



BIOLOGICAL CONSULTING SERVICES
OF NORTH FLORIDA, INC.

May 13, 2018

Joshua Buchholz

Berkey Water

Hurst, TX

(888) 803-4438

josh@berkeywater.com

Client ID: Black Berkey Purification Unit A, Black Berkey Purification Unit B

BCS ID: 1805039, 1805040

Project Name: Purifier Efficacy Testing; *Cryptosporidium parvum* and *Giardia lamblia* (Oo)cycts filtration

Dear Joshua Buchholz,

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:

Validation of Water Purifier Efficacy: Screening of initial purifier performance as per client requested protocol; BCS SOP-F1 (ISO17025 accredited)

Report Conclusion: Acceptable performance for the tested species at the indicated test points .

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

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Final Report BCS ID 1805039, 1805040 Revision# 0; 05/09/2018

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BCS LABORATORIES, INC. — GAINESVILLE
4609 NW 6TH STREET, STE. A, GAINESVILLE, FLORIDA 32609
TEL. (352) 377-9272, FAX. (352) 377-5630

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FL DOH #E82924, ISO/IEC 17025:2005 L2422 (ANAB), PA DEP# 68-03950, EPA# FLO1147
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Analysis: *Cryptosporidium parvum* Filtration Efficacy

Test Water: General Test Water #1

Test Point: Initial Filtration Efficacy

Test Point Conclusion: Pass

Flow rate: 43 mL/min Temp.: 24.5 C pH: 7.8 NTU: 0.2 NTU TOC: 0.4 ppm

Influent Conc.: 7.7E+02 (Oo)cysts/mL TDS: 190 ppm Hardness: N/A

Test Notes: Oocysts were not detected in units' effluent (Qualifier: U). Units' performance meets and/or exceeds the requirement for oocyst removal; 3.5 log10 or greater (>99.95%).

BCS Sample ID 1: 1805039	ClientID 1: Black Berkey Purification Unit A	Pressure(psi): Gravity Filtration
Eff. Conc. 1: <2.0E-02 (Oo)cysts/mL	% Reduct. 1: >99.997	Log10 Reduct. 1: >4.6
BCS Sample ID 2: 1805040	Client ID 2: Black Berkey Purification Unit B	Pressure(psi): Gravity Filtration
Eff. Conc. 2: <2.0E-02 (Oo)cysts/mL	% Reduct. 2: >99.997	Log10 Reduct. 2: >4.6

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Analysis: *Giardia lamblia* Cyst Filtration Efficacy

Test Water: General Test Water #1

Test Point: Initial Filtration Efficacy

Test Point Conclusion: Pass

Flow rate: 43 mL/min Temp.: 24.5 C pH: 7.8 NTU: 0.2 NTU TOC: 0.4 ppm

Influent Conc.: 3.8E+02 cysts/mL TDS: 190 ppm Hardness: N/A

Test Notes: Cysts were not detected in units' effluent (Qualifier: U). Units' performance meets and/or exceeds the requirement for cyst removal; 3.0 log₁₀ or greater (>99.9%).

BCS Sample ID 1: 1805039	Client ID 1: Black Berkey Purification Unit A	Pressure(psi): Gravity Filtration
Eff. Conc. 1: <2.0E-02 cysts/mL	% Reduct. 1: >99.994	Log10 Reduct. 1: >4.3
BCS Sample ID 2: 1805040	Client ID 2: Black Berkey Purification Unit B	Pressure(psi): Gravity Filtration
Eff. Conc. 2: <2.0E-02 cysts/mL	% Reduct. 2: >99.994	Log10 Reduct. 2: >4.3

Client: Berkey Water

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Project: Purifier Efficacy Testing; Cryptosporidium parvum and Giardia lamblia (Oo)cysts filtration
Date Received: May 03, 2018 12:48 Analyst(s): David Sekora, M.S. & Jessica Weglarz, B.S.
Test Start Date: May 04, 2018 Test End Date: May 09, 2018 Qualifier: U

Report Notes:

The study was conducted as clients request to evaluate the provided Black Berkey element's efficacy for the filtration of Cryptosporidium parvum oocysts and Giardia lamblia cysts from a water supply. The study was conducted by fitting a single element into a Travel Berkey Gravity filtration Unit. Two units fitted each with a single element were assembled and flushed/conditioned as per manufacturer's instructions. Four (4) liters of General Test Water 1 (GTW1, NSF P231, dechlorinated municipal tap water) was added to the upper reservoir of each unit & the water was allowed to filter through by gravity. After conditioning, aliquots of the challenge species was added to 8-liters of GTW1, the water was homogenized. Four liters of the challenge water was transferred into each upper reservoir of the filtration unit. The water was allowed to filter through in its entirety by gravity and the elapsed time was determined. Samples of the influent challenge water were removed prior to & at the end of the challenge along with duplicate samples of each collected and homogenized effluent. Analysis was conducted as per laboratory's accredited ISO17025:2005 methodology: Cryptosporidium parvum oocysts and Giardia lamblia cysts were analyzed as per EPA 1623.1, turbidity as per SM2130B, pH as per SM4500HB, TOC as per SM5310C, Alkalinity as per SM2320B (if needed), TDS as per SM2540, chlorine as per SM4500-Cl G, & hardness as per SM2340C. Analysis was conducted using calibrated and/or validated Instruments to traceable standards (NIST). All 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 I am familiar with the information submitted herein. The results pertain only to the sample(s) analyzed associated identifier #(s). 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. 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 17025-2005 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: May 09, 2018

Client: Berkey Water

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DATA QUALIFIER CODES	
SYMBOL	MEANING
D	Measurement was made in the field.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
J1	The sample matrix interfered with the ability to make any accurate determination.
J2	No Quality Control criteria exist for the component.
^	analysis conducted outside the Laboratory's scope of accreditation
L	Off scale high. Actual value is known to be greater than value given.
O	Sampled, but analysis not performed.
Q	Sample held beyond the accepted holding time.
U	Indicates that the compound was analyzed for but not detected. The reported value is the method detection limit.
V	Analyte was detected in both sample and associated method blank. Data may not be accurate.
Y	The laboratory analysis was from an improperly preserved sample. The data may not be accurate.
Z	Too many colonies present (TNTC); the numeric value given represents the upper end of the value that can be determined based on the volume.
?	Data are rejected and should not be used. QC data did not meet acceptance criteria.
**	Analysis of analyte submitted to an accredited sub-contract laboratory.
!	Data deviate from historically established concentration range.
#	BCS Lab specific qualifier. See laboratory analysis notes.

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