



BIOLOGICAL CONSULTING SERVICES  
OF NORTH FLORIDA, INC.

2022-12-05

Mark Zakaib  
Survivor Filter  
2190 Warden Avenue, Suite 203  
Scarborough, Ontario, Canada M1T1V6

Client ID: Active All Terrain Unit 3, Active All Terrain Unit 2, Active All Terrain Unit 1

BCS ID: 2211336, 2211337, 2211338

Project Name: Survivor Filter 112822 Bacteria & Cyst Filtration Efficacy Testing

Dear Mark Zakaib,

We have completed the filtration efficacy study on the submitted units as outlined below. The contaminant species, study conditions, and water parameters utilized were based on client's request and adaptation of the guidance documents and protocols listed below:

Testing of water purifier microbiological filtration efficacy: Initial microbial filtration performance as per client request; BCS SOP-F1 (ISO17025: 2017 accredited).

**Report Conclusion: Test performed as per client's request.**

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

Sincerely,

George Lukasik, Ph.D.  
Laboratory Director

Page 1 of 9

Final Report BCS ID 2211336, 2211337, 2211338 Revision #0: 12/02/2022 JN

Client: Survivor Filter

Project: Survivor Filter 112822 Bacteria & Cyst Filtration Efficacy Testing

BCS LABORATORIES, INC. — GAINESVILLE  
4609 NW 6TH STREET, STE. A, GAINESVILLE, FLORIDA 32609  
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Analysis: *E. coli* (ATCC 12229) Filtration Efficacy

Test Water: General Test Water

Analysis Method: Spread Plating (Standard Method 9215)

Test Point: Initial Efficacy Performance

Challenge Date: 2022-11-29 Challenge Analysts: Jonathon Nunes

Initial Pres. (PSI): < 3.0 Temp(C): 23.4

pH: 7.641 Turbidity (NTU): 0.2 TOC (ppm): N/A TDS(ppm): 212.4 Hardness(ppm): 124.0

Alkalinity(ppm): N/A Total Chlorine(ppm): 0.0 Polyphosphate (as ppm phosphorus): N/A

Influent Conc: 4.9E+05 cfu/mL Ambient Temp(C): 24.2

Analysis Date: 2022-11-29 Analysts: Jonathon Nunes

Test Notes: Test performed using mouth drawn unit test protocol

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BCS Sample ID 1: 2211336	Client ID 1: Active All Terrain Unit 3	Flow Rate: 800 mL/min		
Eff Conc 1: 7.0E+02 cfu/mL	% Reduct 1: 99.9	Log10 Reduct 1: 2.8		
BCS Sample ID 2: 2211337	Client ID 2: Active All Terrain Unit 2	Flow Rate: 800 mL/min		
Eff Conc 2: 7.7E+02 cfu/mL	% Reduct 2: 99.8	Log10 Reduct 2: 2.8		
BCS Sample ID 3: 2211338	Client ID 3: Active All Terrain Unit 1	Flow Rate: 800 mL/min		
Eff Conc 3: 7.1E+02 cfu/mL	% Reduct 3: 99.9	Log10 Reduct 3: 2.8		

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Analysis: 3.0um Microspheres Filtration Efficacy (Cyst) Test Water: General Test Water

Analysis Method: Fluorescent Microscopic Enumeration (EPA 1623.1)

Test Point: Initial Efficacy Performance

Challenge Date: 2022-11-29 Challenge Analysts: Jonathon Nunes

Initial Pres. (PSI): < 3.0 Temp(C): 23.4

pH: 7.641 Turbidity (NTU): 0.2 TOC (ppm): N/A TDS(ppm): 212.4 Hardness(ppm): 124.0

Alkalinity(ppm): N/A Total Chlorine(ppm): 0.0 Polyphosphate (as ppm phosphorus): N/A

Influent Conc: 2.3E+04 microspheres/mL Ambient Temp(C): 24.2

Analysis Date: 2022-11-29 Analysts: Jonathon Nunes

Test Notes: Test performed using mouth drawn unit test protocol

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BCS Sample ID 1:	2211336	Client ID 1:	Active All Terrain Unit 3	Flow Rate:	800 mL/min			
Eff Conc 1:	<6.7E-01 microspheres/mL	% Reduct 1:	>99.997	Log10 Reduct 1:				>4.5
BCS Sample ID 2:	2211337	Client ID 2:	Active All Terrain Unit 2	Flow Rate:	800 mL/min			
Eff Conc 2:	<6.7E-01 microspheres/mL	% Reduct 2:	>99.997	Log10 Reduct 2:				>4.5
BCS Sample ID 3:	2211338	Client ID 3:	Active All Terrain Unit 1	Flow Rate:	800 mL/min			
Eff Conc 3:	<6.7E-01 microspheres/mL	% Reduct 3:	>99.997	Log10 Reduct 3:				>4.5

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Project: Survivor Filter 112822 Bacteria & Cyst Filtration Efficacy Testing

Date Received: 2022-11-28 9:30

Test Start Date: 2022-11-29

Test End Date: 2022-12-01

System Type: Squeeze Filter

Est. Capacity: N/A

Performance Indicating Device: No

Batch Volume: 1L

Batch, number per day: N/A

Test Cycle (min): N/A

Cycle On/Off (%): 100

Restricted Flow Rate: No

Test Duration (hr/day): N/A

Test Conditioning: See Report Notes.

Report Notes:

The purifier units were received from the study sponsor, and each was assigned the referenced BCS identifiers. The conducted test study was performed to evaluate the provided purifier units' filtration efficacy as per the client requested and laboratory developed protocol. The provided filters were fitted into the accompanying bottle and installed in a peristaltic pump assembly. The pump was set to a flow rate of 800mL/min and each filter was conditioned by passage of 3 liters laboratory grade RO/DI water through it. A reservoir of General Test Water (GTW, Dechlorinated Municipal water) was then seeded with the indicated contaminants, thoroughly homogenized, and connected to the assembly. 1L of the contaminated water was then passed through each filter as previously described and discarded, and the next 100 mL collected for analysis. Samples of the influent challenge water were removed prior to the challenge, and diluted 1/1,000 in phosphate buffered water. The collected samples were analyzed in duplicates at minimum as per standard lab operating procedures. The respective percent reductions were determined based on the concentration obtained in the filter influent and analyzed effluent sample. Each filter's Influent and effluent samples were analyzed as per laboratory accredited methodology; EC 11229 was analyzed as per SM 9215C (APHA 2012), fluorescent microspheres (Cysts) as per EPA 1623.1, pH as per SM4500HB, turbidity as per SM2130B, TDS as per SM2540, hardness as per SM2340C, and chlorine as per SM4500-Cl G. All analysis was conducted using calibrated and/or validated Instruments to traceable standards (NIST). All method QC was within method acceptance limit. No general environmental conditions are specified in the standard or have been identified that could affect the test results or measurements. END OF REPORT NOTES.

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\*I certify that I have examined and I am familiar with the information submitted herein. The results pertain only to the sample(s) tested, associated identifier #(s), and condition at receipt. Based on my inquiry of the individuals responsible for the analysis, I believe the data to be true, accurate, and complete. Unit descriptions and names were obtained from the submitted documents. The analysis was authorized and commissioned by the client or client's representative. The resulting data are representative of the analysis conducted on the collected samples and it's/their condition at the time of analysis. The data provided is strictly representative of the study conducted under laboratory conditions using the material/samples/articles provided by the client (or client's representative) and it's (their) condition at the time of test following receipt. The data obtained may not be representative or indicative of a real-life process and/or application. The sample(s) were analyzed in accordance with the appropriate method, however due to the inherent limitations of methods, microorganisms may avoid detection. BCS Laboratories offers no express or implied warranties concerning the quality, safety, and/or purity of any sample, batch, source, or the process they are derived from. Quality assurance controls were performed as outlined in the method and as per Good Laboratory Practices. Analyses were performed in accordance with laboratory practices and procedures set-forth by ISO 17025-2017 and NELAP/TNI accreditation standards unless otherwise noted. BCS makes no express or implied warranty regarding the ownership, merchantability, safety or fitness for a particular purpose of any such property or product.

Signature of Laboratory Director/Authorized Rep.  Date: 2022-12-02

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**Pictures:**



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*Balance ID: N/A	Description:		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
*pH Meter ID: PH-09	Description: Orion Versa Star Pro Meter w/pH and Conductivity Modules		
Range of Function: 0.001-12.000		Instrument Reporting Limit: 0.001	
Last Service Date: 2022-09-02		Service Due Date: 2023-09-30	
Service Type: Validation to NIST		NIST Validation Instrument: NIST Standard Solution	
*Conductivity Meter ID: CM-08	Description: Orion Versa Star Pro Meter w/pH and Conductivity Modules		
Range of Function: 0.01-2400 ppm		Instrument Reporting Limit: 0.01ppm	
Last Service Date: 2022-09-02		Service Due Date: 2023-09-30	
Service Type: Validation to NIST		NIST Validation Instrument: NIST Standard Solutions	
*Alkalinity Meter ID: N/A	Description:		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
*Hardness Meter ID: HARD-02	Description: Hach Total Hardness Test Kit 10-4,000 mg/L		
Range of Function: 10-4000mg/L		Instrument Reporting Limit: 10 mg/L	
Last Service Date: 2021-05-21		Service Due Date: 2022-05-21	
Service Type: Validation to NIST		NIST Validation Instrument: NIST Standard solutions	
*Turbidity Meter ID: TM-05	Description: Hach Turbidimeter		
Range of Function: 0.00-999NTU		Instrument Reporting Limit: 0.01NTU	
Last Service Date: 2022-10-04		Service Due Date: 2023-10-04	
Service Type: Manufacturer OEM		NIST Validation Instrument: NIST Standard Solutions	
*Spectrophotometer ID: N/A	Description:		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
Incubator ID: I-20	Description: Thermo Fisher Forma 29 cu. ft. Reach-In Incubator		
Range of Function: 10-65C		Instrument Reporting Limit: 0.1C	
Last Service Date: 2022-09-02		Service Due Date: 2023-09-30	
Service Type: Annual Service		NIST Validation Instrument: Reference Std./Instrument	

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<b>**Flow Meter ID 1: N/A</b>	Description:		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
<b>**Flow Meter ID 2: N/A</b>	Description:		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
<b>**Flow Meter ID 3: N/A</b>	Description:		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
<b>Microscope ID: MIC-03</b>	Description: Olympus BH-2 Microscope		
Range of Function: 40X-400X Magnification		Instrument Reporting Limit: 0.5 micron	
Last Service Date: 2022-09-15		Service Due Date: 2023-09-15	
Service Type: Annual Service		NIST Validation Instrument: NIST Micrometer	
<b>Refrigerator ID: N/A</b>	Description:		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
<b>Centrifuge ID: C-12</b>	Description: Eppendorf centrifuge w/ cell culture package		
Range of Function: 0-4400 RPM		Instrument Reporting Limit: 1 RPM	
Last Service Date: 2022-09-02		Service Due Date: 2023-09-30	
Service Type: Annual Service		NIST Validation Instrument: TA-01	
<b>Pressure Source Pump ID: N/A</b>	Description:		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
<b>Pressure Meter ID: N/A</b>	Description:		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	

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<b>Cert. Pressure Meter ID:</b> N/A	<b>Description:</b>		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
<b>TOC Analyzer ID:</b> N/A	<b>Description:</b>		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
<b>Spectrograph ID:</b> N/A	<b>Description:</b>		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
<b>Thermometer ID:</b> IR-11 NIST	<b>Description:</b> VWR Traceable Infrared Thermometer Gun		
Range of Function:	0-300 C	Instrument Reporting Limit:	0.1 C
Last Service Date:	2022-09-12	Service Due Date:	2023-09-12
Service Type:	Annual calibration	NIST Validation Instrument:	Manufacturer calibration
<b>Particle Counter ID:</b> N/A	<b>Description:</b>		
Range of Function:		Instrument Reporting Limit:	
Last Service Date:		Service Due Date:	
Service Type:		NIST Validation Instrument:	
<b>Timer ID:</b> T-48	<b>Description:</b> VWR Traceable Lap-Top Timer		
	NIST Expiration Date:		2023-01-06

\*Validated at each day of use using NIST traceable standards. Other major equipment validated quarterly.  
\*\*Validated at each use using traceable volume and time measurements.  
**All above equipment with completed fields were used from Test Start Date to Test End Date unless otherwise noted. Service Date indicates PM or calibration by accredited service provider. Service Dates reported for latest period. If Last Service Date occurs during study duration, please contact us for the previous period's validation information.**

END OF REPORT

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