

**SageWay Solutions, LLC**  
**Project 20052**  
**Bathroom Cleaners**  
**Soap Scum-ASTM D5343**  
**Water Hardness**

Living Clean  
Grove Collaborative  
Seventh Generation  
Scrubbing Bubbles (Trigger)

March 2, 2020

Mr. Gregory van Buskirk  
 SageWay Solutions, LLC  
 65 Panorama Ct  
 Danville, CA 94506

Dear Gregory,

You sent us a sample of **Bathroom Cleaner** identified as **Living Clean, Tub & Tile Cleaner** for comparison against **Grove Collaborative, Seventh Generation, & Scrubbing Bubbles**. We tested sample using ASTM D5343 soap scum and water hardness. A summary of the testing is below.

**Grove Tub & Tile and Seventh Generation performed the best in Overall Soil Removal.**

**All samples are comparable in Overall Soil Removal.**

Sample	% Soil Removals		Overall Soil Removal Totals	% of Best
	Soap Scum	Hardness		
Grove Tub & Tile	72.8	98.9	<b>171.7</b>	Best
Seventh Generation	72.7	99.0	<b>171.7</b>	Best
Living Clean	70.9	98.8	<b>169.7</b>	99%
Scrubbing Bubbles	68.0	99.1	<b>167.1</b>	97%
<i>Sig. Dif.</i>	4.9	0.9		

Descriptions of the test method and the sample information are attached.

Sincerely,



Tod Losey  
 Sterling Laboratories

## Sample Information

### Bathroom Cleaners

1. **Living Clean**, Tub & Tile Cleaner Formula - Free & Clear,  
Production Code: SWS-020720-TTC1, 7 February 2020,  
Sample For Sterling Laboratories,  
Received 2-13-20 from SageWay Solutions
2. **Grove Collaborative**, Tub & Tile Cleaner, Orange & Rosemary,  
2-Pack, 1 oz. Concentrates,  
Lot #: C069126 (on Tube Crimp), UPC #: 8 5326900657 9  
Received 2-7-20 from Grove Collaborative
3. **Seventh Generation**, Tub & Tile Cleaner, Emerald Cypress & Fur Scent,  
Powerful Clean 0% Chlorine Bleach, Dyes, Synthetic Fragrances,  
26 fl. oz. (768 mL) Trigger-Spray Bottle,  
Lot #: AM19310222 A142772, UPC #: 7 2391344774 9,  
Purchased 2-18-20 from Meijer, Toledo, OH
4. **Scrubbing Bubbles**, Bathroom Grime Fighter, Rain Shower,  
Removes 100% Soap Scum, Powerful Clean, No Harsh Chemicals,  
32 fl. oz. (946 mL) Trigger-Spray Bottle,  
Lot #: W251F, UPC #: 0 2570000095 2,  
Purchased 2-18-20 from Meijer, Toledo, OH

## Photographs of Samples Tested

### Bathroom Cleaners



Living Clean  
Tub & Tile Cleaner



Grove Collaborative  
Tub & Tile



Seventh Generation  
Tub & Tile



Scrubbing Bubbles  
Bathroom Grime Fighter



## TEST METHOD

### Bathroom Cleaners ASTM D5343 Soap Scum

#### ASTM D5343 Soap Scum

##### Substrates:

- White Ceramic Tiles. (4" x 4", Counterparts, Bright White, # L 100-4).

##### Soiling the Substrates

We soiled the ceramic tiles with soap scum per ASTM D-5343 and allowed them to cool overnight. The reflectance of each tile was measured before and after soiling using a Photovolt 577 Reflectometer with a Green Tristimulus filter.

##### Sample Dilutions

- Living Clean, Seventh Generation & Scrubbing Bubbles: Used as received.
- Grove: Diluted 1 oz. (1 Tube) into 15 oz. of Toledo tap water.

##### Applying the Sample to the Soiled Tiles

We applied two milliliters (2 mL) of sample onto a soiled tile. The sample was allowed to soak for one (1) minute. We then scrubbed the tile for ten (10) cycles on a Gardener In-Line Abrasion Apparatus using a water-dampened sponge. The tile was then rinsing under the tap. Each tile was allowed to dry at room temperature, and then measured again using the Photovolt Reflectometer. Each sample was evaluated using three (3) replicates. Soil Removal Calculations are defined below.

##### Soil Removal Calculations

On each test panel we measured the reflectance of the test area before and after soiling and after cleaning, calculated the percent soil removed from the formula:

$$\text{Soil Removal} = \frac{100(C-S)}{(O-S)}$$

Where "O" is the reflectance of the unsoiled tile, "S" is the reflectance after soiling, and "C" is the reflectance after cleaning.

If the samples differ by less than 10% they are said to be comparable. We determined the least significant difference at the 95% confidence rate for the samples tested.

## TEST METHOD Bathroom Cleaners

### Water Hardness

For water hardness, we sprayed the black ceramic tiles with a solution of magnesium and calcium chlorides followed by a solution of sodium carbonate. They were then baked at 100° C for 30 minutes. This cycle was repeated three (3) more times for a total of four (4) layers of water hardness. After the final layer, we baked the tiles for one (1) hour at 100° C. The tiles were allowed to cool overnight. We measured their gloss after cooling.

### Sample Dilutions

The samples were used full strength.

### Cleaning (Mechanical Scrub)

A soiled tile was placed in the tray of a Gardner Straight-Line Washability Apparatus, and a damp sponge fixed in the carriage. Two milliliters (2 mL) of sample was applied to the soil. We immediately scrubbed it for ten (10) cycles. After rinsing and drying we measured the reflectance, or gloss, of each tile as before. Three (3) tiles of each soil were cleaned with each test product.

### Soil Removal Calculations

On each test panel we measured the gloss of the test area before and after soiling and after cleaning, calculated the percent soil removed from the formula:

$$\text{Soil Removal} = 100(C-S) / (O-S).$$

Where “O” is the reflectance of the unsoiled tile, “S” is the reflectance after soiling, and “C” is the reflectance after cleaning.

If the samples differ by less than 10% they are said to be comparable. We determined the least significant difference at the 95% confidence rate for the samples tested.