CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2004
DateRun:	02/24/2004
Experimenters:	Jason Marshall
ClientType:	State Agency
ProjectNumber:	Project #3
Substrates:	Textile
PartType:	Coupon
Contaminants:	Dirt
Cleaning Methods:	Mechanical Agitation
Analytical Methods:	Light Meter, Photography, Visual
Purpose:	Evaluation of supplied cleaning products using minimal mechanical cleaning (Gardner Straight Line Washability Unit)
Experimental Procedure:	The procedure followed is a modified version of the Institute of Inspection Cleaning and Restoration Certification (IICRC) Standard and Reference Guide S100. Most of the layout of the testing was modeled after Appendix D, IICRC Carpet Cleaning Methods Testing Protocol. The carpet substrate used was donated by Shaw Industries and was a tufted, 36 ounce cut-pile residential carpet, light beige in color (off-white). This carpet type is specifically designated in the IICRC Appendix method. Soil selection was suggested by DuPont to be one of the American Association of Textile Chemists and Colorists (AATCC) soils. The specific soil, Synthetic Carpet Soil AATCC Method 122, was from Textile Innovators Corp. Prior to soiling, a SPER Scientific Light Meter 840021 was used to measure Foot Candles from the surface of the carpet. Each carpet was marked off into 6 sections measuring 3.5" wide and 6" long. Six readings were made in each grid area. (The carpeting was not cut into individual pieces as it would become difficult to soil and clean the smaller carpeting sections.) Soiling of the carpet needed to be modified from the specified method in the IICRC S100. The lab replaced the Zytel Type 6,6 nylon pellets with Nalgene Tubing cut into 1/8" pieces. The lab also did not use the milling stones. Carpeting was cut into 7.375" x 19.6" pieces (144.54 sq in.) According to the standard there should be around 1000 grams pellets per 12 grams soil. With this ratio, the lab needed 83 grams of the tubing per gram of soil. S100 also suggests using 500 g pellet per soil mix for a piece of carpeting with dimensions of 10.375" x 39.375" (408.5 sq in). This works out to 1.22 g pellets per sq. in. carpet (500/408.5 = 1.22). Therefore, with the lab using 174 grams of tubing, 2 grams of soil needed to be added to contaminate the soil. The carpet pieces were soiled by placing one piece of carpet into a 1 gallon can, making sure the carpet lined the inner wall of the can. The plastic tubing pieces were poured into the bucket and the soil was distributed along the width of the can. The lid of the can was placed onto the can and placed into the harness attached to a crank shaft. The crank was turned at an average rate of 42 rpm by hand for 5 minutes in one direction, and then for 5 minutes in the reverse direction. At the end of the 10 minute soiling routine, the carpet was placed onto a carpet template and vacuumed with a Eureka SuperBroom Brush Up Motor Driven Brush Roll Vacuum for 3 strokes in the forward direction and then 3 strokes in the backward direction. The carpet pieces were then evaluated again for foot candles. Carpet sections were then cut down the middle, length wise to allow carper samples to fit into the Gardner Straight Line Washability Unit (GSLWU). Each piece was marked off into three sections. Each section was sprayed 15 times with a cleaning product and allowed to soak for 30 seconds. A Professional Painter's Rag was attached to the GSLWU cleaning sled. The rag was also sprayed with the same cleaning product until the rag was saturated (usually about 15 sprays). After the soaking was done, the rag/sled was placed on one end of the carpet section and the GSLWU was turned on and run for 91 cycles or about 2.5 minutes. Every 30 cycles, each section of carpet was sprayed 6 times with the cleaning solution. At the end of the cleaning, the carpet piece was removed from the cleaning unit and allowed to dry overnight. Final light meter readings were made on each section. Initial light meter readings were used as the benchmark for cleanliness. The average dirty readings were subtracted from the average initial readings to determine how soiled the carpet pieces were. The average dirty readings were subtracted from the average final readings then divided by the average initial readings to determine how clean the carpet pieces became after cleaning. Each product tested was then ranked from best to worst with the other products. In addition to the light meter readings, visual observations were made by two members of the laboratory staff. Products were ranked from cleanest to dirtiest by each staff member and then ranked by both staff

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members in a joint effort to ensure consistent methodology was being utilized. All three visual rankings were then compared with the rankings obtained from the light meter readings.

Results:

Using the cleaning time of 2.5 minutes and a soak time of 30 seconds resulted in marginal soil removal. The light meter readings revealed that the cleaned carpet samples were at best 27% (H2Orange2 Concentrate) of the original readings (before soiling). However, the products could still be compared to each other to see which product worked the best under these conditions. The table lists the average light readings for each section of each carpet piece initially, after soiling and after cleaning. Values for the drop in Foot Candles (from the light meter) are listed as well as the amount of Foot Candles the carpet samples were raised after cleaning. The product averages were calculated by the comparing the drop and jump to the initial light readings.

Cleaner	Carpet Section	Location	Initial Readings	Dirty Readings	Cleaned Readings	Drop	Jump	% of Total	Product Average
H2Orange2 #117	1	A-Ave	9.10	4.75	5.74	4.35	0.99	22.70	14.47
		B-Ave	9.79	3.94	4.47	5.86	0.53	9.11	
		C-Ave	9.00	3.71	4.32	5.29	0.61	11.62	
Grout Safe		D-Ave	10.63	4.74	4.99	5.89	0.25	4.30	6.45
		E-Ave	10.34	3.30	4.01	7.04	0.71	10.02	
		F-Ave	10.01	3.00	3.35	7.01	0.35	5.02	
Carpet Extraction	2	A-Ave	10.38	4.65	5.00	5.73	0.35	6.10	10.78
		B-Ave	10.34	3.62	4.62	6.73	1.00	14.92	
		C-Ave	9.02	4.02	4.58	5.01	0.57	11.32	
Traffic Lane Cleaner		D-Ave	10.92	4.99	5.52	5.93	0.53	8.99	12.85
		E-Ave	10.34	3.37	4.63	6.96	1.26	18.05	
		F-Ave	10.01	3.82	4.54	6.19	0.71	11.51	
Carpet Cleaner (Extractor)	3	A-Ave	10.77	4.89	5.54	5.88	0.65	11.11	13.55
		B-Ave	10.55	3.36	4.20	7.19	0.84	11.64	
		C-Ave	8.76	2.33	3.48	6.43	1.15	17.89	
Carpet Cleaner (Pad Cleaning)		D-Ave	12.14	5.18	6.54	6.96	1.36	19.47	17.01
		E-Ave	11.12	4.78	5.61	6.34	0.82	12.99	
		F-Ave	10.41	2.61	4.06	7.80	1.45	18.56	
Carpet Cleaner (Pre-Spray)	4	A-Ave	10.85	3.68	5.36	7.16	1.67	23.34	24.39
		B-Ave	10.47	3.85	5.46	6.62	1.60	24.20	
		C-Ave	9.22	3.02	4.61	6.20	1.59	25.62	
PC 112 Carpet		D-Ave	11.77	3.78	4.76	8.00	0.99	12.32	14.31
		E-Ave	11.14	3.47	4.81	7.67	1.34	17.49	
		F-Ave	9.76	3.02	3.90	6.74	0.88	13.10	
H2O2 Concentrate	5	A-Ave	11.09	4.58	6.32	6.51	1.74	26.74	27.32
		B-Ave	10.10	3.33	5.23	6.77	1.90	28.05	
		C-Ave	8.97	3.23	4.79	5.75	1.56	27.18	
Super H2O2 Citrus Concentrate		D-Ave	12.24	4.66	5.64	7.58	0.97	12.83	13.52
		E-Ave	10.98	2.81	4.05	8.17	1.23	15.10	
		F-Ave	9.43	2.66	3.51	6.77	0.86	12.63	

In addition to the light readings, the two lab staff members individually ranked the carpets visual from cleanest to dirtiest. Then the two members jointly ranked the carpet. The table below lists the rankings for each staff member as well as the joint ranking. In addition, the ranking for each carpet cleaner from the light reading results is included.

Product	Staff 1	Staff 2	Joint	Light
H2Orange2 #117	7	10	10	4

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Grout Safe	6	9	9	10
Carpet Extraction	2	5	5	9
Traffic Lane Cleaner	5	6	6	8
Carpet Cleaner (Extractor)	8	7	8	6
Carpet Cleaner (Pad Cleaning)	3	4	3	3
Carpet Cleaner (Pre-Spray)	4	2	2	2
PC 112 Carpet	10	8	7	5
H2O2 Concentrate	1	1	1	1
Super H2O2 Citrus Concentrate	9	3	4	7

Summary:

Substrates:	Textile
Contaminants:	Dirt

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
EnvirOx LLC	H2Orange2	1	4.00	☑	Light Rank; Dilution Factor: 128
EnvirOx LLC	Grout Safe	1	10.00	☐	Light Rank; Dilution Factor: 128
The Clean Environment Co	Carpet Extraction	1	9.00	☐	Light Rank; Dilution Factor: 128
The Clean Environment Co	Traffic Lane Cleaner	100	8.00	☐	Light Rank; Dilution Factor: 0
Cogent Environmental Solutions	Carpet Cleaner (Extractor)	0	6.00	☐	Light Rank; Dilution Factor: 384
Cogent Environmental Solutions	Carpet Cleaner (Pad Cleaning)	2	3.00	☑	Light Rank; Dilution Factor: 64
Cogent Environmental Solutions	Carpet Cleaner (Pre-Spray)	5	2.00	☑	Light Rank; Dilution Factor: 20
Next-Gen Supply Group	PC 112 Carpet	0	5.00	☑	Light Rank; Dilution Factor: 512
Cleanline Products	H2O2 Super Citrus Concentrate	8	7.00	☐	Light Rank; Dilution Factor: 12.5
Cleanline Products	H2O2 Super Citrus Concentrate	4	1.00	☑	Light Rank; Dilution Factor: 25

Conclusion:

All of the products showed signs of removing the soil from the carpet samples within the 2.5 minutes and 30 second soak time. The H202 Concentrate was found to be the most effective cleaner under these conditions by all four rankings. A follow up test will evaluate a longer cleaning time of 5 minutes.