CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2005

DateRun: 08/03/2005

Experimenters: Jason Marshall

ClientType: Cleaner Manufacturer

ProjectNumber: Project #1

Substrates: Marble

PartType: Coupon

Contaminants: Calcium/lime

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric, Photography, Visual

Purpose: To evaluate effect on marble substrate through overnight immersion.

Experimental Procedure: Several marble chips of similar size and shape were weighed to determine the baseline weight of each piece. The selected chips were then immersed in the two supplied products at full strength as well as a tap water bath and allowed to sit overnight. After soaking at room temperature for 18 hours, the marble chips were removed from the products and rinsed in a tap water spray at 120 F for 3 minutes to remove loose material from the chips. Then the chips were dried for 15 minutes using a Master Appliance Heat gun at 300 F. When the chips cooled to room temperature, final weights were recorded to determine weight loss, if any. Parts were then allowed to air dry for 72 hours and weighed again to determine if all the moisture had been removed from the chips. Observations were made and photographs were taken after the initial immersion of the chips into solutions (5 minutes), at 60 minutes and then following the overnight immersion.

Results: From visual observations the two supplied solutions appeared to effect the marble chips. During the soak, the two supplied solutions started to bubble. This bubbling was more vigorous after 60 minutes of soaking. The solutions overflowed the beaker overnight. Both solutions shifted from being transparent to opaque overnight. The water beaker had no signs of interacting with the marble. The photos of the beakers show the status at 5 minutes, 60 minutes and 18 hours. In addition to the beakers, there are photographs showing the baseline marble chips, the 18 hour soaks for DFC 23, DFC 30 and water. Both DFC 23 and DFC 30 resulted in more than 5% loss in weight after soaking. The water had an average loss of 0.06%. The extended drying time of 72 hours did not change the final weights of the marble chips. The table lists the initial weight, final weight and weight change for each marble chip soaked.

Product	Initial wt	Final wt	% Wt loss
DFC 23	22.5369	20.7137	8.09
	30.6078	28.7485	6.07
	22.7806	21.6803	4.83
	29.4623	27.5022	6.65
DFC 30	23.8107	22.2973	6.36
	17.6874	16.6576	5.82
	30.6460	29.3322	4.29
	32.8858	31.2474	4.98
Water	16.5910	16.5813	0.06
	17.0030	16.9947	0.05
	12.3762	12.3675	0.07
	16.0933	16.0808	0.08

Summary:

Substrates:	Marble				
Contaminants:	Calcium/lime				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Cogent Environmental Solutions	DFC 23	100	6.41	☑	Average weight loss
Cogent Environmental Solutions	DFC 30	100	5.36	☑	Average weight loss
Water	Water	100	0.06	☐	Average weight loss

Conclusion: The two DFC products decreased the weight of the marble chips by more than 5%, indicating dissolving of the calcium in the marble.