CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2007

DateRun: 09/25/2007

Experimenters: Jason Marshall, Shweta Bansal, Andrea Cheeseman

ClientType: General

ProjectNumber: Project #2

Substrates: Plastic, Fiberglass

PartType: Coupon

Contaminants: Hucker's Soil

Cleaning Methods: Manual Wipe

Analytical Methods: Gravimetric, Visual

Purpose: To evaluate biobased cleaning products for hard surface cleaning.

Experimental Procedure: The identified cleaning product were diluted to the vendor's recommended concentrations for all purpose cleaning using DI water. Three preweighed fiberglass and plastic coupons were coated with SSL Soil 3 (Hucker's Soil: Jif Creamy Peanut Butter 9.2%, Salted Butter 9.2%, Arrowhead Mills stone ground wheat flour 9.2%, Egg Yolk 9.2%, Evaporated milk 13.8%, Distilled water 45.8%, Printer's ink with boiled linseed oil 0.9%, Shaws saline solution 2.7%) using a hand held swab and allowed to dry for 24 hours at room temperature. The contaminated coupons were weighed again to determine the amount of soil added.

Three coupons were placed into a Gardner Straight Line Washability unit. A reinforced paper towel 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 (~33 seconds). At the end of the cleaning, coupons were wiped once with a dry paper towel. Final weights were recorded, efficiencies were calculated and recorded. Observations were made as well for removal rates.

A total of 38 products from 16 vendors were selected based on supplied information on potential product usage on multiple surfaces and contaminants.

Results: During the laboratory testing, the visual observations made were based on a qualitative assessment for how much of the soil was removed from the various coupons. To assess a semi-quantitative value to the visual observations, the following system was used:
100%: Coupon prior to Hucker's application
75%: Clean
50%: Slightly dirty
25%: Dirty
0%: Very Dirty

Each of the three coupons cleaned by a single product would be assessed a numerical value and then averaged for the product. These values are listed in the table below, along with the observations. Of the 72 product/dilution combinations, 34 combinations had an average cleaning level at or above the 50% mark. There were seven products with an average of 67 or greater.

Company	Product	Conc	Observations	Qualitative % Removal
1st Envirosafety	Cleaner and Degreaser	3	Slightly dirty	33
			Dirty	
			Dirty	
		6.25	Clean	67
			Clean	
			Slightly dirty	
		9.1	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
	EccoCommercial Cleaner	3	Slightly dirty	33
			Dirty	
			Dirty	
		12.5	Dirty	42
			Slightly dirty	
			Slightly dirty	

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	Organic Cleaner & Degreaser	3	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
	Quick Shine Wash & Polish	7	Slightly dirty	58
			Clean	
			Slightly dirty	
Bi-O-Kleen	Citrus Soy Solvent	3	Clean	75
	Cleaner & Degreaser		Clean	
			Clean	
	Cleaner and Degreaser	0.78	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
		1.6	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
		2.3	Dirty	25
			Dirty	
			Dirty	
	Soy Cream Cleaner	100	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
	SoyLube SL-100	100	Very dirty, turned coupon blue	0
			Very dirty, turned coupon blue	
			Very dirty, turned coupon blue	
Bio-Kleen	BKP 130	2.3	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
		8.3	Dirty	42
			Slightly dirty	
			Slightly dirty	
		20	Dirty	33
			Dirty	
			Slightly dirty	
Clean Environment Co	Super Citrus Clean RTU 100	100	Clean	58
			Slightly dirty	
			Slightly dirty	
		0.8	Slightly dirty	42
			Slightly dirty	
			Dirty	
		2	Slightly dirty	33
			Dirty	
			Dirty	
		8.3	Slightly dirty	42
			Slightly dirty	
			Dirty	
Cleanline Products	Super H2O2 Citrus Conc. 0.8	0.8	Slightly dirty	33

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			Very dirty	
			Slightly dirty	
		12.5	Very dirty	33
			Slightly dirty	
			Slightly dirty	
Enviro-One	Multi-Use Cleaner	2	Very dirty	17
			Dirty	
			Dirty	
		6.25	Slightly dirty	58
			Slightly dirty	
			Clean	
		20	Clean	67
			Clean	
			Slightly dirty	
		50	Dirty	58
			Clean	
			Clean	
Envirox	GroutSafe	0.8	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
		7.7	Slightly dirty	42
			Slightly dirty	
			Dirty	
		9.1	Dirty	8
			Very dirty	
			Very dirty	
		20	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
	H2Orange2	0.8	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
		1.6	Dirty	25
			Dirty	
			Dirty	
		7.7	Slightly dirty	42
			Slightly dirty	
			Dirty	
		25	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
Franmar	Bean-A-Doo	100	Very dirty	0
			Very dirty	
			Very dirty	
	Kernal Clean	100	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
Garden Guys	Organic Degreaser	100	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
Gemtek Products	SC 1000	0.7	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
	SC 2000 All Purpose	100	Slightly dirty	67
			Clean	

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			Clean	
	SC Aircraft & Metal Cleaner	5	Dirty	33
			Dirty	
			Slightly dirty	
	SC Bathroom Cleaner	100	Clean	67
			Clean	
			Slightly dirty	
		11.1	Dirty	25
			Dirty	
			Dirty	
	SC Floor & Tile Cleaner	100	Dirty	8
			Very dirty	
			Very dirty	
	SC Multi-Surface Cleaner	100	Dirty	42
			Slightly dirty	
			Slightly dirty	
	SC Toilet Bowl Cleaner	100	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
		25	Slightly dirty	42
			Slightly dirty	
			Dirty	
	SC Tub and Tile Cleaner	100	Slightly dirty	42
			Slightly dirty	
			Dirty	
		11.1	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
Global Biobased Asia	All Purpose 102 Conc	2	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
Orison Marketing	EZ Safe Solutions Cleaner	20	Dirty	42
			Slightly dirty	
			Slightly dirty	
	VPW SC 1000	6.7	Dirty	33
			Dirty	
			Slightly dirty	
PureTech Int.	Botanical Gold	33	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
Rochester Midland	EnviroCare Low Foam All Purpose	0.8	Dirty	25
Corporation			Dirty	
			Dirty	
		2.3	Dirty	25
			Dirty	
			Dirty	
	EnviroCare Neutral Disinfectant	1.6	Dirty	25

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			Very dirty	
			Slightly dirty	
	EnviroCare Tough Job Cleaner	6.2	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
		12.5	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
	EnviroCare Washroom Cleaner	12.5	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
	All Purpose	100	Dirty	25
			Dirty	
			Dirty	
		1.2	Dirty	25
			Dirty	
			Dirty	
		1.6	Dirty	42
			Slightly dirty	
			Dirty	
		12.5	Dirty	25
			Dirty	
			Dirty	
SoySafe	Basin, Tub and Tile	100	Slightly dirty	42
			Dirty	
			Slightly dirty	
		50	Dirty	33
			Dirty	
			Slightly dirty	
	Spray & Wipe	100	Clean	67
			Clean	
			Slightly dirty	
Spartan	Restroom Cleaner	100	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
		10	Dirty	33
			Dirty	
			Slightly dirty	
	Soy Strong	100	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
	Tribase	0.8	Dirty	42
			Slightly dirty	
			Slightly dirty	
		1.6	Slightly dirty	50
			Slightly dirty	
			Slightly dirty	
		2	Clean	67
			Clean	
			Slightly dirty	
		6.25	Slightly dirty	33
			Dirty	
			Dirty	

Summary:

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Substrates:	Plastic, Fiberglass
Contaminants:	Hucker's Soil

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
1st Envirosafety Inc. - No Longer Exists	Cleaner and Degreaser - For Comparison Purposes Only	3	33.00	☐	Semi-quantitative
1st Envirosafety Inc. - No Longer Exists	Cleaner and Degreaser - For Comparison Purposes Only	6.25	67.00	☑	Semi-quantitative
1st Envirosafety Inc. - No Longer Exists	Cleaner and Degreaser - For Comparison Purposes Only	9.1	50.00	☑	Semi-quantitative
1st Envirosafety Inc. - No Longer Exists	Ecco Commercial Cleaner - For Comparison Purposes Only	3	33.00	☐	Semi-quantitative
1st Envirosafety Inc. - No Longer Exists	Ecco Commercial Cleaner - For Comparison Purposes Only	12.5	42.00	☐	Semi-quantitative
1st Envirosafety Inc. - No Longer Exists	Organic Cleaner/Degreaser - For Comparison Purposes Only	3	50.00	☑	Semi-quantitative
1st Envirosafety Inc. - No Longer Exists	Quick Shine Wash & Polish - For Comparison Purposes Only	7	58.00	☑	Semi-quantitative
Bi-O-Kleen Industries	Citrus Soy Solvent Cleaner & Degreaser	3	75.00	☑	Semi-quantitative
Bi-O-Kleen Industries	Bi-O-Kleen Cleaner & Degreaser	0.78	50.00	☑	Semi-quantitative
Bi-O-Kleen Industries	Bi-O-Kleen Cleaner & Degreaser	1.6	50.00	☑	Semi-quantitative
Bi-O-Kleen Industries	Bi-O-Kleen Cleaner & Degreaser	2.3	25.00	☐	Semi-quantitative
Bi-O-Kleen Industries	Soy Cream Cleaner	100	50.00	☑	Semi-quantitative
Bi-O-Kleen Industries	Soy Lube- SL 100	100	0.00	☐	Semi-quantitative
Bi-O-Kleen Industries	BKP 130	2.3	50.00	☑	Semi-quantitative
Bi-O-Kleen Industries	BKP 130	8.3	42.00	☐	
Bi-O-Kleen Industries	BKP 130	20	33.00	☐	
The Clean Environment Co	Super Citrus Clean N 46	100	58.00	☑	Semi-quantitative
The Clean Environment Co	Super Citrus Clean N 46	0.8	42.00	☐	Semi-quantitative
The Clean Environment Co	Super Citrus Clean N 46	2	33.00	☐	Semi-quantitative
The Clean Environment Co	Super Citrus Clean N 46	8.3	42.00	☐	Semi-quantitative
Cleanline Products	H2O2 Super Citrus Concentrate	0.8	33.00	☐	
Cleanline Products	H2O2 Super Citrus Concentrate	12.5	33.00	☐	Semi-quantitative
Enviro-One	Multi Use Green Conc.	2	17.00	☐	Semi-quantitative
Enviro-One	Multi Use Green Conc.	6.25	58.00	☑	Semi-quantitative
Enviro-One	Multi Use Green Conc.	20	67.00	☑	Semi-quantitative
Enviro-One	Multi Use Green Conc.	50	58.00	☑	
EnvirOx LLC	Grout Safe	0.8	50.00	☑	Semi-quantitative
EnvirOx LLC	Grout Safe	7.7	42.00	☐	Semi-quantitative
EnvirOx LLC	Grout Safe	9.1	8.00	☐	Semi-quantitative
EnvirOx LLC	Grout Safe	20	50.00	☑	
EnvirOx LLC	H2Orange2	0.8	50.00	☑	Semi-quantitative
EnvirOx LLC	H2Orange2	1.6	25.00	☐	Semi-quantitative

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EnvirOx LLC	H2Orange2	7.7	42.00	☐	
EnvirOx LLC	H2Orange2	25	50.00	☑	Semi-quantitative
Franmar Chemical	Bean-e-doo (Parts Washer Solvent)	100	0.00	☐	Semi-quantitative
Franmar Chemical	Kernel Clean glass cleaner	100	50.00	☑	Semi-quantitative
Garden Guys	Organic Products Degreaser	100	50.00	☑	Semi-quantitative
Gemtek Products	SC 1000 Aqueous Cleaner Concentrate	0.7	50.00	☑	Semi-quantitative
Gemtek Products	SC 2000 All Purpose	100	67.00	☑	Semi-quantitative
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	5	33.00	☐	Semi-quantitative
Gemtek Products	SC Bathroom Cleaner	100	67.00	☑	Semi-quantitative
Gemtek Products	SC Bathroom Cleaner	11.1	25.00	☐	Semi-quantitative
Gemtek Products	SC Floor & Tile Cleaner	100	8.00	☐	Semi-quantitative
Gemtek Products	SC Multisurface Cleaner	100	42.00	☐	Semi-quantitative
Gemtek Products	SC Toilet Bowl Cleaner	100	50.00	☑	Semi-quantitative
Gemtek Products	SC Toilet Bowl Cleaner	25	42.00	☐	Semi-quantitative
Gemtek Products	SC Tub & Tile Cleaner	100	42.00	☐	Semi-quantitative
Gemtek Products	SC Tub & Tile Cleaner	11.1	50.00	☑	Semi-quantitative
Globalbiobased Asia	All Purpose 102	2	50.00	☑	Semi-quantitative
Orison Marketing	EZ Safe Solutions Cleaner Concentrate	20	42.00	☐	Semi-quantitative
Orison Marketing	VPW SC 1000	6.7	33.00	☐	Semi-quantitative
PureTech International	Botanical Gold	33	50.00	☑	Semi-quantitative
Rochester Midland Corporation	EnviroCare Low Foam All Purpose	0.8	25.00	☐	Semi-quantitative
Rochester Midland Corporation	EnviroCare Low Foam All Purpose	2.3	25.00	☐	Semi-quantitative
Rochester Midland Corporation	EnviroCare Neutral Disinfectant	1.6	25.00	☐	Semi-quantitative
Rochester Midland Corporation	EnviroCare Tough Job	6.2	50.00	☑	Semi-quantitative
Rochester Midland Corporation	EnviroCare Tough Job	12.5	50.00	☑	Semi-quantitative
Rochester Midland Corporation	Washroom Cleaner	12.5	50.00	☑	Semi-quantitative
Rochester Midland Corporation	All Purpose Cleaner	100	25.00	☐	Semi-quantitative
Rochester Midland Corporation	All Purpose Cleaner	1.2	25.00	☐	Semi-quantitative
Rochester Midland Corporation	All Purpose Cleaner	1.6	42.00	☐	Semi-quantitative
Rochester Midland Corporation	All Purpose Cleaner	12.5	25.00	☐	Semi-quantitative
SoySafe	Basin, Tub and Tile cleaner	100	42.00	☐	Semi-quantitative
SoySafe	Basin, Tub and Tile cleaner	50	33.00	☐	Semi-quantitative
SoySafe	Spray & Wipe	100	67.00	☑	Semi-quantitative

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Spartan Chemical Company	BioRenewables - 100% Industrial Degreaser	100	50.00	☑	Semi-quantitative
Spartan Chemical Company	BioRenewables - 100% Industrial Degreaser	10	33.00	☐	Semi-quantitative
Spartan Chemical Company	Soy Strong	100	50.00	☑	Semi-quantitative
Spartan Chemical Company	Tribase Multipurpose Cleaner	0.8	42.00	☐	Semi-quantitative
Spartan Chemical Company	Tribase Multipurpose Cleaner	1.6	50.00	☑	Semi-quantitative
Spartan Chemical Company	Tribase Multipurpose Cleaner	2	67.00	☑	Semi-quantitative
Spartan Chemical Company	Tribase Multipurpose Cleaner	6.25	33.00	☐	Semi-quantitative

Conclusion: With a high number of moderately successful products in the laboratory setting, products were selected for piloting based on the average value and whether or not there were multiple products available from a particular vendor.