CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2017
DateRun:	12/03/2017
Experimenters:	George Liang, Carla De La Cruz, Vinh Tran, Hayley Byra, Aaron Wilson
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Liquid
PartType:	Coupon
Contaminants:	Odor
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Smell
Purpose:	To evaluate supplied products for malodor elimination

Experimental Procedure:

Clean carpet was cut into twenty-one 2 in x 4 in rectangular strips. These strips were placed into glass bottles and the cat urine was directly applied to the carpet. The cat urine was aged for 2 days to determine the baseline dirty odor characteristics. A panel of four people examined the odors to determine the baseline values using 22 bottles, including a control.

Each panelist was asked to describe the aged cat urine odor carpets and to rank the level of intensity of the malodor; from 1 being no malodor to 5 being high malodor levels. Afterwards, each bottle was subjected to rounds of cleaning agent treatment, one treatment cycle consists of 2 sprays and each panelist was used to assess malodor levels after each cycle of treatment. One of the seven cleaners were each assigned to a set of three carpet strips out of the twenty-one carpet strips total. Treatments of contaminated bottles are stopped after three treatment cycles. The bottles were then allowed to age overnight. Following the overnight sit, panelists were asked to determine the bottles' malodor ratings to obtain an increase in malodor baseline from the day after it was treated. The bottles were subject to one last treatment cycle before the final set of malodor ratings were performed. An effective cleaner will have a malodor level of under 2 after the 3rd round of treatment.

Results:

Table 1.0

(Results: Table pertaining to the initial 2 days' overnight sit to age the cat urine in the bottles.)

Cleaner	Aquavert Pet Stain & Odor				Average	Overall Avg.
Treatment:	Untreated					
Bottle 1	3.5	3.0	4.0	4.0	3.6	3.3
Bottle 2	3.5	2.5	3.0	3.0	3.0	
Bottle 3	2.5	4.0	4.0	3.0	3.4	
Treatment:	1 treatment cycle (2 Sprays)				Average	Overall Avg.
Bottle 1	1.5	3.0	2.0	1.5	2.0	2.2
Bottle 2	1.5	3.0	1.5	2.0	2.0	
Bottle 3	1.5	3.0	4.0	1.5	2.5	
Treatment:	2 treatment cycle (4 Sprays)				Average	Overall Avg.
Bottle 1	1.5	2.5	3.0	3.0	2.5	2.0
Bottle 2	2.0	2.0	1.5	3.0	2.1	
Bottle 3	1.0	2.5	3.5	2.0	1.5	
Treatment:	3 treatment cycle (6 Sprays)				Average	Overall Avg.
Bottle 1	3.0	2.5	2.0	4.0	2.9	3.0*
Bottle 2	3.5	3.0	3.0	3.0	3.1	
Bottle 3	4.5	4.5	2.0	1.0	2.0	

* This result was omitted from the data analysis as an outlier to the norm of the data. However, noted from the panelist there may be an increase in malodor level after a third treatment; the malodor may not be risen from the cat urine, but due to irritation of the cleaning agent odor.

Table 1.1

CLEANING LABORATORY EVALUATION SUMMARY

(Results Continued: Table pertaining to the initial 2 days' overnight sit to age the cat urine in the bottles.)						
Cleaner	Aquavert Multi-Purpose				Average	Overall Avg.
Treatment:	Untreated					
Bottle 1	3.5	3.0	3.5	5.0	3.8	3.6
Bottle 2	3.0	4.5	3.5	4.0	3.8	
Bottle 3	3.0	2.0	4.5	3.5	3.3	
Treatment:	1 treatment cycle (2 Sprays)				Average	Overall Avg.
Bottle 1	2.5	2.5	1.0	3.5	2.4	2.5
Bottle 2	1.4	2.5	2.0	4.0	2.5	
Bottle 3	1.5	3.0	3.0	2.5	2.5	
Treatment:	2 treatment cycle (4 Sprays)				Average	Overall Avg.
Bottle 1	4.0	4.0	2.0	2.5	3.1	2.8
Bottle 2	3.0	3.5	1.5	3.5	2.9	
Bottle 3	2.5	1.5	3.0	2.5	2.4	
Treatment:	3 treatment cycle (6 Sprays)				Average	Overall Avg.
Bottle 1	4.0	3.5	3.0	3.0	3.4	3.0
Bottle 2	3.5	2.0	2.0	4.0	2.9	
Bottle 3	2.5	4.0	2.0	2.5	2.8	
Cleaner	Nature's Miracle Stain and Odor				Average	Overall Avg.
Treatment:	Untreated					
Bottle 1	2.0	3.5	3.5	5.0	3.5	3.6
Bottle 2	3.5	5.0	4.0	4.0	4.1	
Bottle 3	2.0	4.0	2.5	4.5	3.3	
Treatment:	1 treatment cycle (2 Sprays)				Average	Overall Avg.
Bottle 1	1.0	1.0	3.0	1.0	1.5	1.5
Bottle 2	1.0	1.0	2.0	1.0	1.3	
Bottle 3	1.0	1.5	2.5	2.5	1.9	
Treatment:	2 treatment cycle (4 Sprays)				Average	Overall Avg.
Bottle 1	1.0	1.5	4.0	3.0	2.4	2.0
Bottle 2	1.0	1.5	3.5	2.5	2.1	
Bottle 3	1.0	2.0	1.5	1.5	1.5	
Treatment:	3 treatment cycle (6 Sprays)				Average	Overall Avg.
Bottle 1	1.0	1.0	1.0	1.0	1.0	1.5
Bottle 2	1.5	1.5	3.0	2.0	2.0	
Bottle 3	1.5	1.5	2.0	1.5	1.6	
Cleaner	Shout Corp. Oxy and Odor				Average	Overall Avg.
Treatment:	Untreated					
Bottle 1	4.0	4.0	5.0	3.0	4.0	3.8
Bottle 2	3.5	3.5	5.0	3.0	3.8	
Bottle 3	3.0	4.0	4.0	3.0	3.5	
Treatment:	1 treatment cycle (2 Sprays)				Average	Overall Avg.
Bottle 1	1.5	2.0	2.0	1.5	1.8	1.8
Bottle 2	1.0	1.5	1.5	1.5	1.4	
Bottle 3	1.5	3.5	2.0	2.5	2.4	
Treatment:	2 treatment cycle (4 Sprays)				Average	Overall Avg.
Bottle 1	1.0	1.5	4.0	3.0	2.4	2.0
Bottle 2	1.0	1.5	3.5	2.5	2.1	

CLEANING LABORATORY EVALUATION SUMMARY

Bottle 3	1.0	1.5	2.5	1.5	1.6	
Treatment:	3 treatment cycle (6 Sprays)				Average	Overall Avg.
Bottle 1	1.0	1.0	2.0	1.0	1.3	1.4
Bottle 2	2.5	1.0	1.5	1.0	1.5	
Bottle 3	1.5	1.0	2.0	1.5	1.5	

Table 1.2

(Results Continued: Table pertaining to the initial 2 days' overnight sit to age the cat urine in the bottles.)						
Cleaner	Resolve Pet Expert				Average	Overall Avg.
Treatment:	Untreated					
Bottle 1	3.5	4.0	2.5	3.0	3.3	3.3
Bottle 2	2.5	3.5	4.5	3.0	3.4	
Bottle 3	2.5	2.5	4.0	4.5	3.4	
Treatment:	1 treatment cycle (2 Sprays)				Average	Overall Avg.
Bottle 1	1.0	1.0	2.5	2.0	1.6	1.7
Bottle 2	1.0	1.0	2.0	3.5	1.9	
Bottle 3	1.5	1.5	1.0	2.0	1.5	
Treatment:	2 treatment cycle (4 Sprays)				Average	Overall Avg.
Bottle 1	3.5	1.5	3.5	1.0	2.4	2.0
Bottle 2	3.0	1.5	3.0	1.0	2.1	
Bottle 3	2.0	1.0	2.0	1.0	1.5	
Treatment:	3 treatment cycle (6 Sprays)				Average	Overall Avg.
Bottle 1	2.0	1.0	1.0	1.0	1.3	1.5
Bottle 2	2.0	1.0	1.5	1.0	1.4	
Bottle 3	2.5	1.0	2.0	2.5	2.0	
Cleaner	Out Advanced Severe Stain				Average	Overall Avg.
Treatment:	Untreated					
Bottle 1	3.0	1.5	3.0	4.0	2.9	3.4
Bottle 2	3.5	4.5	4.5	3.5	4.0	
Bottle 3	1.5	4.0	3.5	4.0	3.3	
Treatment:	1 treatment cycle (2 Sprays)				Average	Overall Avg.
Bottle 1	1.0	1.5	2.0	1.5	1.5	2.4
Bottle 2	2.0	1.0	3.5	5.0	2.9	
Bottle 3	1.5	1.5	5.0	3.5	2.9	
Treatment:	2 treatment cycle (4 Sprays)				Average	Overall Avg.
Bottle 1	2.5	3.5	2.5	1.0	2.4	3.3
Bottle 2	4.5	5.0	4.0	3.0	4.1	
Bottle 3	3.5	3.0	4.5	3.0	3.5	
Treatment:	3 treatment cycle (6 Sprays)				Average	Overall Avg.
Bottle 1	1.5	1.5	3.0	1.0	1.8	2.5
Bottle 2	3.5	3.5	3.5	2.5	3.3	
Bottle 3	2.5	3.0	3.0	2.0	2.6	
Cleaner	Nature's Miracle Advanced Stain and Odor Eliminator				Average	Overall Avg.
Treatment:	Untreated					
Bottle 1	2.5	3.0	3.0	4.0	3.1	3.5
Bottle 2	3.0	3.5	4.0	4.5	3.8	

CLEANING LABORATORY EVALUATION SUMMARY

Bottle 3	3.5	4.0	5.0	2.0	3.6	
Treatment:	1 treatment cycle (2 Sprays)				Average	Overall Avg.
Bottle 1	1.0	2.0	2.0	1.0	1.5	1.8
Bottle 2	1.0	2.0	4.0	1.0	2	
Bottle 3	1.0	1.5	3.0	1.5	1.8	
Treatment:	2 treatment cycle (4 Sprays)				Average	Overall Avg.
Bottle 1	2.0	3.0	1.0	1.0	1.8	1.7
Bottle 2	1.0	1.0	1.5	2.5	1.5	
Bottle 3	2.0	2.5	2.0	1.0	1.9	
Treatment:	3 treatment cycle (6 Sprays)				Average	Overall Avg.
Bottle 1	3.5	2.5	2.0	1.0	2.3	2.1
Bottle 2	1.0	1.0	1.5	2.5	1.5	
Bottle 3	3.5	3.5	2.0	1.0	2.5	

Summary Table

Cleaner	Untreated Malodor Rating	Treatment (Cycle)	Avg. Treatment Rating
Aquavert Pet Stain & Odor	3.3	2	2.0
Aquavert Multi-Purpose	3.6	3	3.0
Nature's Miracle Stain and Odor	3.6	1	1.5
Shout Corp. Oxy and Odor	3.8	1	1.8
Resolve Pet Expert	3.3	1	1.7
Out Advanced Severe Stain	3.4	3	2.5
Nature's Miracle Advanced Stain and Odor Eliminator	3.5	3	1.8

From the panel of four, the initial untreated malodor level for the stained carpets are starting at the same malodor level; with minimal difference in untreated malodor ratings going from a range of 3.3 to 3.8. The malodor rating is rated from 1 being no malodor level to 5 being high malodor levels. An effective cleaner is based on its ability to remove malodor after being treated, typically a malodor rating of 2 and under is considered effective. Therefore, the most effective cleaning agent in removing cat urine from the carpets are Nature’s Miracle Stain & Odor, Shout Corp. Oxy and Odor, Resolve Pet Expert, because it required only one treatment cycle to bring the malodor ratings below a two. Subsequently, Aquavert Pet Stain & Odor was observed to require only two treatment cycles. However, noted from the panelist there may be an increase in malodor level after a third treatment as shown in the Results Table 1.0; the malodor may not be risen from the cat urine, but due to irritation of the cleaning agent odor. Furthermore, Nature’s Miracle Advanced Stain and Odor Eliminator was able to eliminate the malodor after three treatment cycles of the cleaning agent. However, Aquavert Multi-Purpose, and Out Advanced Severe Stain were not as effective in removing the malodor levels as compared to the other cleaning agents.

Overnight Results:

Table 2.0

(Overnight Results: Results obtained after letting the treated bottles sit overnight.)			
Cleaner	Aquavert Pet Stain & Odor	Average	Overall Avg.

CLEANING LABORATORY EVALUATION SUMMARY

Treatment:	Overnight Untreated						
Bottle 1	3.0	3.5	3.0	3.5	4.0	3.4	3.4
Bottle 2	3.5	3.5	2.0	3.0	5.0	3.4	
Bottle 3	3.5	4.0	3.0	3.0	3.0	3.3	
Treatment:	Overnight 1 Treatment Cycle (2 Sprays)					Average	Overall Avg.
Bottle 1	3	4.0	3.0	2	3.0	3	2.9
Bottle 2	2.5	4.5	3	3.5	2.0	3.1	
Bottle 3	3.0	4.0	1.5	3.0	2.0	2.7	
Cleaner	Aquavert Multi-Purpose					Average	Overall Avg.
Treatment:	Overnight Untreated						
Bottle 1	3.0	4.0	3.0	2.0	4.0	3.2	3.3
Bottle 2	2.5	4.5	3.0	3.5	5.0	3.7	
Bottle 3	3.0	4.0	1.5	3.0	3.0	2.9	
Treatment:	Overnight 1 Treatment Cycle (2 Sprays)					Average	Overall Avg.
Bottle 1	5	3.0	1.5	2.5	3.0	3	3.1
Bottle 2	3.5	3.5	2.5	4.5	2.0	3.2	
Bottle 3	3.5	4.0	2.5	4.0	2.0	3.2	
Cleaner	Nature's Miracle Stain and Odor					Average	Overall Avg.
Treatment:	Overnight Untreated						
Bottle 1	3.5	1.5	1.5	1.0	4.0	2.3	2.1
Bottle 2	2.5	1.0	1.5	1.0	5.0	2.2	
Bottle 3	1.5	1.5	2.0	1.5	3.0	1.9	
Treatment:	Overnight 1 Treatment Cycle (2 Sprays)					Average	Overall Avg.
Bottle 1	2	1.0	2.5	2	3.0	2.1	1.7
Bottle 2	1	1.0	2	1.0	2.0	1.4	
Bottle 3	2.0	1.0	1.5	1.0	2.0	1.5	

Table 2.1

(Overnight Results Continued: Results obtained after letting the treated bottles sit overnight.)							
Cleaner	Shout Corp. Oxy and Odor					Average	Overall Avg.
Treatment:	Overnight Untreated						
Bottle 1	3.0	1.5	4.2	1.5	4.0	2.8	2.3
Bottle 2	2.0	1.0	2.0	1.0	5.0	2.2	
Bottle 3	2.0	1.0	2.0	1.5	3.0	1.9	
Treatment:	Overnight 1 Treatment Cycle (2 Sprays)					Average	Overall Avg.
Bottle 1	2	2.5	3.0	2.5	3.0	2.6	2.1
Bottle 2	3.5	1.0	1.5	1.0	2.0	1.8	
Bottle 3	3.0	1.0	3.0	1.0	2.0	2	
Cleaner	Resolve Pet Expert					Average	Overall Avg.
Treatment:	Overnight Untreated						
Bottle 1	3.5	1.5	2.0	1.0	4.0	2.4	3.1
Bottle 2	5.0	2.5	3.0	3.5	5.0	3.8	
Bottle 3	4.0	4.0	2.0	2.5	3.0	3.1	
Treatment:	Overnight 1 Treatment Cycle (2 Sprays)					Average	Overall Avg.

CLEANING LABORATORY EVALUATION SUMMARY

Bottle 1	4	2.0	3.5	3	3.0	3.1	2.9
Bottle 2	4	3.5	3.5	1.5	2.0	2.9	
Bottle 3	3.5	2.0	2.5	3.5	2.0	2.7	
Cleaner	Out Advanced Severe Stain					Average	Overall Avg.
Treatment:	Overnight Untreated						
Bottle 1	2.0	2.5	1.0	2.5	4.0	2.4	2.6
Bottle 2	3.0	2.5	1.5	1.0	5.0	2.6	
Bottle 3	3.5	4.0	1.0	3.0	3.0	2.9	
Treatment:	Overnight 1 Treatment Cycle (2 Sprays)					Average	Overall Avg.
Bottle 1	1.5	2.5	1.0	4	3.0	2.4	2.2
Bottle 2	3.5	2.5	1.5	1.5	2.0	2.2	
Bottle 3	2.0	2.5	1.5	2.5	2.0	2.1	
Cleaner	Nature's Miracle Advanced Stain and Odor Eliminator					Average	Overall Avg.
Treatment:	Overnight Untreated						
Bottle 1	3.0	3.5	2.0	3.0	4.0	3.1	2.8
Bottle 2	3.0	2.0	1.5	2.5	5.0	2.8	
Bottle 3	3.5	2.5	1.0	2.5	3.0	2.5	
Treatment:	Overnight 1 Treatment Cycle (2 Sprays)					Average	Overall Avg.
Bottle 1	3	4.0	2.0	3.5	3.0	3.1	2.3
Bottle 2	1.5	1.0	1.5	2.5	2.0	1.7	
Bottle 3	2.0	3.0	1.0	2.5	2.0	2.1	

Overnight Summary Table

Cleaner	Avg. Malodor Rating Before Overnight Sit	Overnight Sit Untreated Avg.	After Overnight Treatment Malodor Avg.
Aquavert Pet Stain & Odor	2.0	3.4	2.9
Aquavert Multi-Purpose	3.0	3.3	3.1
Nature's Miracle Stain and Odor	1.5	2.1	1.7
Shout Corp. Oxy and Odor	1.4	2.3	2.1
Resolve Pet Expert	1.5	3.1	2.9
Out Advanced Severe Stain	2.5	2.6	2.2
Nature's Miracle Advanced Stain and Odor Eliminator	2.1	2.8	2.3

CLEANING LABORATORY EVALUATION SUMMARY

In general, following the overnight sit the average malodor rating for all of the bottles were heightened. The difference between the average malodor ratings before the overnight sit and the average malodor ratings following the overnight sit ranged from a 0.1 increase to an increase of 1.6. In terms of malodor increase from the overnight sit the cleaner that displayed the most malodor increase was the Resolve Pet Expert with a 1.6 malodor increase, Aquavert Pet Stain & Odor with a 1.4 increase, Shout Corp. Oxy and Odor with a 0.9 increase, Nature's Miracle Advanced Stain and Odor Eliminator with a 0.7 increase, Nature's Miracle Stain and Odor with a 0.6 increase, Aquavert Multi-Purpose with a 0.3 increase, and finally Out Advanced Severe Stain with an increase of 0.1. This means that the Out Advanced Severe Stain cleaning agent had the least potential to have an increased malodor rating following an overnight sit. Furthermore, following the treatment cycle conducted after the overnight sit, all of the bottles exhibited a lower average malodor rating from before. The difference between the untreated average and the overnight treatment ranged from 0.2 to 0.5. However, because a malodor value of 2 after the overnight treatment cycle is seen as effective that means that the only effective odor neutralizer is the Nature's Miracle Stain and Odor with an average malodor rating of 1.7. The rest of the cleaning agents were ineffective at removing the malodor from the bottles.

Summary:

Substrates:	Liquid				
Contaminants:	Odor				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Aquavert Clean Co.	Aquavert Pet Stain & Odor	100	0.00	☑	
Aquavert Clean Co.	Aquavert Multi Purpose Sanitizer	100	0.00	☐	
Nature's Miracle	Nature's Miracle Stain & Odor Remover	100	0.00	☑	
SC Johnson & Son Inc	Shout Carpet Oxy - Stain & odor remover	100	0.00	☑	
Reckitt Benckiser	Resolve Pet Expert Carpet Stain Remover	100	0.00	☑	
OUT! Pet Care	Out! Advanced Severe Stain & Odor Remover	100	0.00	☑	
Nature's Miracle	Advanced Stain & Odor Eliminator	100	0.00	☑	

Conclusion:

The most effective cleaning agent was the Nature's Miracle Stain & Odor, followed by the Shout Corp. Oxy and Odor, Out Advanced Severe Stain, Nature's Miracle Advanced Stain and Odor Eliminator, Resolve Pet Expert, Aquavert Pet Stain & Odor, and Aquavert Multi-Purpose.