



3980 Trust Way Hayward, Ca 94545  
(650) 208-8482; info@rayvio.com

8/23/2019

Client: LARQ Inc.  
Job Number: JIV20190805-1

Study: Antibacterial efficacy of LARQ UV-C Pitcher against aqueous heterotrophic bacteria  
Method: ASTM E2315

Report Date: 8/23/2019

### Experimental Summary:

The purpose of this procedure was to test the effectiveness of the UVC function in LARQs pitcher at inhibiting the growth of, and deactivation of aqueous heterotrophic bacteria in water samples. The testing procedure was designed after discussions between LARQ and RayVio Inc. and is based on ASTM E2315 (“Standard Guide for Assessment of Antimicrobial Activity Using a Time-Kill Procedure”) testing guidelines and was conducted at RayVio Inc. in Hayward, CA.

### Methods and Materials:

Two nominally identical LARQ pitchers were presented for testing (marked UV and no-UV.) The products are configured to automatically deliver a predetermined UVC dose to the bottom reservoir of the pitcher every 6 hours. For the following tests the UVC function was active in one pitcher (marked “UV”), while the electronics were turned off in the second pitcher (marked “no UV”). To further ensure that the “no UV” pitcher did not receive an unintended UVC dose, electrical tape was placed over the UVC LED emission window. 1 ml aliquots were periodically taken from each pitcher and plated on aqueous heterotrophic media plates. The plates were incubated at 37 °C for at least 48 hours before counting CFUs.





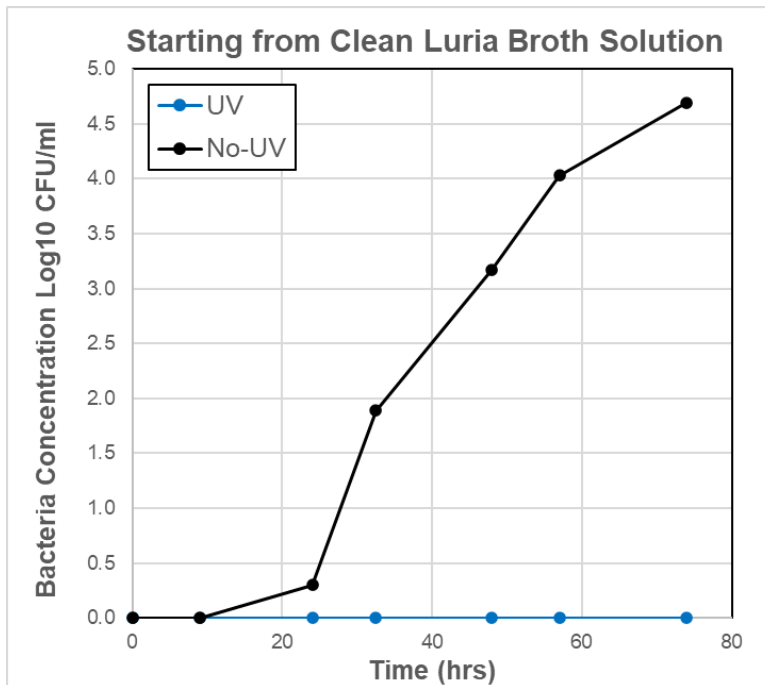
3980 Trust Way Hayward, Ca 94545  
(650) 208-8482; info@rayvio.com

8/23/2019

**First test** – measurement of inhibition of aqueous heterotrophic bacterial growth

In the first test 400 ml of a sterile 0.05% Luria broth solution was added to each clean pitcher. The pitcher marked “UV” had the UVC function active and automatically delivered a UV dose every 6 hours. For the pitcher marked “no-UV” the electronics were switched off, and it received no UV treatment. The table and graph below show the measured bacterial concentrations in the two solutions over time.

Time (hrs)	Measured CFU/ml		Measured log <sub>10</sub> (CFU/ml)		Difference in log <sub>10</sub> (CFU/ml)
	UV	no-UV	UV	no-UV	
0.0	0	0	n/a	n/a	n/a
9.0	0	0	0	0	0
24.0	0	2	0	0.30	0.30
32.5	0	77	0	1.89	1.89
48.0	0	1,486	0	3.17	3.17
57.0	0	10,789	0	4.03	4.03
74.0	0	49,295	0	4.69	4.69



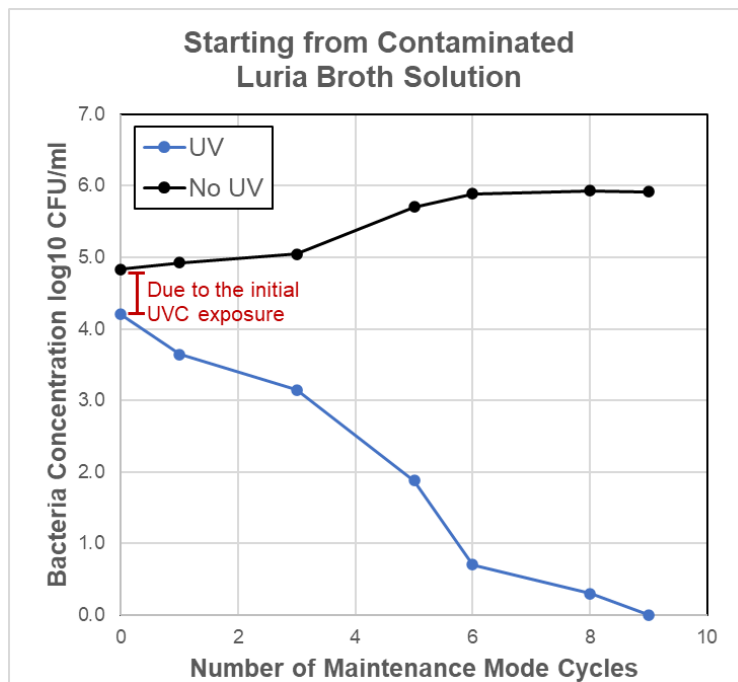
**Second test** – measurement of deactivation of aqueous heterotrophic bacteria

At the conclusion of the first experiment, the contaminated Luria broth from the “no UV” pitcher was transferred to a separate container and 300 ml of sterile water was added to it. The two pitchers were thoroughly cleaned with detergent and water, and left to dry overnight. At the start of the second

experiment 350 ml of the contaminated Luria broth solution was transferred into each of the pitchers. Again, one pitcher received regular UVC exposures, while the other did not. At the start of the experiment, a UVC exposure equal to what the pitcher delivers in normal operation was initiated for the active pitcher. After that the active pitcher automatically initiated UVC exposures every 6 hours. The electronics were turned off in the other pitcher and it received no UVC exposures.

The table and graph below show the measured bacteria concentration in the pitchers versus the number of UVC cycles. The difference in the two curves at zero is due to the initial UVC dose.

Number of UV Cycles	Measured CFU/ml		Measured log <sub>10</sub> (CFU/ml)		Difference in log <sub>10</sub> (CFU/ml)
	UV	no-UV	UV	no-UV	
Start	68,000	68,000	4.83	4.83	n/a
Initial UVC dose	16,000	68,000	4.20	4.83	0.63
1	4,416	85,000	3.65	4.93	1.28
3	1,400	112,000	3.15	5.05	1.90
5	75	508,429	1.88	5.71	3.83
6	5	780,000	0.70	5.89	5.19
8	2	850,000	0.30	5.93	5.63
9	0	830,000	0	5.92	5.92





3980 Trust Way Hayward, Ca 94545  
(650) 208-8482; info@rayvio.com

8/23/2019

**Conclusions:**

This study was intended to measure the effectiveness of LARQs UVC pitcher at both inhibiting the growth of, and deactivation of aqueous heterotrophic bacteria. The tables and graphs show that the LARQ filter pitcher's UV function both inhibited the growth of aqueous heterotrophic bacteria, and achieved detectable reduction of aqueous heterotrophic bacteria versus the controls.

*Faisal Sudradjat*

---

Faisal Sudradjat  
Test Manager  
RayVio Inc.  
fsudradjat@rayvio.com