



BIOLOGICAL CONSULTING SERVICES  
OF NORTH FLORIDA, INC.

February 21, 2017

James A. M. Russell  
Versati Com e Ind Eireli  
Av. Prof. Dea Ehrhardt de Carvalho n. 2981  
CEP: 13101-664, Campinas SP, Brasil

Client ID: VISP G2 (A), VISP G2 (B), VISP G2 (C)

BCS ID: 1702095, 1702096, 1702097

Project Name: Purifier Unit Efficacy Testing

Dear James A. M. Russell,

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 Purifiers' Initial Biological and Particulate Filtration Efficacy (Biological): Adaptation of ANSI/NSF P231 for initial purifier performance testing; SOP F-1(ISO17025 only accredited)

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 1702095, 1702096, 1702097

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Purifier Unit Efficacy Testing

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FL DOH #E82924, ISO/IEC 17025:2005 L2422 (L-A-B), PA DEP# 68-03950, EPA# FLO1147  
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Analysis: 3.0 Microspheres Filtration Efficacy (parasite)

Test Water: General Test Water #1

Test Point: Initial Filtration Efficacy, GTW1

Flow rate: 405.9 mL/min pH: 7.34 NTU: 2.61 TDS: 173 Hardness: 102

Influent Conc: 4.30E+04 microspheres/mL

BCS Sample ID 1 1702095 Client ID 1 VISP G2 (A) Press 1(psi): 3.5

Eff Conc 1: <1.00E+00 microspheres/mL % Reduct 1: >99.998 Log10 Reduct 1: >4.6

BCS Sample ID 2 1702096 Client ID 2 VISP G2 (B) Press 2(psi): 3.5

Eff Conc 2: <1.00E+00 microspheres/mL % Reduct 2: >99.998 Log10 Reduct 2: >4.6

BCS Sample ID 3 1702097 Client ID 3 VISP G2 (C) Press 3(psi): 3.5

Eff Conc 3: <1.00E+00 microspheres/mL % Reduct 3: >99.998 Log10 Reduct 3: >4.6

Test Notes: Microspheres were not detected in units effluent (Qualifier: U). System's performance meets and/or exceeds the NSF P231 water purifier standard for microsphere removal; 3 Log10 or greater (>99.9%).

Analysis: 3.0 Microspheres Filtration Efficacy (parasite)

Test Water: Challenge Test Water #3

Test Point: Initial Filtration Efficacy, CTW3

Flow rate: 361.2 pH: 8.99 NTU: 32.4 TDS: 1500 Hardness: 106

Influent Conc: 4.10E+04 microspheres/mL

BCS Sample ID 1 1702095 Client ID 1 VISP G2 (A) Press 1(psi): 3.5

Eff Conc 1: <1.00E+00 microspheres/mL % Reduct 1: >99.998 Log10 Reduct 1: >4.6

BCS Sample ID 2 1702096 Client ID 2 VISP G2 (B) Press 2(psi): 3.5

Eff Conc 2: <1.00E+00 microspheres/mL % Reduct 2: >99.998 Log10 Reduct 2: >4.6

BCS Sample ID 3 1702097 Client ID 3 VISP G2 (C) Press 3(psi): 3.5

Eff Conc 3: <1.00E+00 microspheres/mL % Reduct 3: >99.998 Log10 Reduct 3: >4.6

Test Notes: Microspheres were not detected in units effluent (Qualifier: U). System's performance meets and/or exceeds the NSF P231 water purifier standard for microsphere removal; 3 Log10 or greater (>99.9%).



Analysis: *E. coli* Bacteria Filtration Efficacy

Test Water: General Test Water #1

Test Point: Initial Filtration Efficacy, GTW1

Flow rate: 405.9 mL/min    pH: 7.34    NTU: 2.61    TDS: 173    Hardness: 102

Influent Conc: 3.10E+05 cfu/mL

BCS Sample ID 1 1702095    Client ID 1 VISP G2 (A)    Press 1(psi): 3.5

Eff Conc 1: &lt;4.50E-01 cfu/mL    % Reduct 1: &gt;99.9999    Log10 Reduct 1: &gt;5.8

BCS Sample ID 2 1702096    Client ID 2 VISP G2 (B)    Press 2(psi): 3.5

Eff Conc 2: &lt;4.50E-01 cfu/mL    % Reduct 2: &gt;99.9999    Log10 Reduct 2: &gt;5.8

BCS Sample ID 3 1702097    Client ID 3 VISP G2 (C)    Press 3(psi): 3.5

Eff Conc 3: &lt;4.50E-01 cfu/mL    % Reduct 3: &gt;99.9999    Log10 Reduct 3: &gt;5.8

Test Notes: Bacteria was not detected in units effluent (Qualifier: U). System's performance meets and/or exceeds the NSF P231 water purifier standard for bacterial removal; 6 Log10 or greater (>99.9999%).

Analysis: *E. coli* Bacteria Filtration Efficacy

Test Water: Challenge Test Water #3

Test Point: Initial Filtration Efficacy, CTW3

Flow rate: 361.2    pH: 8.99    NTU: 32.4    TDS: 1500    Hardness: 106

Influent Conc: 3.50E+05 cfu/mL

BCS Sample ID 1 1702095    Client ID 1 VISP G2 (A)    Press 1(psi): 3.5

Eff Conc 1: &lt;4.50E-01 cfu/mL    % Reduct 1: &gt;99.9996    Log10 Reduct 1: &gt;5.9

BCS Sample ID 2 1702096    Client ID 2 VISP G2 (B)    Press 2(psi): 3.5

Eff Conc 2: &lt;4.50E-01 cfu/mL    % Reduct 2: &gt;99.9999    Log10 Reduct 2: &gt;5.9

BCS Sample ID 3 1702097    Client ID 3 VISP G2 (C)    Press 3(psi): 3.5

Eff Conc 3: &lt;4.50E-01 cfu/mL    % Reduct 3: &gt;99.9999    Log10 Reduct 3: &gt;5.9

Test Notes: Bacteria was not detected in units effluent (Qualifier: U). System's performance meets and/or exceeds the NSF P231 water purifier standard for bacterial removal; 6 Log10 or greater (>99.9999%).



Analysis: *MS-2 Virus Filtration Efficacy*

Test Water: General Test Water #1

Test Point: Initial Filtration Efficacy, GTW1

Flow rate: 405.9 mL/min    pH: 7.34    NTU: 2.61    TDS: 173    Hardness: 102

Influent Conc: 7.00E+05 pfu/mL

BCS Sample ID 1 1702095    Client ID 1 VISP G2 (A)    Press 1(psi): 3.5

Eff Conc 1: 7.20E+00 pfu/mL    % Reduct 1: 99.999    Log10 Reduct 1: 5

BCS Sample ID 2 1702096    Client ID 2 VISP G2 (B)    Press 2(psi): 3.5

Eff Conc 2: 2.10E+00 pfu/mL    % Reduct 2: 99.9997    Log10 Reduct 2: 5.5

BCS Sample ID 3 1702097    Client ID 3 VISP G2 (C)    Press 3(psi): 3.5

Eff Conc 3: &lt;4.20E+00 pfu/mL    % Reduct 3: &gt;99.9994    Log10 Reduct 3: &gt;5.2

Test Notes: System's performance meets and/or exceeds the NSF P231 water purifier standard for virus removal; 4 Log10 or greater (&gt;99.99%).

Analysis: *MS-2 Virus Filtration Efficacy*

Test Water: Challenge Test Water #3

Test Point: Initial Filtration Efficacy, CTW3

Flow rate: 361.2    pH: 8.99    NTU: 32.4    TDS: 1500    Hardness: 106

Influent Conc: 5.40E+05 pfu/mL

BCS Sample ID 1 1702095    Client ID 1 VISP G2 (A)    Press 1(psi): 3.5

Eff Conc 1: 9.10E+00 pfu/mL    % Reduct 1: 99.998    Log10 Reduct 1: 4.8

BCS Sample ID 2 1702096    Client ID 2 VISP G2 (B)    Press 2(psi): 3.5

Eff Conc 2: 2.10E+00 pfu/mL    % Reduct 2: 99.9996    Log10 Reduct 2: 5.4

BCS Sample ID 3 1702097    Client ID 3 VISP G2 (C)    Press 3(psi): 3.5

Eff Conc 3: 2.50E+00 pfu/mL    % Reduct 3: 99.9995    Log10 Reduct 3: 5.3

Test Notes: System's performance meets and/or exceeds the NSF P231 water purifier standard for virus removal; 4 Log10 or greater (&gt;99.99%).



Test Water: Challenge Test Water #3

Test Point: Initial Filtration Efficacy, CTW3

Flow rate: 361.2                  pH: 8.99      NTU: 32.4                  TDS: 1500                  Hardness: 106

Influent Conc: 5.50E+05 Particles/mL

|                 |         |             |             |               |     |
|-----------------|---------|-------------|-------------|---------------|-----|
| BCS Sample ID 1 | 1702095 | Client ID 1 | VISP G2 (A) | Press 1(psi): | N/A |
|-----------------|---------|-------------|-------------|---------------|-----|

|                                    |                      |                      |
|------------------------------------|----------------------|----------------------|
| Eff Conc 1: <1.00E+00 Particles/mL | % Reduct 1: >99.9998 | Log10 Reduct 1: >5.7 |
|------------------------------------|----------------------|----------------------|

|                 |         |             |             |                   |
|-----------------|---------|-------------|-------------|-------------------|
| BCS Sample ID 2 | 1702096 | Client ID 2 | VISP G2 (B) | Press 2(psi): N/A |
|-----------------|---------|-------------|-------------|-------------------|

|                                    |             |          |                 |      |
|------------------------------------|-------------|----------|-----------------|------|
| Eff Conc 2: <1.00E+00 Particles/mL | % Reduct 2: | >99.9998 | Log10 Reduct 2: | >5.7 |
|------------------------------------|-------------|----------|-----------------|------|

|                 |         |             |             |                   |
|-----------------|---------|-------------|-------------|-------------------|
| BCS Sample ID 3 | 1702097 | Client ID 3 | VISP G2 (C) | Press 3(psi): N/A |
|-----------------|---------|-------------|-------------|-------------------|

|                                    |                      |                      |
|------------------------------------|----------------------|----------------------|
| Eff Conc 3: <1.00E+00 Particles/mL | % Reduct 3: >99.9998 | Log10 Reduct 3: >5.7 |
|------------------------------------|----------------------|----------------------|

Test Notes: Undetected: Analyte was not detected in the effluent samples analyzed; Value represents the method's detection limit for the amount of sample analyzed as per the method's standard reporting units.

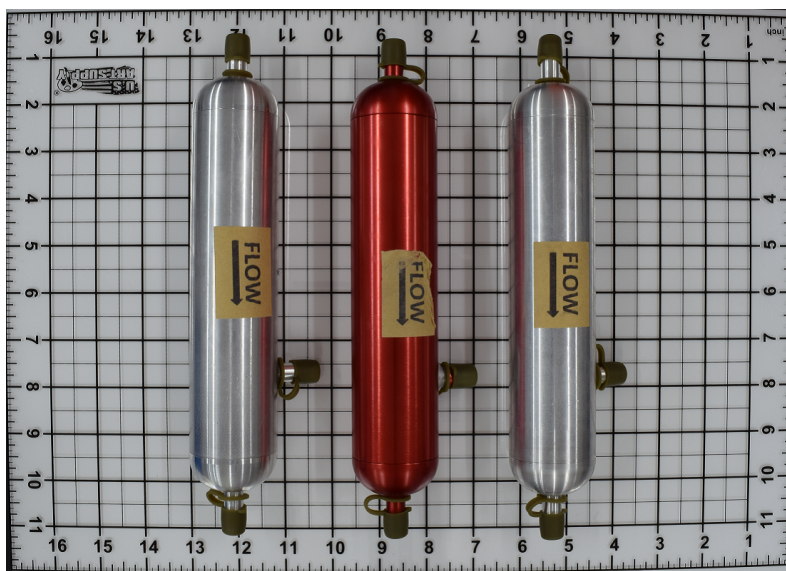
Project: Purifier Unit Efficacy Testing

Date Received: February 13, 2017 2:30 Analyst: David Sekora, M.S.

Test Start Date: February 16, 2017 Test End Date: February 17, 2017 Qualifier: U

#### Report Notes:

The received purifiers (VISP-G2) were conditioned by the passage of 2 liters of General Test Water type 1 (GTW1 (NSF P231); Dechlorinated municipal water) through each unit. The indicated challenge species were added to 10 liters of GTW1 in a sterile pressure vessel. The water was homogenized and the pressure vessel was sealed. Following, each purifier unit was connected to the sealed pressure vessel and the system was charged to 3.5 PSI using a compressed regulated air supply. The water flow through the filters was measured at 383.7-431.7 mL/min. Duplicate 50 mL samples from each filter's effluent were collected following the passage of a minimum 2 liters (>10 bed volumes) through each unit. Following the initial challenge, aliquots of challenge species were then added to Challenge Test Water Type 3 (CTW3/NSF P231, (CTW3; High Total Dissolved Solids (TDS 1430-1530), pH 8.99, high organic content (TOC 10-14), turbidity of 32.4 NTU and temperature 3.8 degrees C).) and the study was repeated as described. 2 liters was passed through each filter and duplicate effluent samples were collected. The water flow through the filter systems was 353.9-365.9 mL/min. Each filter's Influent and effluent samples was analyzed as per laboratory accredited methodology: E. coli was analyzed as per SM 9215C (APHA 2012), MS-2 as per EPA 1602 (Lab SOP V-10), fluorescent microspheres as per EPA 1623.1, and 0.5-5.0 micron dust particulates were enumerated microscopically. Each sample was analyzed in duplicates at the minimum. Test water met NSF/ANSI requirements for both General Test Water type 1 and type 3. This test does not indicate compliance with the full 10 test day NSF P231 standard. It only examines initial purifiers' units efficacy using water parameters specified in NSFP231. End of report notes.



\*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: February 21, 2017



| 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.                                                                                  |

