CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2010
DateRun:	06/20/2010
Experimenters:	Jason Marshall, Timothy Weil
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Ceramics, Plastic
PartType:	Coupon
Contaminants:	Greases, Oil, Hucker's Soil, Food
Cleaning Methods:	Manual Wipe
Analytical Methods:	Gravimetric
Purpose:	To evaluate the supplied solvents for all purpose cleaning.
Experimental Procedure:	The two supplied solvent were used at full strength and at a 50:50 mix with each other. Solvents were compared with Dowanol DPM - dipropylene glycol methyl ether. Preweighed ceramic, plastic G-10 and painted steel coupons were coated with Hucker's Soil Formulation (Jiffy 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 handheld 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 Kimberly-Clark Wypal 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. A second soil consisting of DCC 17 soil (Mix lard, vegetable oil, vegetable shortening and carbon black) was applied to the same coupon types and cleaned in the same manner as the Hucker's soil.
Results:	During cleaning trials, the ceramic coupons were noted that the weights being recorded did not match the visual observations. Some of the calculated efficiencies were in excess of 100% when the coupons were still visible dirty. Likewise, some coupons that had more than half the soil removed resulted in less than 50% calculated efficiency. The plastic coupons showed more consistent results. The table lists the amount of soil added, the amount removed and the cleaning efficiency for each coupon cleaned.

Cleaner	Initial wt	Final wt	% Removed
SG21000D-ceramic-soil 1			
	0.2876	-0.0205	107.13
	0.7628	0.2632	65.50
	2.6844	1.3035	51.44
SG22002D-ceramic-soil 1			
	2.4305	0.7559	68.90
	0.3426	0.0483	85.90
	1.1151	0.3936	64.70
50/50- ceramic-soil 1			
	0.4683	0.0913	80.50
	2.5607	1.0807	57.80
	0.1353	-0.0869	164.23
DBM- ceramic-soil 1			
	0.0579	-0.3403	687.74
	0.4850	0.3260	32.78
	2.6159	1.1020	57.87
SG21000D- soil1 plastic			
	0.6037	0.1318	78.17

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	0.2053	0.1476	28.11
	0.1733	0.1129	34.85
SG22002D- soil1 plastic			
	0.3084	0.0479	84.47
	0.2170	0.0318	85.35
	0.4671	0.0475	89.83
50/50- soil1 plastic			
	0.2352	0.0356	84.86
	0.2054	0.0422	79.45
	0.1530	0.0257	83.20
DBM- soil1 plastic			
	0.4949	0.0403	91.86
	0.3485	0.0381	89.07
	0.2706	0.0497	81.63
SG21000D- soil 2 ceramic			
	2.2324	0.4703	78.93
	1.2771	0.5026	60.65
	2.3888	0.7591	68.22
SG22002D- soil 2 ceramic			
	1.4913	0.4298	71.18
	1.3822	0.2189	84.16
	0.6064	0.0791	86.96
50/50- soil 2 ceramic			
	0.9010	-0.0383	104.25
	1.3457	0.3286	75.58
	0.8817	0.2331	73.56
DBM-soil 2 ceramic			
	1.5586	0.5899	62.15
	1.0532	0.3194	69.67
	2.5796	0.8665	66.41
SG21000D- soil 2 plastic			
	0.7165	0.1630	77.25
	0.4241	0.1761	58.48
	0.9887	0.1921	80.57
SG22002D- soil 2 plastic			
	0.5383	0.1779	66.95
	0.3018	0.1579	47.68
	0.7670	0.0439	94.27
50/50- plastic-soil 2			
	0.5767	0.0493	91.45
	0.6125	0.0463	92.44
	0.4419	0.0691	84.36
DBM- plastic-soil 2			
	0.3528	0.0663	81.21
	0.4981	0.0529	89.38
	0.7739	0.0681	91.20

Summary

	Overall average	Plastic	without Ceramic-huckers	DCC Grease	Hucker's
SG21000D	65.77	59.57	62.80	70.68	60.87
SG22002D	77.53	78.09	78.98	75.20	79.86

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50/50	89.31	85.96	85.46	86.94	91.67
DBM	125.08	87.39	80.29	76.67	173.49

Summary:

Substrates:	Ceramics, Plastic				
Contaminants:	Greases, Oil, Hucker's Soil, Food				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Segetis	Segetis SG21000D	100	72.10	☐	
Segetis	Segetis SG22002D	100	69.64	☐	
Dow Chemical Company	Dowanol DPM	100	87.26	☑	
Segetis	Segetis SG21000D	50	89.42	☑	Mix with Segetis SG22000D 50:50

Conclusion:

With some inconsistent calculated efficiencies with ceramic coupons, a follow test will be conducted on porcelain coupons and stainless-steel coupons. The supplied solvents did have positive results for potential all-purpose cleaning solvents. The average removal for both soils from the plastic surface was 85% for the 50:50 mix which was about the same as the DBM comparison solvent. Typically, the 85% level is considered to be effective for the TURI Lab testing methodology.