



BIOLOGICAL CONSULTING SERVICES  
OF NORTH FLORIDA, INC.

July 18, 2016

Sagan, LLC  
11035 Technology Place, Suite 100  
San Diego, CA 92127  
858-675-7017 ext. 2000

RE: Heavy Metal, Fluoride and Perchlorate filtration efficacy test study of the provided Sagan® DuraFlo 550 filter units; BCS ID 1606040 and 1606105.

To whom it may concern,

We have conducted the requested filtration efficacy study on the filter units received on June 9<sup>th</sup>, 2016. The experimental set up and challenge of the water filter was designed to evaluate the filter's chemical removal efficacy of heavy metal species, Fluoride and Perchlorate potentially found in drinking water at initial use. The filter challenge study test was based on client's request to demonstrate the filter's initial performance to remove the stated species from drinking water.

In the following pages, you will find a summary of the methodology used and the results of our analysis. Should you have any questions or concerns, please do not hesitate to contact me.

Best Regards,

A handwritten signature in black ink that reads "George Lukasik".

George Lukasik, Ph.D.  
Laboratory Director

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BCS LABORATORIES, INC. - GAINESVILLE  
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FL DOH #E82924, ISO/IEC 17025:2005 L2422 (L-A-B), EPA# FLO1147  
FILE: SAGAN DURAFLO 550 METAL, FLUORIDE & PERCHLORATE REMOVAL STUDY BCS 1606040-1606105  
07.06.2016

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**Test Article(s):**

On June 9<sup>th</sup>, 2016, 2 Sagan DuraFlo 550 filter units were received from Sagan LLC. The two filter units were issued BCS identifiers 1601038 and 1601039 respectively.

**Study Date:**

The study was initiated on June 15<sup>th</sup>, 2016 and completed on June 16<sup>th</sup>, 2016.

**Performed by:** David Sekora, M.S.

**Analyzed by:** David Sekora, M.S.

**Study Supervisor:** George Lukasik, Ph.D.

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## Physical parameter measuring devices and critical equipment utilized:

| Equipment and Measurement Parameter     | Manufacturer                     | BCS Lab ID |
|---|----------------------------------|------------|
| Balance                                 | Sartorius Laboratory Instruments | BL-4       |
| Timer                                   | VWR Traceable<br>62344-910       | T-11       |
| 1-Liter standardized graduated cylinder | Nalgene                          | GC-1L-A    |

### Test Matrix; General Test Water 1:

General Test Water 1 (GTW1, NSF P231) was made up of the dechlorinated municipal water. Municipal water was dechlorinated by filtration through carbon block filters and was used in the study. A measured aliquot of Heavy Metal Spike solution (CPI International, USA), Zinc Sulfate (Fisher Scientific, USA) and Mercuric Chloride (Ricca, USA) were added to 60 liters and homogenized. The test water was allowed to incubate overnight to allow the settling and separation of any precipitates. The top 80% fraction of the water was collected and used for the challenge study.

For the Fluoride, a measured aliquots of a standard solution was added to a separate 40 liter volume of carbon block dechlorinated municipal water and homogenized.

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Additionally, an aliquot of perchlorate standard was added to a separate 40 Liter volume of dechlorinated municipal water.

### **Challenge study Description / Methodology:**

The provided filters were fitted into the inside of a 5-gallon plastic container (Lowe's Hardware Store, USA) bucket. As the container was filled with the test water, it would drain out through the filter at the bottom of the container. 20 liters of the heavy metal test water was then added to each 5-gallon plastic container. After the passage of >10 liters of the test water, 250mL samples of the filters' influent and effluent were collected in special containers that contained a preservative (TestAmerica Laboratories, Tampa, FL). The study was repeated as described for both the prepared perchlorate and fluoride test waters and samples of the filters' effluents were collected following the passage of 10 liters of the respective test water. The collected influent and effluent samples were preserved and shipped to Test America Laboratories (Tampa, FL) for analysis.

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Study data are summarized in the provided table(s). The results presented pertain only to the study conducted on the test articles/samples/units provided by the client (or client representative). The study was authorized and commissioned by the client. The analytical results pertain only to the samples analyzed relating to the respective identifier number(s) indicated. The data provided is strictly representative of the study conducted using the material/samples/articles provided by the client (or client's representative) and it's (their) condition at the time of test. The study and data obtained under the laboratory conditions may not be representative or indicative of a real-life process and/or application. Positive, negative, and neutralization controls were performed as outlined in the method and as per Good Laboratory Practices. All 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.

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**Project:** Sagan, LLC DuraFlo 550 Efficacy Test  
**Sample(s):** BCS 1606040 and 1606105 received June 9<sup>th</sup>, 2016  
**Test:** Filtration efficacy at initial use (single challenge at pH 6.5)  
**Test Parameter:** Heavy Metal, Perchlorate and Fluoride Removal  
**Test Dates:** June 15<sup>th</sup>, 2016-June 16<sup>th</sup>,2016

| Sample Type                        | Chemical species content, following the passage of 10 liters of test water |              |                    |                    |                    |               |              |                   |                |
|------------------------------------|--|--------------|--------------------|--------------------|--------------------|---------------|--------------|-------------------|----------------|
|                                    | Arsenic (ppm)  | Barium (ppm) | Cadmium (ppm)      | Chromium (ppm)     | Lead (ppm)         | Mercury (ppm) | Zinc (ppm)   | Perchlorate (ppb) | Fluoride (ppm) |
| Filter Influent                    | 0.71   | 1.1          | 1.0                | 0.27               | 0.49               | 5,700         | 7.9          | 5,200             | 2.5            |
| DuraFlo 550 Filter A Effluent      | 0.0084   | 0.33         | Undetected < 0.001 | Undetected < 0.002 | 0.0026             | 0.076         | < 0.0050     | 450               | 0.14           |
| DuraFlo 550 Filter B Effluent      | 0.026  | 0.92         | 0.69               | Undetected < 0.002 | Undetected < 0.002 | 20            | 0.86         | 250               | 0.25           |
| <b>Cumulative Percent Removal*</b> | <b>98.1%</b>   | <b>43.2%</b> | <b>65%</b>         | <b>&gt; 99.2%</b>  | <b>99.2%</b>       | <b>99.9%</b>  | <b>94.5%</b> | <b>99.9%</b>      | <b>94.5%</b>   |

\*The respective percent reductions were determined based on the concentration obtained in the filter influent and effluent samples.

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I hereby certify to the accuracy, quality, and data integrity of the reported study. I also certify that the study was appropriately executed and is fully defensible. All physical measurements and their source have been documented. Measurements were obtained using approved protocols and NIST traceable and/or validated instruments. Analysis execution and results were fully documented. Analytical methods used to produce the study's raw data are within the laboratory's ISO 17025 accreditation. The results and conclusions of the study accurately reflect the real raw data obtained in the study.

Signature of Sr. Analyst \_\_\_\_\_  
David Sekora, M.S.

Date: 07/18/2016

\_\_\_\_\_  
George Lukasik, Ph.D.

Date: 07/18/2016

I certify that I have personally examined and am familiar with the information submitted herein. Based on my inquiry of the individuals immediately responsible for obtaining the information, I certify the submitted information to be true, accurate, and complete. The data provided is solely representative of the analysis conducted on the material/samples/articles provided by the client (or client's representative) it's (their) condition at the time of study. They may not be representative of a process or product. The sample(s) were analyzed in accordance with the method described for each analyte. Due to the inherent limitation(s) of analytical method(s), 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. The species analysis and presented results in this report meet the requirements of The NELAP Institute (TNI), ISO 17025, and The State of Florida Department of Public Health's Laboratory Certification Program, as applicable unless otherwise noted.

Signature of Study Director \_\_\_\_\_  
George Lukasik, Ph.D.

Date: 07/18/2016

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