

SCL Record(s): Massachusetts Operational Services Division (OSD) Contract for:
Cogent Environmental Solutions of Caledon, Ontario, Canada

Date(s): 2/20/03 and 2/24/03

Experimenter(s): J. Marshall and H. Wilcox

Cleaner(s): *General Purpose*

Substrate(s): 3" x 4" Fiberglass, 2" x 4" Ceramic, Chrome, Glass, Plastic and Steel Coupons

Contaminant(s): SSL Soil 1 (Bathroom Soap Scum)¹; SSL Soil 2 (Glass Soap Scum)² and
Hucker's Soil³

Cleaning Method(s): Gardner Straightline Washability Apparatus

Analytical Method(s): Gravimetric, accompanied by Photography

Purpose: To determine the product's performance for OSD's EPP Procurement Program
as a Bathroom, Glass and All-Purpose Cleaner

Trial I. Bathroom Cleaner

Experimental Design and Procedure

The cleaning product as delivered was diluted with DI (deionized) water to the vendor-recommended concentration for bathroom cleaning. Pre-weighed coupons of **fiberglass** (3), **ceramic** (3) and **chrome** (3) were coated with SSL Soil 1 using a hand held swab and allowed to dry overnight at ambient temperature.

The contaminated coupons were weighed using a Denver Instrument Model A-250 analytical balance to determine the amount of soil added (i.e., initial weight). Photographs of the coupons were taken using a Kodak Digital Model DC260 Zoom Camera.

The coupons were placed in a Gardner Straight Line Washability unit, as referenced in ASTM International (formerly the American Society for Testing and Materials) standards and by CSPA, the Consumer Specialty Products Association's (formerly CSMA) detergent compendium. A professional painter's rag was attached to the cleaning sled and soaked with 5-7 sprays of cleaning solutions. Each coupon was sprayed 7-10 times with the same cleaning solution. The cleaning unit was run for 20 cycles (approx. 33 seconds). The coupons were wiped once with a dry paper towel. Gravimetric weights were recorded once more, from which the remaining soil (i.e., final weight) can be determined. Photographs of the coupons were again taken.

Results

The cleaning efficiency of *General Purpose* on fiberglass surfaces was calculated and recorded in Table 1 and photographs for comparison before and after cleaning are shown in Figure 1.

Cleaner Conc.: 5.9%	Initial Weight of Soil (g)	Final Weight of Soil (g)	Percent Soil Removal (%)
Coupon 1	0.2681	0.0054	97.99
Coupon 2	0.2316	0.0235	89.85
Coupon 3	0.2104	0.0272	87.07

All experimental conditions are conducted in triplicate to ensure scientific reproducibility. This is non-negotiable.

Table 1. PERFORMANCE OF GENERAL PURPOSE ON FIBERGLASS SUBSTRATE



Figure 1. PHOTOGRAPHS OF FIBERGLASS BEFORE (LEFT) AND AFTER (RIGHT) GENERAL PURPOSE CLEANING

The cleaning efficiency of *General Purpose* on ceramic surfaces was calculated and recorded in Table 2 and photographs for comparison before and after cleaning are shown in Figure 2.

Cleaner Conc.: 5.9%	Initial Weight of Soil (g)	Final Weight of Soil (g)	Percent Soil Removal (%)
Coupon 1	0.2212	0.0826	62.66
Coupon 2	0.1600	0.0480	70.00
Coupon 3	0.2432	0.1330	45.31

All experimental conditions are conducted in triplicate to ensure scientific reproducibility. This is non-negotiable.

Table 2. PERFORMANCE OF GENERAL PURPOSE ON CERAMIC SUBSTRATE



Figure 2. PHOTOGRAPHS OF CERAMIC BEFORE (LEFT) AND AFTER (RIGHT) GENERAL PURPOSE CLEANING

The cleaning efficiency of *General Purpose* on chrome surfaces was calculated and recorded in Table 3 and photographs for comparison before and after cleaning are shown in Figure 3.

Cleaner Conc.: 5.9%	Initial Weight of Soil (g)	Final Weight of Soil (g)	Percent Soil Removal (%)
Coupon 1	0.0524	0.0033	93.70
Coupon 2	0.0565	0.0033	94.16
Coupon 3	0.0747	0.0030	95.98

All experimental conditions are conducted in triplicate to ensure scientific reproducibility. This is non-negotiable.

Table 3. PERFORMANCE OF GENERAL PURPOSE ON CHROME SUBSTRATE



Figure 3. PHOTOGRAPHS OF CHROME BEFORE (LEFT) AND AFTER (RIGHT) GENERAL PURPOSE CLEANING

Trial II. Glass Cleaner

Experimental Design and Procedure

The cleaning product as delivered was diluted with DI (deionized) water to the vendor-recommended concentration for glass cleaning. Pre-weighed coupons of **glass** (3) and **chrome** (3) were coated with SSL Soil 2 by a hand held aerosol and allowed to dry overnight at ambient temperature.

The contaminated coupons were weighed using a Denver Instrument Model A-250 analytical balance to determine the amount of soil added (i.e., initial weight). Photographs of the coupons were taken using a Kodak Digital Model DC260 Zoom Camera.

The coupons were placed in a Gardner Straight Line Washability unit, as referenced in ASTM International (formerly the American Society for Testing and Materials) standards and by CSPA, the Consumer Specialty Products Association's (formerly CSMA) detergent compendium. A professional painter's rag was attached to the cleaning sled and soaked with 5-7 sprays of cleaning solutions. Each coupon was sprayed 7-10 times with the same cleaning solution. The cleaning unit was run for 5 cycles (approx. 9 seconds). The coupons were wiped once with a dry paper towel. Gravimetric weights were recorded once more, from which the remaining soil (i.e., final weight) can be determined. Photographs of the coupons were again taken.

Results

The cleaning efficiency of *General Purpose* on glass surfaces was calculated and recorded in Table 4 and photographs for comparison before and after cleaning are shown in Figure 4.

Cleaner Conc.: 1.6%	Initial Weight of Soil (g)	Final Weight of Soil (g)	Percent Soil Removal (%)
Coupon 1	0.0272	-0.0004	101.47
Coupon 2	0.0227	-0.0002	100.88
Coupon 3	0.0183	0.0012	93.44

All experimental conditions are conducted in triplicate to ensure scientific reproducibility. This is non-negotiable.

Table 4. PERFORMANCE OF GENERAL PURPOSE ON GLASS SUBSTRATE

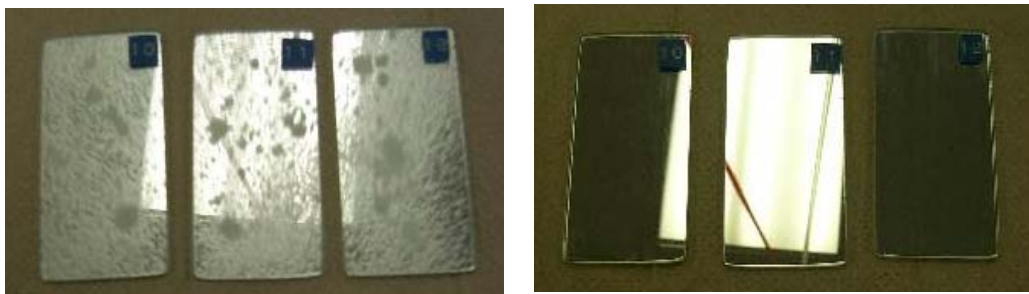


Figure 4. PHOTOGRAPHS OF GLASS BEFORE (LEFT) AND AFTER (RIGHT) GENERAL PURPOSE CLEANING

The cleaning efficiency of *General Purpose* on chrome surfaces was calculated and recorded in Table 5 and photographs for comparison before and after cleaning are shown in Figure 5.

Cleaner Conc.: 1.6%	Initial Weight of Soil (g)	Final Weight of Soil (g)	Percent Soil Removal (%)
Coupon 1	0.0229	0.0018	92.14
Coupon 2	0.0303	0.0030	90.10
Coupon 3	0.0188	0.0029	84.57

All experimental conditions are conducted in triplicate to ensure scientific reproducibility. This is non-negotiable.

Table 5. PERFORMANCE OF GENERAL PURPOSE ON CHROME SUBSTRATE



Figure 5. PHOTOGRAPHS OF CHROME BEFORE (LEFT) AND AFTER (RIGHT) GENERAL PURPOSE CLEANING

**Trial III. All-Purpose Cleaner
Experimental Design and Procedure**

The cleaning product as delivered was diluted with DI (deionized) water to the vendor-recommended concentration for all-purpose cleaning. Pre-weighed coupons of **ceramic** (3), **plastic** (3) and **steel** (3) were coated with Hucker’s Soil and allowed to dry overnight at ambient temperature.

The contaminated coupons were weighed using a Denver Instrument Model A-250 analytical balance to determine the amount of soil added (i.e., initial weight). Photographs of the coupons were taken using a Kodak Digital Model DC260 Zoom Camera.

The coupons were placed in a Gardner Straight Line Washability unit, as referenced in ASTM International (formerly the American Society for Testing and Materials) standards and by CSPA, the Consumer Specialty Products Association’s (formerly CSMA) detergent compendium. A professional painter's rag was attached to the cleaning sled and soaked with 5-7 sprays of cleaning solutions. Each coupon was sprayed 7-10 times with the same cleaning solution. The cleaning unit was run for 20 cycles (approx. 33 seconds). The coupons were wiped once with a dry paper towel. Gravimetric weights were recorded once more, from which the remaining soil (i.e., final weight) can be determined. Photographs of the coupons were again taken.

Results

The cleaning efficiency of *General Purpose* on ceramic surfaces was calculated and recorded in Table 6 and photographs for comparison before and after cleaning are shown in Figure 6.

Cleaner Conc.: 2.9%	Initial Weight of Soil (g)	Final Weight of Soil (g)	Percent Soil Removal (%)
Coupon 1	0.0618	0.0093	84.95
Coupon 2	0.0286	0.0048	83.22
Coupon 3	0.0163	0.0021	87.12

All experimental conditions are conducted in triplicate to ensure scientific reproducibility. This is non-negotiable.

Table 6. PERFORMANCE OF GENERAL PURPOSE ON CERAMIC SUBSTRATE



Figure 6. PHOTOGRAPHS OF CERAMIC BEFORE (LEFT) AND AFTER (RIGHT) GENERAL PURPOSE CLEANING

The cleaning efficiency of *General Purpose* on plastic surfaces was calculated and recorded in Table 7 and photographs for comparison before and after cleaning are shown in Figure 7.

Cleaner Conc.: 2.9%	Initial Weight of Soil (g)	Final Weight of Soil (g)	Percent Soil Removal (%)
Coupon 1	0.0439	0.0157	64.24
Coupon 2	0.0196	0.0018	90.82
Coupon 3	0.0344	0.0104	69.77

All experimental conditions are conducted in triplicate to ensure scientific reproducibility. This is non-negotiable.

Table 7. PERFORMANCE OF GENERAL PURPOSE ON PLASTIC SUBSTRATE

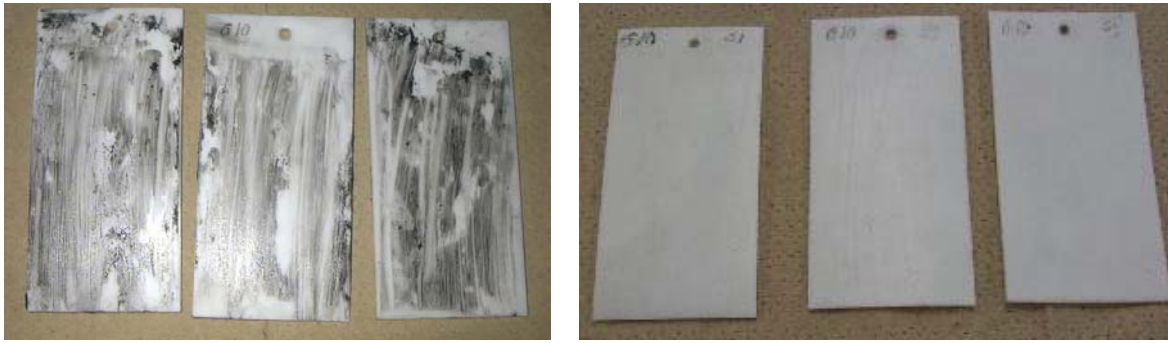


Figure 7. PHOTOGRAPHS OF PLASTIC BEFORE (LEFT) AND AFTER (RIGHT) GENERAL PURPOSE CLEANING

The cleaning efficiency of *General Purpose* on steel surfaces was calculated and recorded in Table 8 and photographs for comparison before and after cleaning are shown in Figure 8.

Cleaner Conc.: 2.9%	Initial Weight of Soil (g)	Final Weight of Soil (g)	Percent (%) Soil Removal
Coupon 1	0.0319	-0.0003	100.94
Coupon 2	0.0402	0.0022	94.53
Coupon 3	0.1229	0.0002	99.84

All experimental conditions are conducted in triplicate to ensure scientific reproducibility. This is non-negotiable.

Table 8. PERFORMANCE OF GENERAL PURPOSE ON STEEL SUBSTRATE



Figure 8. PHOTOGRAPHS OF STEEL BEFORE (LEFT) AND AFTER (RIGHT) GENERAL PURPOSE CLEANING

Observations and Conclusions

The **average** percent soil removal rates for *General Purpose* on each of the substrates were determined and overall percent efficiencies recorded for each of the three categories of bathroom, glass and all-purpose cleaners in Tables 9.

	Average Percent Soil Removal Rates (%) by Substrate						Overall	Comments
	Fiberglass	Ceramic	Chrome					
Bathroom / SSL Soil 1								
Cleaner Conc.: 5.9%	91.64	59.32	94.62				81.86%	Fail
Cleaner Conc.: 12.0%		94.78					93.68%	Pass
Glass / SSL Soil 2			Chrome	Glass			Overall	Comments
Cleaner Conc.: 1.6%			98.60	88.94			93.77%	Pass
All-Purpose / Hucker's Soil		Ceramic			Plastic	Painted Steel	Overall	Comments
Cleaner Conc.: 2.9%		85.09			74.94	98.44	86.16%	Pass

Table 9. OVERALL PERCENT SOIL REMOVAL RATES BY CLEANING CATEGORIES

A score of \$85% soil removal is considered acceptable cleaning for a given category. Consequently, *General Purpose* performed satisfactorily as a glass and all-purpose cleaner at the recommended concentrations.

As a bathroom cleaner, *General Purpose* did not perform satisfactorily at the initial recommended concentration.

Trial IV. Bathroom Cleaner

Re-test

Trial III was repeated, with the product as delivered being diluted with DI (deionized) water to a concentration of 12%.

Results

The cleaning efficiency of *General Purpose* on ceramic surfaces was calculated and recorded in Table 10 and photographs for comparison before and after cleaning are shown in Figure 9.

Cleaner Conc.: 12%	Initial Weight of Soil (g)	Final Weight of Soil (g)	Percent Soil Removal (%)
Coupon 1	0.2278	0.0218	90.43
Coupon 2	0.3424	0.0105	96.93
Coupon 3	0.2840	0.0086	96.97

All experimental conditions are conducted in triplicate to ensure scientific reproducibility. This is non-negotiable.

Table 10. PERFORMANCE OF GENERAL PURPOSE ON CERAMIC SUBSTRATE



Figure 9. PHOTOGRAPHS OF CERAMIC BEFORE (LEFT) AND AFTER (RIGHT) GENERAL PURPOSE CLEANING

Addendum

As a bathroom cleaner, *General Purpose* performed satisfactorily in the re-test on ceramic surfaces, with an average soil removal rate of 94.78%.

¹SSL Soil 1 (Bathroom soap scum):* All-in-one shampoo and conditioner 28.6%, Dry skin lotion 21.4%, Liquid hand soap 21.4%, Liquid body wash 14.3%, Deodorant bar soap 7.2% and water 7.1%.

²SSL Soil 2 (Glass soap scum):* Water 51.5%, Hair gel 25.6%, Toothpaste 10.4%, Shaving cream 5.3%, Hair spray 3.7% and Spray deodorant 3.5%.

³Hucker’s soil:* Distilled water 45.8%, Evaporated milk 13.8%, Creamy peanut butter 9.2%, Salted butter 9.2%, Stone ground wheat flour 9.2%, Egg yolk 9.2%, Saline solution 2.7% and Printer's ink with boiled linseed oil 0.9% .

*Additional information about these preparations can be obtained by contacting the Laboratory.