



inc. BIOLOGICAL CONSULTING SERVICES
OF NORTH FLORIDA, INC.

July 16, 2015

Triple Clear Water
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Re: Biological and inorganic species filtration efficacy of the provided 10" cartridge filters; BCS1506071, 1506072, 1507155, 1507156, and 1507157.

To whom it may concern,

We have conducted the requested inorganics' and biologicals' filtration efficacy study on the Triple Clear Water Solutions 2.5" x 10" filters received on June 8th, 2015 and July 13th, 2015. The filters were assigned designations BCS1506071 and 1506072 for inorganics testing and BCS 1507155, 1507156, and 1507157 for biological testing. The experimental set up and challenge of the water filters was designed to evaluate the inorganic soluble chemicals, bacteria, virus, and parasite waterborne contaminants removal efficacy. The contaminant species and water parameters selected were based on client's request and NSF/ANSI and US EPA water purifier testing protocols.

Following, you will find our report on the results of the challenge study. Should you have any questions, please do not hesitate to contact me.

Sincerely,

George Lukasik, Ph.D.
Laboratory Director

PAGE 1 OF 13

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FILE: TRIPLE CLEAR WATER SOLUTIONS HEAVY METAL AND BACTERIA VIRUS AND CYSTS CHALLENGE BCS 1506071, 072 BCS
1507155, 156, 157.DOCX

FL DOH #E82924, ISO/IEC 17025:2005 L2422 (L-A-B), EPA# FL01 147



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BUREAU** a division of AS-9
ACCREDITED ISO/IEC 17025



Project: Triple Clear Water Solutions
Study Sponsor: Triple Clear Water Solutions
Sample(s): BCS 1506071 and 1506072, received June 8th, 2015.
Test: Inorganic Filtration Efficacy – Efficacy following passage of 1000 gallons of City of Gainesville municipal tap water **
Test Parameter: Soluble Inorganic; Metals – pH 6.5
Performed and Analyzed by: George Lukasik, Ph.D. & Kintin Ng; June 10th, 2015

Metal Species	Influent Concentration (ppm)	Filter #1 Effluent following passage of 100 gallons water; BCS 1407065		Filter #2 Effluent following passage of 100 gallons water; BCS 1407066		Cumulative % Reduction
		Concentration (ppm)	% Reduction	Concentration (ppm)	% Reduction	
Arsenic (As)	0.11	0.0052	95.3%	<0.0040**	> 96.4%**	95.9%
Barium (Ba)	0.11	0.01	90.9%	0.0054	95.1%	93.0%
Cadmium (Cd)	0.10	<0.0010**	> 99.0%**	<0.0010**	> 99.0%**	> 99.0%**
Chromium (Cr)	0.15	<0.0020**	> 98.7%**	<0.0020**	> 98.7%**	> 98.7%**
Lead (Pb)	0.084	<0.0022**	> 97.4%**	0.0027	96.8%	97.1%
Mercury (Hg)	0.140	0.069	50.7%	0.056	40.0%	45.4%
Selenium (Se)	0.11	<0.0050**	> 95.5%**	<0.0050***	> 95.5%**	> 95.5%**
Silver (Ag)	0.064	0.0049	92.3%	<0.0010**	> 98.4%**	95.4%

** The species was not detected in the filter effluent.

Project: Triple Clear Water Solutions
Study Sponsor: Triple Clear Water Solutions
Sample(s): BCS 1507155, 1507156, and 1507157; received July 13th 2015
Test: Biological Filtration Efficacy– Efficacy following passage of 1000 gallons of City of Gainesville municipal water **
Test Parameter: *Raoultella terrigena* (Bacteria), MS-2 Bacteriophage (virus), and 3.0 µM Fluorescent Microspheres as *Cryptosporidium parvum* Oocyst Surrogate
Performed and Analyzed by: David Sekora & Kintin Ng; July 15th, 2015

Test Unit	Percent Removal of Challenge Species following passage of 1000 gallons water		
	<i>Raoultella terrigena</i> ¹ (Bacterial Contaminant) Influent Concentration: 3.85 x 10 ⁵ cfu /ml	MS-2 Bacteriophage ² (Viral Contaminant) Influent Concentration: 1.83 x 10 ⁵ pfu /ml	3.0 µM Fluorescent microspheres ¹ (Parasite Contaminant) Influent Concentration: 1.9 x 10 ⁴ /ml
Filter 1 BCS 1507155	> 99.9999%**	99.99%	99.995%
Filter 2 BCS 150156	> 99.9999%**	99.99%	> 99.995%**
Filter 3 BCS 150157	> 99.9999%**	99.99%	> 99.995%**

¹ *Raoultella terrigena* (ATCC 33257) was obtained from ATCC and propagated on Tryptic Soy Agar (TSA, Becton Dickinson, USA). It is used as a bacterial model to evaluate filters for bacterial removal efficacy. The bacteria were enumerated as colony forming units (cfu) following incubation at 36.5°C for 24 hours.

² Bacteriophage MS-2 (ATCC 15597-B1) was used as a model for human viruses. It is of similar shape and size to human enteroviruses and thus is used to determine filter's viral capture efficacy. It was enumerated using *E. coli* C3000 (ATCC 15597) as a host using the single layer plaque assay agar procedure as per EPA 1601.

³ Three micron green fluorescent latex microspheres (Fluoro-Max™ Green Fluorescent Polymer Microspheres 3.00µm, Thermo Scientific CA, USA) were used as surrogates for *Cryptosporidium* oocysts. It is used to determine filter's parasitic removal efficacy. The microspheres were enumerated by fixing 3-Well PTFE Slides (Electron Microscopy Sciences, USA) and viewing by UV fluorescence microscopy.

* Provided filters were subjected to the challenge study as described in the methods section. Filters' influent and effluent samples were assayed for the respective challenge species as per Standard Methods and Lab Standard Operating Procedures (SOP F-1). The respective percent reductions were determined based on the species' concentration obtained in the filter influent and effluent samples.

**No species were detected in the filter's effluent for the volume analyzed (<0.45 cfu /ml). Filter effluent samples were analyzed in duplicates at the minimum following collection.

*** Purifier NSF/ANSI standard microbial removal claims are 99.9999% or greater for bacteria, 99.99% or greater for virus, and 99.9% or greater for parasite cysts.

