



Dimer UV

Arthur Kreitenberg

Antimicrobial Evaluation of Dimer UV Treated Articles
EXECUTIVE SUMMARY

Background

The United States Environmental Protection Agency (EPA) OCSPP 810.2200 tests for hospital/healthcare chemical spray disinfectant requiring >6 log reduction of *Staphylococcus aureus* (ATCC 6538) and *Pseudomonas aeruginosa* (ATCC 15442) within 10 minutes¹. The EPA offers no guidance on UVC disinfection systems.

Objective

To test a UVC emitter with a protocol based on the OCSPP 810.2200, modified to accommodate UVC emission.

Device Tested

The Dimer UVHammer wing was tested powering only 2 of the 3 lamps for a time limit of under 5 minutes. Test samples were placed horizontally.

Results

For *Staphylococcus aureus* (ATCC 6538), average reductions were >6 log in 51 of 60 samples, and >5 log in 60 of 60 samples.

For *Pseudomonas aeruginosa* (ATCC 15442), average reductions were >6 log in 57 of 60 samples, and >5 log reductions in 60 of 60 samples.

Conclusions

The UVHammer wing, using only 2 of 3 lamps, performed comparable to the EPA chemical requirements for hospital/healthcare surface disinfection in less than half the time.

About the Lab

ResInnova Laboratories is a microbiology laboratory focused on antimicrobial product testing. They maintain a wide library of industry-relevant bacteria, fungi, and viruses. ResInnova tests porous textiles & fabrics, solid plastics, polymeric or hydrophobic materials, films, non-porous coatings finishes & surfaces, UV/UVC lights, mops & wipes, aerosol disinfectants, and liquid disinfectants. The lab serves your needs by implementing the most current international testing standards and developing custom testing as needed. Their strategy of combining standardized methods with your unique modification requests delivers the most usable data of the highest quality.

¹ *Product Performance Test Guidelines OCSPP 810.2200: Disinfectants for Use on Environmental Surfaces Guidance for Efficacy Testing (Page 6)



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Test Method Details

Test Method	Modified ASTM E2197
Test Organism	<i>Staphylococcus aureus</i> (ATCC #6538)
Test Solution	Phosphate Buffered Saline (1x) with Serum (5%)
Test Carriers	75 X 26 mm Glass Slide carriers
Inoculum Applied to Test Carrier	0.010 mL applied to each carrier and spread in circular motion to within 1 mm of edges
Recovery Solution	5 mL Phosphate Buffered Saline (1x) with Triton X-100 surfactant (0.1%)
Measuring Method of Number of Viable Bacteria	Dilution Plate Method onto nutritive Tryptic Soy Agar (1x)

Note: Per client request, the carriers were not dried in a desiccation chamber prior to testing. However, as the testing process occurred, the carriers dried during the exposure. Therefore, it is difficult to ascertain whether the desiccation process had an impact on the test carrier results.

Results – *S. aureus* carrier testing

Modified ASTM E2197: Standard Quantitative Disk Carrier Test Method	
Number of Replicate Experiments	3
Number of Replicate Carriers per Experiment	65 test carriers, 2 controls
Total Quantity of Carriers Tested (including controls)	201
Exposure Time for Test Carriers	4 minutes, 50 seconds

Test #1

Replicate Carrier	Average Bacterial Burden (CFU/carrier)	Average Log Bacterial Burden (CFU/carrier)	Log Reduction (vs Control)	Percent Reduction (vs Control)
Average Control	5.23E+06	6.72	--	--
1	0.00E+00	0.00	6.72	100.00%
2	3.90E+03	3.59	3.13	99.93%
3	0.00E+00	0.00	6.72	100.00%
4	0.00E+00	0.00	6.72	100.00%
5	0.00E+00	0.00	6.72	100.00%
6	0.00E+00	0.00	6.72	100.00%
7	0.00E+00	0.00	6.72	100.00%
8	0.00E+00	0.00	6.72	100.00%
9	0.00E+00	0.00	6.72	100.00%
10	0.00E+00	0.00	6.72	100.00%
11	0.00E+00	0.00	6.72	100.00%
12	0.00E+00	0.00	6.72	100.00%
13	0.00E+00	0.00	6.72	100.00%
14	0.00E+00	0.00	6.72	100.00%
15	2.00E+02	2.30	4.42	100.00%
16	0.00E+00	0.00	6.72	100.00%
17	0.00E+00	0.00	6.72	100.00%
18	0.00E+00	0.00	6.72	100.00%
19	0.00E+00	0.00	6.72	100.00%
20	0.00E+00	0.00	6.72	100.00%
21	0.00E+00	0.00	6.72	100.00%
22	0.00E+00	0.00	6.72	100.00%
23	0.00E+00	0.00	6.72	100.00%
24	1.05E+03	3.02	3.70	99.98%
25	0.00E+00	0.00	6.72	100.00%
26	0.00E+00	0.00	6.72	100.00%
27	7.50E+02	2.88	3.84	99.99%
28	0.00E+00	0.00	6.72	100.00%
29	0.00E+00	0.00	6.72	100.00%
30	0.00E+00	0.00	6.72	100.00%
31	0.00E+00	0.00	6.72	100.00%

32	0.00E+00	0.00	6.72	100.00%
33	0.00E+00	0.00	6.72	100.00%
34	0.00E+00	0.00	6.72	100.00%
35	0.00E+00	0.00	6.72	100.00%
36	0.00E+00	0.00	6.72	100.00%
37	0.00E+00	0.00	6.72	100.00%
38	0.00E+00	0.00	6.72	100.00%
39	6.55E+04	4.82	1.90	98.75%
40	1.45E+04	4.16	2.56	99.72%
41	0.00E+00	0.00	6.72	100.00%
42	0.00E+00	0.00	6.72	100.00%
43	0.00E+00	0.00	6.72	100.00%
44	0.00E+00	0.00	6.72	100.00%
45	0.00E+00	0.00	6.72	100.00%
46	0.00E+00	0.00	6.72	100.00%
47	0.00E+00	0.00	6.72	100.00%
48	0.00E+00	0.00	6.72	100.00%
49	6.85E+03	3.84	2.88	99.87%
50	1.05E+05	5.02	1.70	97.99%
51	0.00E+00	0.00	6.72	100.00%
52	0.00E+00	0.00	6.72	100.00%
53	0.00E+00	0.00	6.72	100.00%
54	0.00E+00	0.00	6.72	100.00%
55	0.00E+00	0.00	6.72	100.00%
56	0.00E+00	0.00	6.72	100.00%
57	0.00E+00	0.00	6.72	100.00%
58	0.00E+00	0.00	6.72	100.00%
59	0.00E+00	0.00	6.72	100.00%
60	0.00E+00	0.00	6.72	100.00%
61	0.00E+00	0.00	6.72	100.00%
62	0.00E+00	0.00	6.72	100.00%
63	0.00E+00	0.00	6.72	100.00%
64	0.00E+00	0.00	6.72	100.00%
65	0.00E+00	0.00	6.72	100.00%

Figure 1.1 Heat Map **p= 6.33E-47 (log values)**

	6.72	3.13	6.72	6.72	6.72	6.72
6.72	6.72	6.72	6.72	6.72	6.72	6.72
	6.72	4.42	6.72	6.72	6.72	6.72
6.72	6.72	6.72	6.72	3.70	6.72	6.72
	3.84	6.72	6.72	6.72	6.72	6.72
6.72	6.72	6.72	6.72	6.72	6.72	1.90
	2.56	6.72	6.72	6.72	6.72	6.72
6.72	6.72	6.72	2.88	1.70	6.72	6.72
	6.72	6.72	6.72	6.72	6.72	6.72
6.72	6.72	6.72	6.72	6.72	6.72	6.72

Test #2

Replicate Carrier	Average Bacterial Burden (CFU/carrier)	Average Log Bacterial Burden (CFU/carrier)	Log Reduction (vs Control)	Percent Reduction (vs Control)
Average Control	7.19E+06	6.86	--	--
1	3.00E+02	2.48	4.38	100.00%
2	0.00E+00	0.00	6.86	100.00%
3	0.00E+00	0.00	6.86	100.00%
4	0.00E+00	0.00	6.86	100.00%
5	0.00E+00	0.00	6.86	100.00%
6	0.00E+00	0.00	6.86	100.00%
7	0.00E+00	0.00	6.86	100.00%
8	0.00E+00	0.00	6.86	100.00%
9	0.00E+00	0.00	6.86	100.00%
10	0.00E+00	0.00	6.86	100.00%
11	0.00E+00	0.00	6.86	100.00%
12	0.00E+00	0.00	6.86	100.00%
13	0.00E+00	0.00	6.86	100.00%
14	0.00E+00	0.00	6.86	100.00%
15	0.00E+00	0.00	6.86	100.00%
16	0.00E+00	0.00	6.86	100.00%
17	0.00E+00	0.00	6.86	100.00%
18	0.00E+00	0.00	6.86	100.00%
19	0.00E+00	0.00	6.86	100.00%
20	0.00E+00	0.00	6.86	100.00%
21	0.00E+00	0.00	6.86	100.00%
22	0.00E+00	0.00	6.86	100.00%
23	1.45E+03	3.16	3.70	99.98%
24	0.00E+00	0.00	6.86	100.00%
25	0.00E+00	0.00	6.86	100.00%
26	0.00E+00	0.00	6.86	100.00%
27	0.00E+00	0.00	6.86	100.00%
28	0.00E+00	0.00	6.86	100.00%
29	0.00E+00	0.00	6.86	100.00%
30	0.00E+00	0.00	6.86	100.00%
31	0.00E+00	0.00	6.86	100.00%

32	0.00E+00	0.00	6.86	100.00%
33	0.00E+00	0.00	6.86	100.00%
34	5.00E+01	1.70	5.16	100.00%
35	0.00E+00	0.00	6.86	100.00%
36	0.00E+00	0.00	6.86	100.00%
37	0.00E+00	0.00	6.86	100.00%
38	0.00E+00	0.00	6.86	100.00%
39	0.00E+00	0.00	6.86	100.00%
40	0.00E+00	0.00	6.86	100.00%
41	0.00E+00	0.00	6.86	100.00%
42	0.00E+00	0.00	6.86	100.00%
43	0.00E+00	0.00	6.86	100.00%
44	0.00E+00	0.00	6.86	100.00%
45	0.00E+00	0.00	6.86	100.00%
46	0.00E+00	0.00	6.86	100.00%
47	1.50E+02	2.18	4.68	100.00%
48	2.35E+03	3.37	3.49	99.97%
49	0.00E+00	0.00	6.86	100.00%
50	0.00E+00	0.00	6.86	100.00%
51	3.55E+04	4.55	2.31	99.51%
52	1.75E+03	3.24	3.61	99.98%
53	0.00E+00	0.00	6.86	100.00%
54	0.00E+00	0.00	6.86	100.00%
55	0.00E+00	0.00	6.86	100.00%
56	0.00E+00	0.00	6.86	100.00%
57	0.00E+00	0.00	6.86	100.00%
58	0.00E+00	0.00	6.86	100.00%
59	0.00E+00	0.00	6.86	100.00%
60	0.00E+00	0.00	6.86	100.00%
61	0.00E+00	0.00	6.86	100.00%
62	0.00E+00	0.00	6.86	100.00%
63	0.00E+00	0.00	6.86	100.00%
64	0.00E+00	0.00	6.86	100.00%
65	0.00E+00	0.00	6.86	100.00%

Figure 1.2 Heat Map **p=0.0014 (log values)**

	4.38	6.86	6.86	6.86	6.86	6.86
6.86	6.86	6.86	6.86	6.86	6.86	6.86
	6.86	6.86	6.86	6.86	6.86	6.86
6.86	6.86	6.86	3.70	6.86	6.86	6.86
	6.86	6.86	6.86	6.86	6.86	6.86
6.86	5.16	6.86	6.86	6.86	6.86	6.86
	6.86	6.86	6.86	6.86	6.86	6.86
6.86	4.68	3.49	6.86	6.86	2.31	3.61
	6.86	6.86	6.86	6.86	6.86	6.86
6.86	6.86	6.86	6.86	6.86	6.86	6.86

Test #3

Replicate Carrier	Average Bacterial Burden (CFU/carrier)	Average Log Bacterial Burden (CFU/carrier)	Log Reduction (vs Control)	Percent Reduction (vs Control)
Average Control	5.30E+05	5.72	--	--
1	0.00E+00	0.00	6.91	100.00%
2	0.00E+00	0.00	6.91	100.00%
3	0.00E+00	0.00	6.91	100.00%
4	0.00E+00	0.00	6.91	100.00%
5	0.00E+00	0.00	6.91	100.00%
6	0.00E+00	0.00	6.91	100.00%
7	0.00E+00	0.00	6.91	100.00%
8	0.00E+00	0.00	6.91	100.00%
9	0.00E+00	0.00	6.91	100.00%
10	0.00E+00	0.00	6.91	100.00%
11	0.00E+00	0.00	6.91	100.00%
12	0.00E+00	0.00	6.91	100.00%
13	0.00E+00	0.00	6.91	100.00%
14	0.00E+00	0.00	6.91	100.00%
15	0.00E+00	0.00	6.91	100.00%
16	0.00E+00	0.00	6.91	100.00%
17	0.00E+00	0.00	6.91	100.00%
18	0.00E+00	0.00	6.91	100.00%
19	0.00E+00	0.00	6.91	100.00%
20	0.00E+00	0.00	6.91	100.00%
21	0.00E+00	0.00	6.91	100.00%
22	0.00E+00	0.00	6.91	100.00%
23	0.00E+00	0.00	6.91	100.00%
24	0.00E+00	0.00	6.91	100.00%
25	0.00E+00	0.00	6.91	100.00%
26	0.00E+00	0.00	6.91	100.00%
27	0.00E+00	0.00	6.91	100.00%
28	0.00E+00	0.00	6.91	100.00%
29	0.00E+00	0.00	6.91	100.00%
30	0.00E+00	0.00	6.91	100.00%
31	0.00E+00	0.00	6.91	100.00%

32	0.00E+00	0.00	6.91	100.00%
33	0.00E+00	0.00	6.91	100.00%
34	0.00E+00	0.00	6.91	100.00%
35	0.00E+00	0.00	6.91	100.00%
36	0.00E+00	0.00	6.91	100.00%
37	0.00E+00	0.00	6.91	100.00%
38	0.00E+00	0.00	6.91	100.00%
39	0.00E+00	0.00	6.91	100.00%
40	0.00E+00	0.00	6.91	100.00%
41	0.00E+00	0.00	6.91	100.00%
42	0.00E+00	0.00	6.91	100.00%
43	0.00E+00	0.00	6.91	100.00%
44	0.00E+00	0.00	6.91	100.00%
45	0.00E+00	0.00	6.91	100.00%
46	0.00E+00	0.00	6.91	100.00%
47	0.00E+00	0.00	6.91	100.00%
48	0.00E+00	0.00	6.91	100.00%
49	0.00E+00	0.00	6.91	100.00%
50	0.00E+00	0.00	6.91	100.00%
51	0.00E+00	0.00	6.91	100.00%
52	0.00E+00	0.00	6.91	100.00%
53	0.00E+00	0.00	6.91	100.00%
54	0.00E+00	0.00	6.91	100.00%
55	0.00E+00	0.00	6.91	100.00%
56	0.00E+00	0.00	6.91	100.00%
57	0.00E+00	0.00	6.91	100.00%
58	0.00E+00	0.00	6.91	100.00%
59	0.00E+00	0.00	6.91	100.00%
60	0.00E+00	0.00	6.91	100.00%
61	0.00E+00	0.00	6.91	100.00%
62	0.00E+00	0.00	6.91	100.00%
63	0.00E+00	0.00	6.91	100.00%
64	0.00E+00	0.00	6.91	100.00%
65	0.00E+00	0.00	6.91	100.00%

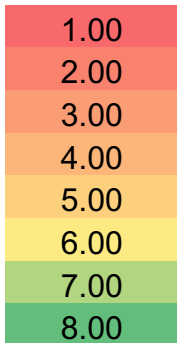
Figure 1.3 Heat Map **p=0.003 (log values)**

	6.91	6.91	6.91	6.91	6.91	6.91
6.91	6.91	6.91	6.91	6.91	6.91	6.91
	6.91	6.91	6.91	6.91	6.91	6.91
6.91	6.91	6.91	6.91	6.91	6.91	6.91
	6.91	6.91	6.91	6.91	6.91	6.91
6.91	6.91	6.91	6.91	6.91	6.91	6.91
	6.91	6.91	6.91	6.91	6.91	6.91
6.91	6.91	6.91	6.91	6.91	6.91	6.91

**Figure 2.1
Average Heat Map
(outliers removed)**

	6.81	6.88	6.83	6.83	6.83	6.83
6.83	6.83	6.83	6.83	6.83	6.83	6.83
	6.83	6.06	6.83	6.83	6.83	6.88
6.83	6.83	6.83	5.77	5.82	6.83	6.83
	5.87	6.83	6.83	6.83	6.83	6.83
6.83	6.26	6.83	6.83	6.83	6.83	5.22
	5.44	6.83	6.83	6.83	6.83	6.83
6.83	6.10	5.70	5.55	5.15	6.81	5.75
	6.83	6.79	6.83	6.83	6.83	6.83
6.83	6.83	6.83	6.83	6.83	6.83	6.83

**Figure
2.2 Heat
Map
Scale**



Note: Values in table highlighted in red are outliers and were not used in calculations.

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Arthur Kreitenberg

Antimicrobial Evaluation of Dimer UV Treated Articles

Test Method Details

Test Method	Modified ASTM E2197
Test Organism	<i>Pseudomonas aeruginosa</i> (ATCC #15442)
Test Solution	Phosphate Buffered Saline (1x) with Serum (5%)
Test Carriers	75 X 26 mm Glass Slide carriers
Inoculum Applied to Test Carrier	0.010 mL applied to each carrier and spread in circular motion to within 1 mm of edges
Recovery Solution	5 mL Phosphate Buffered Saline (1x) with Triton X-100 surfactant (0.1%)
Measuring Method of Number of Viable Bacteria	Dilution Plate Method onto nutritive Tryptic Soy Agar (1x)

Note: Per client request, the carriers were not dried in a desiccation chamber prior to testing. However, as the testing process occurred, the carriers dried during the exposure. Therefore, it is difficult to ascertain whether the desiccation process had an impact on the test carrier results.

Results – Pseudomonas carrier testing

Modified ASTM E2197: Standard Quantitative Disk Carrier Test Method	
Number of Replicate Experiments	3
Number of Replicate Carriers per Experiment	65 test carriers, 2 controls
Total Quantity of Carriers Tested (including controls)	201
Exposure Time for Test Carriers	4 minutes, 50 seconds

Test #1

Replicate Carrier	Average Bacterial Burden (CFU/carrier)	Average Log Bacterial Burden (CFU/carrier)	Log Reduction (vs Control)	Percent Reduction (vs Control)
Average Control	2.03E+07	7.31	--	--
1	0.00E+00	0.00	7.31	100.00%
2	0.00E+00	0.00	7.31	100.00%
3	0.00E+00	0.00	7.31	100.00%
4	0.00E+00	0.00	7.31	100.00%
5	0.00E+00	0.00	7.31	100.00%
6	0.00E+00	0.00	7.31	100.00%
7	0.00E+00	0.00	7.31	100.00%
8	0.00E+00	0.00	7.31	100.00%
9	0.00E+00	0.00	7.31	100.00%
10	0.00E+00	0.00	7.31	100.00%
11	0.00E+00	0.00	7.31	100.00%
12	0.00E+00	0.00	7.31	100.00%
13	0.00E+00	0.00	7.31	100.00%
14	0.00E+00	0.00	7.31	100.00%
15	0.00E+00	0.00	7.31	100.00%
16	0.00E+00	0.00	7.31	100.00%
17	0.00E+00	0.00	7.31	100.00%
18	0.00E+00	0.00	7.31	100.00%
19	0.00E+00	0.00	7.31	100.00%
20	0.00E+00	0.00	7.31	100.00%
21	0.00E+00	0.00	7.31	100.00%
22	0.00E+00	0.00	7.31	100.00%
23	0.00E+00	0.00	7.31	100.00%
24	0.00E+00	0.00	7.31	100.00%
25	0.00E+00	0.00	7.31	100.00%
26	0.00E+00	0.00	7.31	100.00%
27	0.00E+00	0.00	7.31	100.00%
28	0.00E+00	0.00	7.31	100.00%
29	0.00E+00	0.00	7.31	100.00%
30	0.00E+00	0.00	7.31	100.00%
31	0.00E+00	0.00	7.31	100.00%

32	0.00E+00	0.00	7.31	100.00%
33	0.00E+00	0.00	7.31	100.00%
34	0.00E+00	0.00	7.31	100.00%
35	6.45E+04	4.81	2.50	99.68%
36	0.00E+00	0.00	7.31	100.00%
37	0.00E+00	0.00	7.31	100.00%
38	0.00E+00	0.00	7.31	100.00%
39	0.00E+00	0.00	7.31	100.00%
40	0.00E+00	0.00	7.31	100.00%
41	0.00E+00	0.00	7.31	100.00%
42	0.00E+00	0.00	7.31	100.00%
43	0.00E+00	0.00	7.31	100.00%
44	0.00E+00	0.00	7.31	100.00%
45	0.00E+00	0.00	7.31	100.00%
46	0.00E+00	0.00	7.31	100.00%
47	0.00E+00	0.00	7.31	100.00%
48	0.00E+00	0.00	7.31	100.00%
49	0.00E+00	0.00	7.31	100.00%
50	0.00E+00	0.00	7.31	100.00%
51	0.00E+00	0.00	7.31	100.00%
52	0.00E+00	0.00	7.31	100.00%
53	0.00E+00	0.00	7.31	100.00%
54	0.00E+00	0.00	7.31	100.00%
55	0.00E+00	0.00	7.31	100.00%
56	0.00E+00	0.00	7.31	100.00%
57	0.00E+00	0.00	7.31	100.00%
58	0.00E+00	0.00	7.31	100.00%
59	0.00E+00	0.00	7.31	100.00%
60	0.00E+00	0.00	7.31	100.00%
61	0.00E+00	0.00	7.31	100.00%
62	0.00E+00	0.00	7.31	100.00%
63	0.00E+00	0.00	7.31	100.00%
64	0.00E+00	0.00	7.31	100.00%
65	0.00E+00	0.00	7.31	100.00%

Figure 1.1 Heat Map **p=1.84E-15 (log values)**

	7.31	7.31	7.31	7.31	7.31	7.31
7.31	7.31	7.31	7.31	7.31	7.31	7.31
	7.31	7.31	7.31	7.31	7.31	7.31
7.31	7.31	7.31	7.31	7.31	7.31	7.31
	7.31	7.31	7.31	7.31	7.31	7.31
7.31	7.31	2.50	7.31	7.31	7.31	7.31
	7.31	7.31	7.31	7.31	7.31	7.31
7.31	7.31	7.31	7.31	7.31	7.31	7.31
	7.31	7.31	7.31	7.31	7.31	7.31
7.31	7.31	7.31	7.31	7.31	7.31	7.31

Test #2

Replicate Carrier	Average Bacterial Burden (CFU/carrier)	Average Log Bacterial Burden (CFU/carrier)	Log Reduction (vs Control)	Percent Reduction (vs Control)
Average Control	2.98E+06	6.47	--	--
1	0.00E+00	0.00	6.47	100.00%
2	0.00E+00	0.00	6.47	100.00%
3	0.00E+00	0.00	6.47	100.00%
4	0.00E+00	0.00	6.47	100.00%
5	0.00E+00	0.00	6.47	100.00%
6	0.00E+00	0.00	6.47	100.00%
7	0.00E+00	0.00	6.47	100.00%
8	0.00E+00	0.00	6.47	100.00%
9	0.00E+00	0.00	6.47	100.00%
10	0.00E+00	0.00	6.47	100.00%
11	2.15E+05	5.33	1.14	92.77%
12	0.00E+00	0.00	6.47	100.00%
13	0.00E+00	0.00	6.47	100.00%
14	0.00E+00	0.00	6.47	100.00%
15	0.00E+00	0.00	6.47	100.00%
16	0.00E+00	0.00	6.47	100.00%
17	0.00E+00	0.00	6.47	100.00%
18	0.00E+00	0.00	6.47	100.00%
19	0.00E+00	0.00	6.47	100.00%
20	0.00E+00	0.00	6.47	100.00%
21	0.00E+00	0.00	6.47	100.00%
22	7.75E+05	5.89	0.58	73.95%
23	0.00E+00	0.00	6.47	100.00%
24	0.00E+00	0.00	6.47	100.00%
25	0.00E+00	0.00	6.47	100.00%
26	0.00E+00	0.00	6.47	100.00%
27	0.00E+00	0.00	6.47	100.00%
28	0.00E+00	0.00	6.47	100.00%
29	0.00E+00	0.00	6.47	100.00%
30	0.00E+00	0.00	6.47	100.00%
31	0.00E+00	0.00	6.47	100.00%

32	0.00E+00	0.00	6.47	100.00%
33	0.00E+00	0.00	6.47	100.00%
34	0.00E+00	0.00	6.47	100.00%
35	0.00E+00	0.00	6.47	100.00%
36	0.00E+00	0.00	6.47	100.00%
37	0.00E+00	0.00	6.47	100.00%
38	0.00E+00	0.00	6.47	100.00%
39	0.00E+00	0.00	6.47	100.00%
40	0.00E+00	0.00	6.47	100.00%
41	0.00E+00	0.00	6.47	100.00%
42	0.00E+00	0.00	6.47	100.00%
43	0.00E+00	0.00	6.47	100.00%
44	0.00E+00	0.00	6.47	100.00%
45	0.00E+00	0.00	6.47	100.00%
46	0.00E+00	0.00	6.47	100.00%
47	0.00E+00	0.00	6.47	100.00%
48	0.00E+00	0.00	6.47	100.00%
49	0.00E+00	0.00	6.47	100.00%
50	0.00E+00	0.00	6.47	100.00%
51	0.00E+00	0.00	6.47	100.00%
52	0.00E+00	0.00	6.47	100.00%
53	0.00E+00	0.00	6.47	100.00%
54	0.00E+00	0.00	6.47	100.00%
55	0.00E+00	0.00	6.47	100.00%
56	0.00E+00	0.00	6.47	100.00%
57	0.00E+00	0.00	6.47	100.00%
58	0.00E+00	0.00	6.47	100.00%
59	0.00E+00	0.00	6.47	100.00%
60	0.00E+00	0.00	6.47	100.00%
61	0.00E+00	0.00	6.47	100.00%
62	0.00E+00	0.00	6.47	100.00%
63	0.00E+00	0.00	6.47	100.00%
64	0.00E+00	0.00	6.47	100.00%
65	0.00E+00	0.00	6.47	100.00%

Figure 1.2 Heat Map

p=3.45E-06 (log values)

	6.47	6.47	6.47	6.47	6.47	6.47
6.47	6.47	6.47	6.47	1.14	6.47	6.47
	6.47	6.47	6.47	6.47	6.47	6.47
6.47	6.47	0.58	6.47	6.47	6.47	6.47
	6.47	6.47	6.47	6.47	6.47	6.47
6.47	6.47	6.47	6.47	6.47	6.47	6.47
	6.47	6.47	6.47	6.47	6.47	6.47
6.47	6.47	6.47	6.47	6.47	6.47	6.47
	6.47	6.47	6.47	6.47	6.47	6.47
6.47	6.47	6.47	6.47	6.47	6.47	6.47

Test #3

Replicate Carrier	Average Bacterial Burden (CFU/carrier)	Average Log Bacterial Burden (CFU/carrier)	Log Reduction (vs Control)	Percent Reduction (vs Control)
Average Control	2.85E+07	7.45	--	--
1	0.00E+00	0.00	7.45	100.00%
2	0.00E+00	0.00	7.45	100.00%
3	0.00E+00	0.00	7.45	100.00%
4	0.00E+00	0.00	7.45	100.00%
5	0.00E+00	0.00	7.45	100.00%
6	0.00E+00	0.00	7.45	100.00%
7	0.00E+00	0.00	7.45	100.00%
8	0.00E+00	0.00	7.45	100.00%
9	0.00E+00	0.00	7.45	100.00%
10	0.00E+00	0.00	7.45	100.00%
11	0.00E+00	0.00	7.45	100.00%
12	0.00E+00	0.00	7.45	100.00%
13	0.00E+00	0.00	7.45	100.00%
14	0.00E+00	0.00	7.45	100.00%
15	0.00E+00	0.00	7.45	100.00%
16	0.00E+00	0.00	7.45	100.00%
17	0.00E+00	0.00	7.45	100.00%
18	0.00E+00	0.00	7.45	100.00%
19	0.00E+00	0.00	7.45	100.00%
20	0.00E+00	0.00	7.45	100.00%
21	0.00E+00	0.00	7.45	100.00%
22	0.00E+00	0.00	7.45	100.00%
23	0.00E+00	0.00	7.45	100.00%
24	0.00E+00	0.00	7.45	100.00%
25	0.00E+00	0.00	7.45	100.00%
26	0.00E+00	0.00	7.45	100.00%
27	0.00E+00	0.00	7.45	100.00%
28	0.00E+00	0.00	7.45	100.00%
29	0.00E+00	0.00	7.45	100.00%
30	0.00E+00	0.00	7.45	100.00%
31	0.00E+00	0.00	7.45	100.00%

32	0.00E+00	0.00	7.45	100.00%
33	0.00E+00	0.00	7.45	100.00%
34	0.00E+00	0.00	7.45	100.00%
35	0.00E+00	0.00	7.45	100.00%
36	0.00E+00	0.00	7.45	100.00%
37	0.00E+00	0.00	7.45	100.00%
38	0.00E+00	0.00	7.45	100.00%
39	0.00E+00	0.00	7.45	100.00%
40	0.00E+00	0.00	7.45	100.00%
41	0.00E+00	0.00	7.45	100.00%
42	0.00E+00	0.00	7.45	100.00%
43	0.00E+00	0.00	7.45	100.00%
44	0.00E+00	0.00	7.45	100.00%
45	0.00E+00	0.00	7.45	100.00%
46	0.00E+00	0.00	7.45	100.00%
47	0.00E+00	0.00	7.45	100.00%
48	0.00E+00	0.00	7.45	100.00%
49	0.00E+00	0.00	7.45	100.00%
50	1.30E+05	5.11	2.34	99.54%
51	2.00E+02	2.30	5.15	100.00%
52	0.00E+00	0.00	7.45	100.00%
53	0.00E+00	0.00	7.45	100.00%
54	0.00E+00	0.00	7.45	100.00%
55	0.00E+00	0.00	7.45	100.00%
56	0.00E+00	0.00	7.45	100.00%
57	0.00E+00	0.00	7.45	100.00%
58	0.00E+00	0.00	7.45	100.00%
59	0.00E+00	0.00	7.45	100.00%
60	0.00E+00	0.00	7.45	100.00%
61	5.00E+02	2.70	4.76	100.00%
62	4.95E+04	4.69	2.76	99.83%
63	7.85E+03	3.89	3.56	99.97%
64	0.00E+00	0.00	7.45	100.00%
65	0.00E+00	0.00	7.45	100.00%

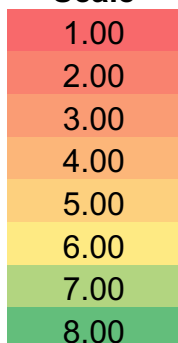
Figure 1.3 Heat Map **p=0.0011(log values)**

	7.45	7.45	7.45	7.45	7.45	7.45	7.45
7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45
	7.45	7.45	7.45	7.45	7.45	7.45	7.45
7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45
	7.45	7.45	7.45	7.45	7.45	7.45	7.45
7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45
	7.45	7.45	7.45	7.45	7.45	7.45	7.45
7.45	7.45	7.45	7.45	7.45	7.45	7.45	7.45
	7.45	7.45	7.45	7.45	7.45	7.45	7.45
7.45	7.45	4.76	2.76	3.56	7.45	7.45	7.45

**Figure 2.1
Average Heat
Map (outliers
removed)**

	7.08	7.08	7.08	7.08	7.08	7.08
7.08	7.08	7.08	7.08	5.30	7.08	7.08
	7.08	7.08	7.08	7.08	7.08	7.08
7.08	7.08	7.38	7.08	7.08	7.08	7.08
	7.08	7.08	7.08	7.08	7.08	7.08
7.08	7.08	6.96	7.08	7.08	7.08	7.08
	7.08	7.08	7.08	7.08	7.08	7.08
7.08	7.08	7.08	7.08	6.89	6.31	7.08
	7.08	6.89	7.08	7.08	7.08	7.08
7.08	7.08	6.18	5.51	5.78	7.08	7.08

**Figure
2.2 Heat
Map
Scale**



Note: Values in table highlighted in red are outliers and were not used in calculations.

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