**

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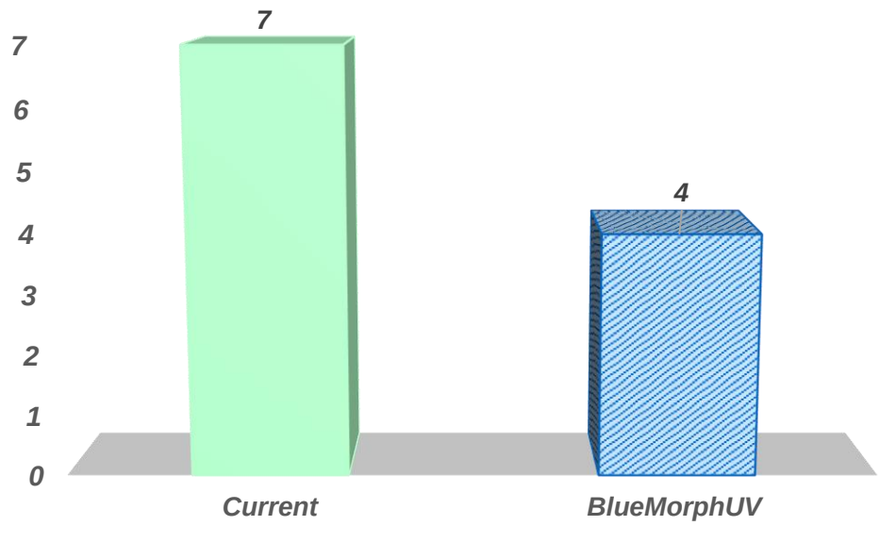
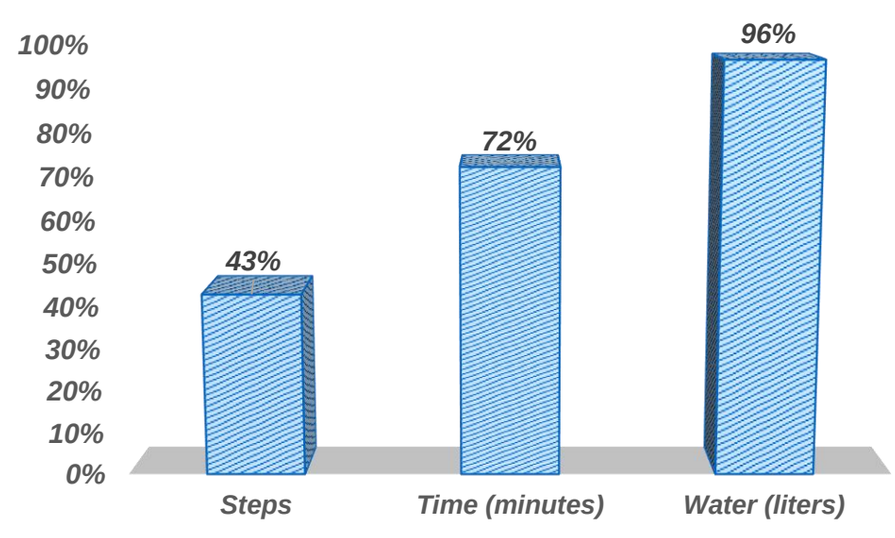
Process Comparison – Significant Savings





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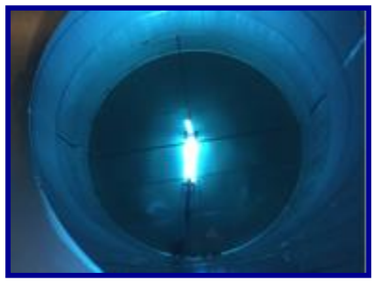
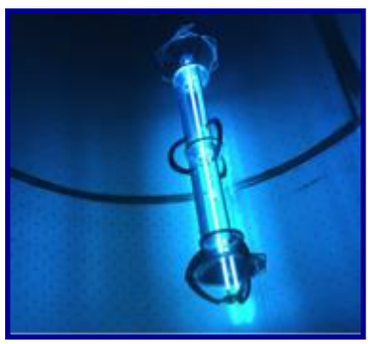
Product Line-Up 2016



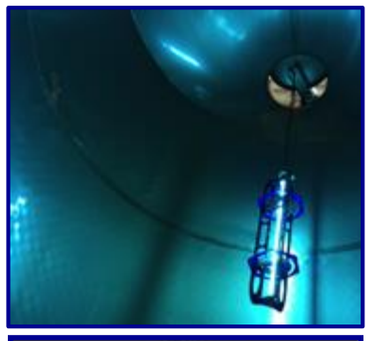
UVT200K

Largest Unit, capable of sanitizing tanks in excess of 1,000,000 liters. Target customer is any winery with tanks greater than 40,000 liters.



UVT6K

Mid-sized unit, capable of sanitizing tanks up to 40,000 liters. Target is smaller American wineries and International market with smaller tanks.



UVT2K

Smallest unit, capable of sanitizing tanks 12,000 liters and under. Goal is to address smallest wineries and to make technology available to wineries of all sizes.

UV55

In development. We are working on using UVC to retrofit their barrel washing systems for added security and “knock back” as well as a hand held unit for small wineries.

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Recognition, Awards & Grants

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Thank You!

Trial Results (CBrands by BevTrac)

Treatment Name	Tank #	Tank Size (Gallons)	Tank Site Sampled	Total Microbial Load*				Log10 Reduction
				Pre- Treatment (CFU)	Pre- Treatment (Log10)	Post-Treatment (CFU)	Post- Treatment (Log10)	
Negative Control	61	~6000	Ceiling	7	0.85	15	1.18	-0.3
			Wall	12	1.08	2	0.3	0.8
			Floor	5	0.7	21	1.32	-0.6
Positive Control	62	~6000	Ceiling	28,600	4.46	26,100	4.42	0
			Wall	51,600	4.71	47,300	4.67	0
			Floor	142,500	5.15	129,800	5.11	0
270 XTRA + Chlorine Dioxide	63	5960	Ceiling	11,200	4.05	3	0.48	3.6
			Wall	33,200	4.52	10	1	3.5
			Floor	161,500	5.21	20	1.3	3.9
270 XTRA + UVC	64	5960	Ceiling	41,800	4.62	41	1.61	3
			Wall	99,800	5	0	0	5
			Floor	313,500	5.5	8	0.9	4.6
270 XTRA + Chlorine Dioxide	67	5960	Ceiling	8,200	3.91	4	0.6	3.3
			Wall	71,300	4.85	8	0.9	3.9
			Floor	228,000	5.36	11	1.04	4.3
270 XTRA + UVC	68	5320	Ceiling	8,400	3.92	62	1.79	2.1
			Wall	80,800	4.91	3	0.48	4.4
			Floor	209,000	5.32	0	0	5.3
No Cleaner + Chlorine Dioxide	65	5960	Ceiling	33,700	4.53	9	0.95	3.6
			Wall	50,400	4.7	6	0.78	3.9
			Floor	247,000	5.39	6	0.78	4.6
No Cleaner + UVC	57	5320	Ceiling	5,600	3.75	10	1	2.7
			Wall	90,300	4.96	9	0.95	4
			Floor	156,800	5.2	4	0.6	4.6

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Trial Results (JFW Oakville by BevTrac)

Treatment Name	Tank #	Tank Capacity (Gallons)	Tank Site Sampled	Total Microbial Load*				% CFU Reduction	Log_{10} Reduction
				Pre-Treatment (CFU)	Pre-Treatment (Log_{10})	Post-Treatment (CFU)	Post-Treatment (Log_{10})		
REGULAR CLEANING**	207	7935	Floor	5,066	3.70	6	0.78	99.9	2.93
			Inner Rack Valve	1,350	3.13	5	0.70	99.6	2.43
			Top Inner Surface	60	1.78	2	0.30	96.7	1.48
TANK BEATER AFTER RACKING + UVC	220	7935	Floor	389	2.59	3	0.48	99.2	2.11
			Inner Rack Valve	670	2.83	12	1.08	98.2	1.75
			Top Inner Surface	29	1.46	2	0.30	93.1	1.16
REGULAR CLEANING**	221	7935	Floor	5,225	3.72	18	1.26	99.7	2.46
			Inner Rack Valve	510	2.71	4	0.60	99.2	2.11
			Top Inner Surface	1,330	3.12	9	0.95	99.3	2.17
HOSE RINSE + UVC	914	3300	Floor	676	2.83	1	0.00	99.9	2.83
			Inner Rack Valve	24	1.38	0	0.00	100	1.38
			Top Inner Surface	13	1.11	0	0.00	100	1.11
TANK BEATER RINSE + UVC	917	3300	Floor	47	1.67	2	0.30	95.7	1.37
			Inner Rack Valve	35	1.54	3	0.48	91.4	1.07
			Top Inner Surface	8	0.90	1	0.00	87.5	0.90
TANK BEATER RINSE + PAA RINSE	919	3300	Floor	13	1.11	3	0.48	76.9	0.64
			Inner Rack Valve	73	1.86	2	0.30	97.3	1.56
			Top Inner Surface	11	1.04	2	0.30	81.8	0.74

***Includes yeast, bacteria, and mold**

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Trial Results (Diageo by BevTrac)

Treatment Name	Tank Site Sampled	Total Microbial Load*				% CFU Reduction	Log10 Reduction
		Pre- Treatment (CFU)	Pre-Treatment (Log10)	Post- Treatment (CFU)	Post-Treatment (Log10)		
UVC	Ceiling	31	1.49	3	0.48	90.3	1.0
	Wall	280	2.45	2	0.30	99.3	2.1
	Floor	66	1.82	1	0.00	98.5	1.8
UVC	Ceiling	67	1.83	4	0.60	94.0	1.2
	Wall	205	2.31	1	0.00	99.5	2.3
	Floor	104	2.02	3	0.48	97.1	1.5
H2O Rinse + Ozone	Ceiling	226	2.35	104	2.02	54.0	0.3
	Wall	304	2.48	22	1.34	92.8	1.1
	Floor	357	2.55	16	1.20	95.5	1.3
H2O Rinse + Ozone	Ceiling	24	1.38	10	1.00	58.3	0.4
	Wall	34	1.53	7	0.85	79.4	0.7
	Floor	205	2.31	11	1.04	94.6	1.3

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Trial Results (Hall by BevTrac)

Treatment Name	Tank Site Sampled	Total Microbial Load*				% CFU Reduction	Log10 Reduction
		Pre-Treatment (CFU)	Pre-Treatment (Log10)	Post-Treatment (CFU)	Post- Treatment (Log10)		
H2O Rinse + Steam	Ceiling	58	1.76	11	1.04	81.0	0.7
	Wall	51	1.71	3	0.48	94.1	1.2
	Floor	596	2.78	59	1.77	90.1	1.0
Caustic + H2O Rinse + PAA + H2O Rinse	Ceiling	22	1.34	5	0.70	77.3	0.6
	Wall	21	1.32	2	0.30	90.5	1.0
	Floor	423	2.63	2	0.30	99.5	2.3
H2O Rinse + UVC	**Ceiling**	**44**	**1.64**	**3**	**0.48**	**93.2**	**1.2**
	Wall	**112**	**2.05**	**3**	**0.48**	**97.3**	**1.6**
	Floor	**1,179**	**3.07**	**2**	**0.30**	**99.8**	**2.8**
Caustic + H2O Rinse + PAA + H2O Rinse	Ceiling	13	1.11	2	0.30	84.6	0.8
	Wall	58	1.76	6	0.78	89.7	1.0
	Floor	1,262	3.10	13	1.11	99.0	2.0

*Includes yeast, bacteria, and mold

Trial Results (Sonoma Cutrer by BevTrac)

Treatment Name	Tank #	Tank Site Sampled	Total Microbial Load*				% CFU Reduction	Log_{10} Reduction
			Pre- Treatment (CFU)	Pre-Treatment (Log_{10})	Post-Treatment (CFU)	Post- Treatment (Log10)		
Trial UV-1	19	Ceiling	12	1.08	0	0.00	100.0	1.1
		Wall	16	1.20	0	0.00	100.0	1.2
		Floor	41	1.61	2	0.30	95.1	1.3
Trial UV-2	83	Ceiling	21	1.32	0	0.00	100.0	1.3
		Wall	855	2.93	8	0.90	99.1	2.0
		Floor	2,375	3.38	11	1.04	99.5	2.3
Trial UV-3	106	Ceiling	11	1.04	0	0.00	100.0	1.0
		Wall	238	2.38	0	0.00	100.0	2.4
		Floor	2,945	3.47	0	0.00	100.0	3.5
Trial UV-4	99	Ceiling	22	1.34	0	0.00	100.0	1.3
		Wall	35	1.54	0	0.00	100.0	1.5
		Floor	37	1.57	0	0.00	100.0	1.6
Trial UV-5	85	Ceiling	22	1.34	0	0.00	100.0	1.3
		Wall	20	1.30	0	0.00	100.0	1.3
		Floor	95	1.98	5	0.70	94.7	1.3
Trial UV-6	91	Ceiling	245	2.39	0	0.00	100.0	2.4
		Wall	25	1.40	0	0.00	100.0	1.4
		Floor	80	1.90	1	0.00	98.8	1.9
Control - Hot Sodium Percarbonate + Citric Acid Rinse + Cold Water Rinse	18	Ceiling	14	1.15	1	0.00	92.9	1.1
		Wall	7	0.85	0	0.00	100.0	0.8
		Floor	2,470	3.39	5	0.70	99.8	2.7

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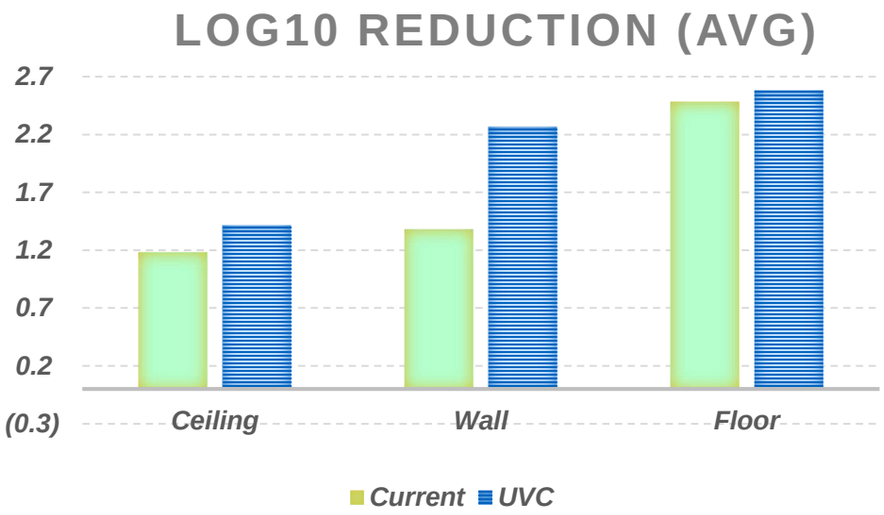
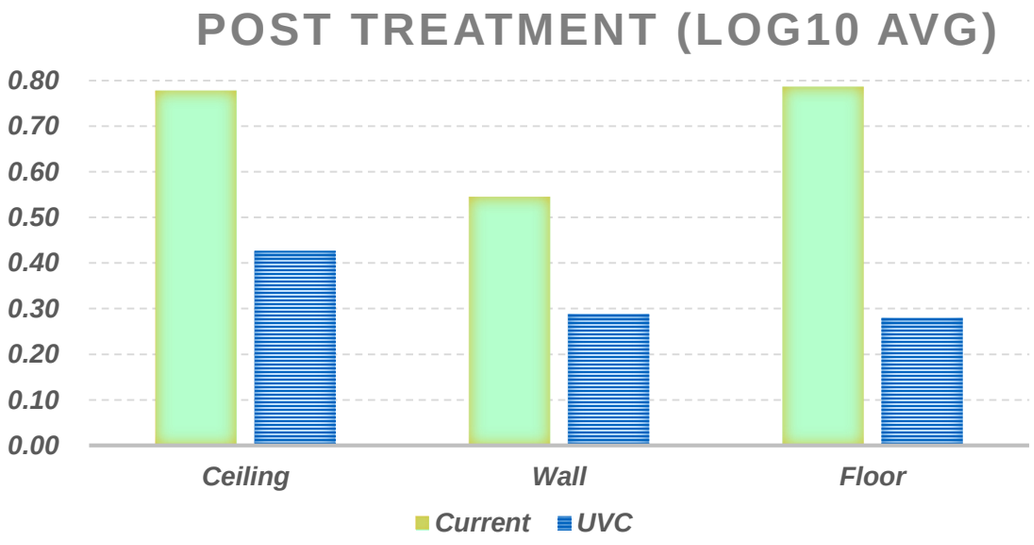
Trial Results (by BevTrac)

Improved sanitization effectiveness as measured by:

Higher reductions in Colony Forming Units (CFUs)



Resulting in overall lower CFUs



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