How To Select And Use Safe Janitorial Chemicals

Completion Report Appendices

Pollution Prevention
Incentives For States

U.S. EPA Region IX
California EPA
County of Santa Clara

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Preface

This report is an account of a pilot project to evaluate pollution prevention opportunities in the janitorial industry. The project was a collaboration of many individuals, businesses, and agencies whom the authors wish to acknowledge for their valuable contribution. The project would not have been a success without their support.

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Appendices

Appendix A References

The following publications and websites are suggested as general references for learning more about the janitorial industry and the chemicals that it uses.

1. Barron, Thomas, C. Berg, and L. Bookman, Janitorial Products Pollution Prevention Project (JP4) Website, < http://www.westp2net.org/Janitorial/jp4.htm>.

2. Berry, Michael, Protecting The Built Environment: Cleaning For Health, Cleaning Management Institute, 1994. Call (518) 783-1281.

3. Bishop, Jeff, et al., More Answers Than You Have Questions About Carpet Cleaning, Volume II, Clean Care Seminars, 1997. Call (334) 983-8730.

4. Cleaning & Maintenance Email Forum, which may be subscribed to by contacting the list manager at: ELam@ntpinc.com.

5. Daugherty, Jack, Assessment of Chemical Exposures, Lewis Publishers, 1997. Call (800) 272-7737.

Appendix B Project Organization

The project team included staff from several government agencies, consultants, and industry representatives. Questions about the project and its findings may be addressed to:

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Appendix C Needs Assessment

The following questionnaire was used to interview site managers, custodians, and janitorial contractors. Not all questions were asked of every site.

Janitorial Products Survey

Thank you for taking part in this survey. It is being conducted for a project in the San Francisco area sponsored by the U.S. Environmental Protection Agency.

The purposes of the project are to learn what needs janitors have for health, safety, and environmental information, and to identify the best ways to provide the needed information.

Please respond by _____ if at all possible. Send your opinions by e-mail to tsbarron@ibm.net or FAX them to (925) 283-6746

Questions? Call (925) 283-8121

A few general questions about the janitorial work that you do:

How many buildings do you service?

What is the total building area that you maintain (Square Feet)?

How many people are employed by you as janitors/custodians?

In a typical building how often do you do the following tasks?

Vacuum / dust mop floors?	
Wet mop floors?	
Strip & refinish floors?	
Vacuum carpets?	
Wet-clean or shampoo carpets?	
Clean restrooms?	
Clean interior windows?	
Clean exterior windows?	
Clean furniture, displays, etc.?	

Next, a few questions about the janitorial products that you use:

How many different janitorial products	
How many different suppliers do you	
How many days worth of supplies do	
What vendor literature do you get	

Please circle the ways you personally learn about product safety and environmental issues?

Trade shows?
Trade magazines?
Vendors?
Professional training courses?
Technical staff person?
Technical consultants?
Internet discussions?
Other?

How important are the following for the various janitorial products that you use?	Very Important	Somewhat Important	Not Important
Low Purchase Price			
Safe To Use			
Effective			
Easy To Mix & Use			
Clearly Labeled Products			
Good Vendor Technical Support			
Good Vendor Training			
Minimize Environmental Impact			
Other Issues?			

How much of these janitorial products do you use each year?
(A rough estimate is fine if you do not have detailed information handy.)

	Estimated Amounts You Use Per Year	
	Gallons/Yr	Cost/Yr
Hard Floor Care		
Sealer		
Floor Finish		
Stripper		
Baseboard Stripper		
General Purpose Floor Cleaner		
Carpet Care		
Pre-Spotter		
Traffic Lane Cleaner		
Shampoo		
Chewing Gum Remover		
Restroom Cleaning		
Acid Bowl Cleaner		
Non-acid Bowl Cleaner		
Disinfectant Cleaner		
Metal Cleaner		
Glass Cleaner		
Spray Deodorizer		
Other Products		
Graffiti Remover		
Wood Furniture Polish		

Overall, do you think chemical dispensers save money compared to concentrated products mixed by hand?

Who do you think are the most frequent purchasers of dispensing systems - sites with employees doing janitorial work or outside janitorial contractors?

Overall, do you think dispensers are safer to use than mixing by hand?

Now we would like to ask your opinions about several health, safety, and environmental issues related to janitorial chemicals.

How aware are you personally of the following issues?	Very Aware	Somewhat Aware	Not Aware
OSHA requirements for safe chemical handling?			
Sanitary sewer discharge requirements?			
Stormwater protection requirements?			
Indoor air quality issues?			
Workers' compensation costs for janitors?			
Health issues for ingredients such as Glycol Ethers?			
Perchloroethylene?			
Alkyl Phenol Ethoxylates?			

How do you think we could best help janitors learn more about safe cleaning chemicals and practices?

	Very Useful	Somewhat Useful	Not Useful
Host Technical Workshops			
Publish Chemical Safety Fact Sheets			
Publish Safety Success Stories			
Make Training Videos			
Certify Cleaning Products			
Organize Business Mentoring Program			
Provide On-Site Assistance			
Operate a Technical Hot Line			
Promote Better Product Labels			
Provide Spanish Language Items			
Conduct Product Demos			
Provide Product Samples			
Other			

Are there any other comments that you would like to make?

Appendix D Product Use Estimates

The following tables summarize estimates made of nineteen common chemicals used by janitorial firms. These estimates are based upon the four complete and several partial surveys that the Santa Clara team conducted during the project. Partial results from other surveyed firms generally fit within the range of product use shown here.

These results are used in the calculations shown in Appendix G.

Table D1
Summary of Annual Janitorial Product Use

Firm:	1	2	3	4	Weighted Averages
Sq. Ft. Maintained:	1,000,000	800,000	4,600,000	426,000	1,706,500
Building Types:	General	Offices	University	General	
Janitors:	50	48	126	67	73
Sq.Ft./Person:	20,000	16,667	36,508	6,358	19,883
Total Quantity (gal)	1,510	1,330	2,182	1,189	1,553
Gallons/1,000 Sq. Ft.	1.51	1.66	0.47	2.79	1.61
Gallons/Person	30	28	17	18	23.2
Total Cost	$12,450	$13,350	$38,350	$10,721	$18,718
Cost/1,000 Sq. Ft.	$12.45	$16.69	$8.34	$25.17	$15.66
Cost/Person	$249	$278	$304	$160	$248

Table D2
Total Amounts Of Janitorial Products Used (Gal Per Year)

	1	2	3	4	Wtd. Avg.
Hard Floor Care					
Sealer	50	200	832		271
Finish	350	300	523	175	337
Stripper	75	200	125	75	119
Baseboard Stripper	10		96		27
General Purpose Floor Cleaner	100	50	96	60	77
Dust Mop Spray	15				4
Carpet Care					
Pre-Spotter	15	50		5	18
Traffic Lane Cleaner	50		100	500	163
Shampoo	150	80	114	60	101
Chewing Gum Remover	15	30	34		20
Mildew Treatment	15				4
Restroom Cleaning					
Acid Bowl Cleaner	75		107	60	60
Non-acid Bowl Cleaner	75				19
Disinfectant Cleaner	250	300	112	184	212
Metal Cleaner	50		4		14
Glass Cleaner	100		30	30	40
Spray Deodorizer	50	40		5	24
Other Products					
Graffiti Remover	15	24	3		10
Wood Furniture Polish	50	56	7	35	37
Total (Gallons):	1,510	1,330	2,183	1,189	1,557

These amounts are for differing amounts of floor space handled by each contractor.

Table D3
Amounts Of Janitorial Products Used (Gal Per 1,000 Square Feet)

	1	2	3	4	Average
Hard Floor Care					
Sealer	0.0500	0.2500	0.1809		0.1202
Finish	0.3500	0.3750	0.1137	0.4108	0.3124
Stripper	0.0750	0.2500	0.0272	0.1761	0.1321
Baseboard Stripper	0.0100		0.0209		0.0077
General Purpose Floor Cleaner	0.1000	0.0625	0.0209	0.1408	0.0811
Dust Mop Spray	0.0150				0.0038
Carpet Care					
Pre-Spotter	0.0150	0.0625		0.0117	0.0223
Traffic Lane Cleaner	0.0500		0.0217	1.1737	0.3114
Shampoo	0.1500	0.1000	0.0248	0.1408	0.1039
Chewing Gum Remover	0.0150	0.0375	0.0073		0.0149
Mildew Treatment	0.0150				0.0038
Restroom Cleaning					
Acid Bowl Cleaner	0.0750		0.0232	0.1408	0.0597
Non-acid Bowl Cleaner	0.0750				0.0188
Disinfectant Cleaner	0.2500	0.3750	0.0243	0.4319	0.2703
Metal Cleaner	0.0500		0.0009		0.0127
Glass Cleaner	0.1000		0.0065	0.0704	0.0442
Spray Deodorizer	0.0500	0.0500		0.0106	0.0276
Other Products					
Graffiti Remover	0.0150	0.0300	0.0005		0.0114
Wood Furniture Polish	0.0500	0.0703	0.0015	0.0822	0.0510
Total (Gallons/1,000 Sq. Ft.):	1.5100	1.6628	0.4743	2.7898	1.6093

Table D4
Costs Of Janitorial Products Used Per Year

	1	2	3	4	Average
Hard Floor Care					
Sealer	$500	$1,800	$10,974		$3,319
Finish	$4,000	$3,500	$7,314	$2,019	$4,208
Stripper	$750	$1,500	$6,371	$807	$2,357
Baseboard Stripper	$100		$309		$102
General Purpose Floor Cleaner	$1,000	$600	$3,200	$360	$1,290
Dust Mop Spray	$100				$25
Carpet Care					
Pre-Spotter	$200	$600		$45	$211
Traffic Lane Cleaner	$750		$1,300	$3,400	$1,363
Shampoo / Extractant	$2,000	$800	$1,219	$540	$1,140
Chewing Gum Remover	$150	$250	$385		$196
Mildew Treatment	$250				$63
Restroom Cleaning					
Acid Bowl Cleaner	$200		$1,190	$720	$528
Non-acid Bowl Cleaner	$200				$50
Disinfectant Cleaner	$1,000	$3,500	$4,120	$1,513	$2,533
Metal Cleaner	$300		$69		$92
Glass Cleaner	$300		$1,597	$325	$556
Spray Deodorizer	$275	$300		$96	$168
Other Products					
Graffiti Remover	$175	$300	$39		$129
Wood Furniture Polish	$200	$200	$263	$896	$390
Total Cost:	$12,450	$13,350	$38,350	$10,721	$18,718

Table D5
Costs Of Janitorial Products Used Per 1,000 Square Feet

	1	2	3	4	Average
Hard Floor Care					
Sealer	$0.50	$2.25	$2.39		$1.28
Finish	$4.00	$4.38	$1.59	$4.74	$3.68
Stripper	$0.75	$1.88	$1.39	$1.89	$1.48
Baseboard Stripper	$0.10		$0.07		$0.04
General Purpose Floor Cleaner	$1.00	$0.75	$0.70	$0.85	$0.82
Dust Mop Spray	$0.10				$0.03
Carpet Care					
Pre-Spotter	$0.20	$0.75		$0.11	$0.26
Traffic Lane Cleaner	$0.75		$0.28	$7.98	$2.25
Shampoo	$2.00	$1.00	$0.27	$1.27	$1.13
Chewing Gum Remover	$0.15	$0.31	$0.08		$0.14
Mildew Treatment	$0.25				$0.06
Restroom Cleaning					
Acid Bowl Cleaner	$0.20		$0.26	$1.69	$0.54
Non-acid Bowl Cleaner	$0.20				$0.05
Disinfectant Cleaner	$1.00	$4.38	$0.90	$3.55	$2.46
Metal Cleaner	$0.30		$0.02		$0.08
Glass Cleaner	$0.30		$0.35	$0.76	$0.35
Spray Deodorizer	$0.28	$0.38	$0.00	$0.23	$0.22
Other Products					
Graffiti Remover	$0.18	$0.38	$0.01		$0.14
Wood Furniture Polish	$0.20	$0.25	$0.06	$2.10	$0.65
Total Cost / 1,000 Sq. Ft.:	$12.46	$16.71	$8.37	$25.17	$15.66

These costs are per 1,000 square feet of building that is 50% carpeted and 50% hard floor.

Table D6
Amounts Of Janitorial Products Used Per Worker (Gal Per Year)

	1	2	3	4	Average
Hard Floor Care					
Sealer	1.00	4.17	6.60		2.94
Finish	7.00	6.25	4.15	2.61	5.00
Stripper	1.50	4.17	0.99	1.12	1.94
Baseboard Stripper	0.20		0.76		0.24
General Purpose Floor Cleaner	2.00	1.04	0.76	0.90	1.17
Dust Mop Spray	0.30				0.08
Carpet Care					
Pre-Spotter	0.30	1.04		0.07	0.35
Traffic Lane Cleaner	1.00		0.79	7.46	2.31
Shampoo	3.00	1.67	0.90	0.90	1.62
Chewing Gum Remover	0.30	0.63	0.27		0.30
Mildew Treatment	0.30				0.08
Restroom Cleaning					
Acid Bowl Cleaner	1.50		0.85	0.90	0.81
Non-acid Bowl Cleaner	1.50				0.38
Disinfectant Cleaner	5.00	6.25	0.89	2.75	3.72
Metal Cleaner	1.00		0.03		0.26
Glass Cleaner	2.00		0.24	0.45	0.67
Spray Deodorizer	1.00	0.83		0.07	0.48
Other Products					
Graffiti Remover	0.30	0.50	0.02		0.21
Wood Furniture Polish	1.00	1.17	0.06	0.52	0.69
Total (Gallons/Person):	30.20	27.72	17.31	17.75	23.25

These amounts are per total number of workers doing janitorial tasks. Amounts of specialized chemicals, like floor finish stripper, are also stated per total number of workers (and not per specialty worker assigned to utility crews).

Table D7
Annual Costs Of Janitorial Products Used Per Worker

	1	2	3	4	Average
Hard Floor Care					
Sealer	$10.00	$37.50	$87.10		$33.65
Finish	$80.00	$72.92	$58.05	$30.13	$60.27
Stripper	$15.00	$31.25	$50.56	$12.04	$27.21
Baseboard Stripper	$2.00		$2.45		$1.11
General Purpose Floor Cleaner	$20.00	$12.50	$25.40	$5.37	$15.82
Dust Mop Spray	$2.00				$0.50
Carpet Care					
Pre-Spotter	$4.00	$12.50		$0.67	$4.29
Traffic Lane Cleaner	$15.00		$10.32	$50.75	$19.02
Shampoo	$40.00	$16.67	$9.67	$8.06	$18.60
Chewing Gum Remover	$3.00	$5.21	$3.06		$2.82
Mildew Treatment	$5.00				$1.25
Restroom Cleaning					
Acid Bowl Cleaner	$4.00		$9.44	$10.75	$6.05
Non-acid Bowl Cleaner	$4.00				$1.00
Disinfectant Cleaner	$20.00	$72.92	$32.70	$22.58	$37.05
Metal Cleaner	$6.00		$0.55	$0.00	$1.64
Glass Cleaner	$6.00		$12.67	$4.85	$5.88
Spray Deodorizer	$5.50	$6.25		$1.43	$3.30
Other Products					
Graffiti Remover	$3.50	$6.25	$0.31		$2.51
Wood Furniture Polish	$4.00	$4.17	$2.09	$13.37	$5.91
Total (Cost/Person):	$249.00	$278.14	$304.37	$160.00	$247.88

Appendix E Product and Ingredient Risk Data

E.1 High Risk Products

This checklist can be used to identify a janitor's highest risk products, which are generally ones that:

- Are corrosive to the eyes and skin;
- Are flammable;
- Give off toxic fumes; or
- Are poisonous.

Product	Hazards Often Seen In This Kind Of Product	Do You Use This Product?
Acid Toilet Bowl Cleaner With Hydrochloric Acid	Corrosive to eyes and skin; Can cause blindness	
Metal Cleaner With Perchloroethylene	Poisonous, Causes Cancer, or Flammable	
Carpet Spotter With Perchloroethylene	Poisonous, Causes Cancer, or Flammable	
General Purpose Cleaner With Butoxyethanol, Sodium Hydroxide, & Ethanolamine	Corrosive to eyes and skin, Poisonous, or Flammable	
Floor Finish Stripper With Butoxyethanol, Sodium Hydroxide, & Ethanolamine	Corrosive to eyes and skin & Poisonous	
Baseboard Stripper With Butoxyethanol, Sodium Hydroxide, & Ethanolamine	Corrosive to eyes and skin & Poisonous	
Graffiti Remover With Methylene Chloride or Perchloroethylene	Poisonous, Causes Cancer, or Flammable	
Glass Cleaner With Butoxyethanol	Flammable, or Poisonous	
Disinfectant With Bleach, Phenol, Quats., or Hydrogen Peroxide	Corrosive to eyes and skin & Poisonous	

E.2 High Risk Ingredients

The following are examples of ingredients in janitorial products that pose the greatest health hazards to the user, building occupants, and the environment in general.

Type	Examples	Problems
Acids	Hydrochloric Acid, Phosphoric Acid	Corrosive - Causes blindness Damages skin Sewer discharge pH too low
Caustic	Sodium Hydroxide; Sodium Metasilicate; Potassium Hydroxide	Corrosive - Causes blindness Damages skin Sewer pH too high
Solvents	Perchloroethylene Butoxyethanol; Ethanolamine Toluene HCFC-141	Causes cancer Poison - Absorbs through skin & poisons liver, kidneys, and a pregnant woman's fetus Environmental - Destroys the ozone layer; causes global warming
Surfactants	Alkyl Phenol Ethoxylates	Environmental - Persists in the environment; bioaccumulates; affects animal hormone systems
Disinfectants	Bleach (Sodium Hypochlorite) Paradichlorobenzene (Urinal Blocks) Quaternary Ammonium Chloride	Corrosive - Can burn eyes & skin Reacts - Bleach mixed with acid or ammonia causes poison gas Causes cancer Corrosive - Can burn eyes & skin

Where can you get more information about these ingredients? The best sources are Material Safety Data Sheets (MSDSs) for your janitorial products, or MSDSs for the toxic ingredients themselves. In addition, our project has published a safety summary of 100 common ingredients found in many janitorial products. Visit our web site for details.

<http://www.westp2net.org/Janitorial/jp4.htm>

E.2.1 Do Not Use The Following Ingredients

Janitorial products with these ingredients pose unacceptable risks to the janitor, to building occupants, or to the environment. Gloves and goggles, may not be enough to fully protect the user from harm. In some instances the ingredients are illegal for janitorial products.

A “Skin Poison” can absorb through your skin and poison your liver, kidneys, and other internal organs. An “Inhale Poison” harms you when you breath the fumes. “Corrosive” means that the chemical can permanently destroy your eyes and skin.

CAS Number	Ingredient Name	Problems
00100-51-6	Benzyl Alcohol	Cancer / Corrosive / Skin Poison
00075-45-6	CFC-22; Chloro difluoro methane	Illegal
68603-42-9	Coconut Oil Diethanolamine	Cancer
00111-42-2	Diethanolamine	Cancer
00075-68-3	HCFC-141	Illegal
00120-40-1	Lauric Acid Diethanolamine	Cancer
00071-55-6	Methyl Chloroform; 1,1,1-TCE	Skin Poison
00078-93-3	Methyl Ethyl Ketone	Skin Poison
00091-20-3	Naphthalene	Cancer / Corrosive / Skin Poison
18662-53-8	Nitrilotriacetic Acid	Cancer
00106-46-7	Para dichloro benzene	Cancer / Inhale Poison
00127-18-4	Tetrachloroethylene; Perchloroethylene “PERC”	Cancer / Skin & Inhale Poison
00108-88-3	Toluene	Skin Poison
00688-73-3	Tributyl Tin	Illegal
00079-01-6	Trichloroethylene	Inhale Poison

E.2.2 Use Extreme Care (Avoid if Possible)

If at all possible, avoid janitorial products with these ingredients. They pose very high risks to the janitor using the product, to the building occupants, or to the environment. If there are no substitutes available, then assure that the workers are fully trained in safe handling and use of this product, and assure that protective gloves and goggles are worn at all times.

CAS Number	Ingredient Name	Problems
00111-76-2	2-Butoxy Ethanol	Skin Poison
00090-43-7	2-Phenyl Phenol	Eye & Skin Burns
00067-64-1	Acetone	Skin/Inhale Poison
07664-41-7	Ammonia	Corrosive
01341-49-7	Ammonium Bifluoride	Corrosive
01336-21-6	Ammonium Hydroxide	Corrosive
00628-63-7	Amyl Acetate	Poison
00124-07-2	Caprylic Acid	Corrosive / Skin Poison
00084-74-2	Dibutyl Phthalate	Hormone Modifier
00112-34-5	Diethylene Glycol Monobutyl Ether	Skin Poison
07647-01-1	Hydrochloric Acid	Corrosive
07722-84-1	Hydrogen Peroxide	Corrosive
00079-14-1	Hydroxyacetic Acid	Corrosive
00141-43-5	Monoethanolamine	Burns / Skin Poison
09016-45-9	Nonyl Phenol Ethoxylate	Hormone Modifier
09036-19-5	Octyl Phenol Ethoxylate	Hormone Modifier
07664-38-2	Phosphoric Acid	Corrosive
26027-38-3	Polyethylene Monophenyl Ether	Hormone Modifier / Burns
07681-51-9	Sodium Hypochlorite; Bleach	Corrosive
00102-71-6	Triethanolamine	Skin Poison
01330-20-7	Xylene	Burns / Skin & Inhale Poison

E.2.3 Use Extreme Care With These Ingredients

These ingredients are dangerous, but may have to be used because safer substitutes are not readily available. Assure that the workers are fully trained in safe handling and use, and assure that protective gloves and goggles are worn at all times (particularly when handling concentrated solutions). Also take care when disposing of left over product, wastewater, and empty containers.

CAS Number	Ingredient Name	Problems
00872-50-4	1-Methyl 2-Pyrolidinone	Burns
08001-54-5	Alkyl Dimethyl Benzyl Ammonium Chloride	Burns
00334-48-5	Capric Acid	Skin Poison
00111-46-6	Diethylene Glycol	Skin Poison
00115-10-6	Dimethyl Ether	Burns
29911-28-2	Dipropylene Glycol Butoxy Ether	Skin Poison Burns
25155-30-0	Dodecyl Benzene Sulfonate	Burns
27176-87-0	Dodecylbenzne Sulfonic Acid	Burns
00064-17-5	Ethanol	Skin/Inhale Poison
00122-99-6	Ethylene Glycol Phenyl Ether	Burns
00067-63-0	Isopropanol	Skin & Inhale Poison / Burns
08008-20-6	Kerosene	Inhale Poison / Burns
00067-56-1	Methanol	Inhale Poison
02809-21-4	Phosphonic Acid	Corrosive
07320-34-5	Potassium Diphosphate	Burns
01310-58-3	Potassium Hydroxide	Burns
07681-38-1	Sodium Bisulfate	Corrosive
00497-19-8	Sodium Carbonate	Corrosive
01310-73-2	Sodium Hydroxide	Corrosive
06834-92-0	Sodium Metasilicate	Corrosive
05329-14-6	Sulfamic Acid	Burns
08052-41-3	Stoddard Solvent	Poison

E.2.4 Use Routine Care With These Ingredients

Some of these ingredients are dangerous, but risks of them getting into the body to do harm are relatively low. For example, several of these ingredients have to be eaten in order for toxic effects to be felt. Others are toxic only at concentrations and quantities that are much higher than those in janitorial products.

As with any chemical, assure that the workers are fully trained in safe handling and use, and assure that protective gloves and goggles are worn at all times (particularly when handling concentrated solutions). Also take care when disposing of left over product, wastewaters, and empty containers.

CAS Number	Ingredient Name	Problems
00770-35-4	1-Phenoxy-2-Propanol	Inhale Irritant
00064-19-7	Acetic Acid	Irritant / Burns
00120-32-1	Chlorophene	Poison
05989-27-5	d-Limonene	Inhale Irritant
00111-90-0	Diethylene Glycol Monoethyl Ether	Inhale Poison (Slight)
00111-77-3	Diethylene Glycol Monomethyl Ether	Poison
02809-21-4	Diphosphonic Acid	Poison
34590-94-8	Dipropylene Glycol Methyl Ether	Skin Poison (Slight)
17572-97-3	EDTA Tetrapotassium Salt	Irritant
00064-02-8	Ethylene Diamine Tetraacetic Acid	Irritant
00097-86-9	Isobutyl Methacrylate	Irritant
67741-65-7	Mineral Spirits	Irritant
08030-30-6	Naphtha	Inhale Poison
05324-84-5	Octane Sulfonic Acid	Skin Poison (Slight)
68441-17-8	Oxidized Polyethylene	Irritant
63148-62-9	Poly Dimethyl Siloxane	Irritant
07757-82-6	Sodium Sulfate	Irritant
07758-29-4	Sodium Tripoly Phosphate	Irritant
01300-72-7	Sodium Xylene Sulfonate	Skin Poison (Slight)

E.3 Criteria For Evaluating Products

Here are about 30 questions that you can use to evaluate the risks of janitorial products. It takes quite a bit of effort to answer all of the questions, so it's best to focus on product characteristics that pose a higher hazard to you. For details see the following pages.

Health & Safety Impacts	How easy is it to use this question?	Do you want to use this question?
Carcinogenic / Prop. 65	Easy	
Reproductive Hazard - Mutagen	Hard	
Reproductive Hazard - Teratogen	Hard	
Endocrine Modifier	Medium	
Corrosivity / pH	Easy	
Flammability / Flash Point	Easy	
Reactivity	Easy	
Eye Irritant	Medium	
Skin Irritant	Medium	
Inhalation Irritant	Medium	
Ease of Skin Absorption	Hard	
Ease Of Inhalation / Vapor Pressure	Hard	
Overall Toxicity (LD50)	Medium	
Environmental Impacts		
Ozone Depleting Substance	Easy	
Global Warming Substance	Easy	
Hazardous Waste	Medium	
Stormwater Pollutant	Hard	
Sanitary Sewer Pollutant	Hard	
Persistence / Biodegradability / Bioaccum.	Hard	
Indoor Air Quality	Hard	
Phosphates	Medium	
Volatile Organic Compounds	Medium	
Other Impacts		
Has Added Fragrance	Hard	
Has Added Dye	Hard	
Packaged As Concentrate / Mixing System	Medium	
Safe Container	Medium	
Refillable Container	Medium	
Container Made Of Recycled Material	Medium	
Non-Aerosol Container	Medium	

Source: http://www.westp2net.org/Janitorial/jp4.htm

Product Risk Evaluation Criteria

Impacts	Description Of Criteria	Where To Get Information
Carcinogenic / Prop. 65 List	Does the product contain ingredients that are known or suspected of causing cancer, either in animals or humans? Example: Tetrachloroethylene Nitrilo Triacetic Acid Recommendation: Avoid products that have even trace amounts of cancer causing ingredients.	Material Safety Data Sheet (MSDS) for the product, or MSDSs for each ingredient, or published cancer studies. Cancer studies are available for only a few of the many hundreds of ingredients used in janitorial products. California's Proposition 65 chemical list is available on the internet.
Reproductive Hazard - Mutagen	Known or suspected of interfering with conception, either in animals or humans? Example: Tetrachloroethylene Recommendation: Avoid even trace amounts of such ingredients.	MSDS for the product, or separate MSDSs for its ingredients, or published toxicology studies.
Reproductive Hazard - Teratogen	Known or suspected of interfering with fetal development, either in animals or humans? Example: Tetrachloroethylene Recommendation: Avoid even trace amounts of such ingredients.	MSDS for the product or its ingredients, or published toxicology studies.
Endocrine Modifier	Known or suspected of interfering with hormone systems, either in animals or humans? Example: Alkylphenol Ethoxylate Dibutyl Phthalate Recommendation: Avoid even trace amounts of such ingredients. Although in normal use these ingredients do not affect the janitor, they do persist in the environment and affect fish and other animals, and can contaminate drinking water used by humans.	Contact product supplier for information - these ingredients are not yet required by OSHA to be listed on the MSDS. Refer to our project web site for links to internet sites with information about endocrine modifiers.

Corrosivity / pH	Will the product cause burns, or destroy skin, or cause blindness? Is the pH below 4 or above 11.5? Examples: Hydrochloric Acid Sodium Hydroxide Recommendation: Avoid corrosive ingredients (high or low pH) where possible. If no alternatives are available, then use product with extreme care.	MSDS for the product or its ingredients. Older MSDSs may not include pH.
Flammability / Flash Point	Is the product flammable or extremely flammable? Is the flash point below 140 F? Is the NFPA or HMIS fire rating 2 or higher? Examples: Propane (Aerosol Propellant) Isopropanol Toluene Recommendation: Avoid flammable (low flash point) ingredients where possible. Change to non-aerosol products if it is the propellant that causes the fire rating to exceed 2..	MSDS for the product or its ingredients.
Reactivity	Does the product contain ingredients that combine violently with other chemicals? Is the NFPA or HMIS reactivity rating 2 or higher? Examples: Bleach & Ammonia Bleach & Acid Recommendation: Avoid reactive ingredients where possible. Keep incompatible products away from each other.	MSDS for the product or its ingredients.

Eye Irritant	Does the product contain ingredients that irritate the eyes “moderately” or “severely”, or cause eye burns, or cause blindness? Examples: Hydrochloric Acid Ammonium Hydroxide Recommendation: Where possible, avoid ingredients that cause moderate eye irritation or worse. Otherwise use such products with extreme care.	MSDS for the product or its ingredients. Ask the supplier for eye irritation test data. Once scarce, these data are now becoming available for more products.
Skin Irritant	Does the product contain ingredients that irritate the skin “moderately” or “severely”, or cause skin burns, or damage/scar the skin? Examples: Hydrochloric Acid Sodium Hydroxide Recommendation: Where possible, avoid ingredients that cause moderate skin irritation or worse. Otherwise use such products with extreme care.	MSDS for the product or its ingredients. Ask the supplier for skin irritation test data. Once scarce, these data are now becoming available for more products.
Inhalation Irritant	Does the product contain ingredients that irritate the nose, throat, or lungs “moderately” or “severely”, or cause burns, or damage/scar the air passage? Examples: Hydrochloric Acid Sodium Hydroxide Recommendation: Where possible, avoid ingredients that cause moderate irritation or worse. Otherwise use such products with extreme care.	MSDS for the product or its ingredients.
Ease of Skin Absorbtion	Does the product contain ingredients that readily absorb through the skin, and that then damage or poison the kidneys, liver, or other internal organs? Examples: 2-Butoxyethanol Ethanolamine Acetone Recommendation: Where possible, avoid ingredients that can be absorbed through skin. Otherwise use such products with extreme care.	MSDS for the product or its ingredients. Ask the supplier for skin absorbtion test data. These data are available for only a few products and ingredients.

Ease of Inhalation / Vapor Pressure	Does the product contain ingredients that evaporate readily, and therefore are easy to inhale, and that then damage or poison the kidneys, liver, or other internal organs? Is the vapor pressure of the product or its most toxic ingredients more than 18 millimeters of mercury measured at 20 C? Examples: Isopropanol Tetrachloroethylene Recommendation: Where possible, avoid toxic ingredients that evaporate faster than water. Otherwise use such products with extreme care, provide good ventilation, and wear a breathing mask.	MSDS for the product or its ingredients.
Overall Toxicity (LD50)	Is the product or any of its ingredients highly toxic? Is the LD50 (oral - rat) for any ingredient less than 500 mg/kg? Examples: Naphthalene Quaternary Ammonium Chloride Recommendation: Where possible avoid ingredients that are highly toxic. Otherwise use such products with extreme care.	MSDS for the product or its ingredients.
Ozone Depleting Substance	Does the product contain any ingredient that evaporates readily and affects the earth's ozone layer? Examples: CFC-12 HCFC - 141 Recommendation: Do not use any product with ingredients that harm the earth's ozone layer.	MSDS for the product or its ingredients.
Global Warming Substance	Does the product contain any ingredient that evaporates readily and affects the earth's ozone layer? Examples: CFC-12 HCFC - 141 Recommendation: Do not use any products with ingredients that have a global warming potential.	MSDS for the product or its ingredients.

Hazardous Waste	Does the product contain any ingredient regulated under SARA Title III? Examples: Glycol Ethers Methylene Chloride Recommendation: Where possible avoid ingredients that are listed by SARA Title III. Otherwise use such products with extreme care.	MSDS for the product or its ingredients.
Stormwater Pollutant	If the product is to be used outdoors, does it contain any ingredients that are considered stormwater pollutants. Examples: Most Chemicals Recommendation: Do not use products containing stormwater pollutants outdoors, unless steps are taken to collect wastes before they can reach stormwater system.	Newer MSDSs (with 16-part format) might describe stormwater requirements. Otherwise ask local stormwater management agency for guidance.
Sanitary Sewer Pollutant	Will any unused product or any wastes be put into the sewer? If yes, does the product contain any ingredients regulated by the local sewer agency? Examples: High or low pH Toxic Organics Zinc & other metals Recommendation: Do not use products containing sanitary sewer pollutants, unless steps are taken to ship wastes off-site rather than putting them into the sewer system.	A few MSDSs mention specific ingredients of concern to local sewer agencies. Ask your local agency for guidance.
Persistence / Biodegradability / Bioaccumulation	Does the product contain any toxic ingredients that persist in the environment and bioaccumulate? Examples: Dibutyl Phthalate Alkylphenol Ethoxylate Recommendation: Do not use products containing ingredients that are not readily and fully biodegraded in the sanitary sewer system.	A few MSDSs mention specific ingredients of concern in this area. Contact product supplier and ask for their ecological fate assessment of the product. Ask your local county health agency for guidance.

Indoor Air Quality	Does the product contain any ingredient that evaporates easily, has an odor, is flammable, or is toxic? Examples: Isopropanol d-Limonene Recommendation: Where possible avoid ingredients that affect indoor air quality. Otherwise use such products with extreme care, with good outside ventilation, and at times when the building is empty.	MSDS for the product or its ingredients. Look for added unnecessary fragrances, flammables, and other volatile ingredients.
Phosphates	Does the product contain phosphates? Example: Trisodium Phosphate Recommendation: Where possible use products with no phosphates, or very low phosphate levels. In any case, be sure phosphate levels are less than required by local sewer agency.	MSDS for product.
Volatile Organic Compounds	Does the product have higher VOC levels than are allowed by California air quality rules? Example: General purpose cleaners must have less than 10% VOC content. Recommendation: Where possible do not use products containing any VOCs. If VOC ingredients are needed, assure that the VOC % is as low as possible.	MSDS for the product or its ingredients. Look for unnecessary added fragrances, flammables, and other volatile ingredients.
Has Added Fragrance	Does the product have a separate fragrance in addition to the natural odors of its other ingredients. Example: Lemon Oil Recommendation: Do not use products with unnecessary fragrances.	Product MSDS. Ask supplier for unscented products.
Has Added Dye	Does the product have a separate dye in addition to the natural colors of its other ingredients. Example: F&D Red Recommendation: Do not use products with unnecessary dyes.	Product MSDS. Ask supplier for uncolored products, or for ones where the color serves to identify different products.

Packaged As Bulk Concentrate / Mixing System	Is the product available as a concentrate? Example: Disinfectant Recommendation: If you have trained people responsible for mixing, and have safe mixing systems, then purchase concentrates. Otherwise buy only ready-to-use (RTU) products.	Ask supplier for mixing systems, dispensers, and mixing guides.
Safe Container	Is the product container spill resistant? Are product containers shipped in spill resistant packaging? Are the container and trigger strong enough to survive routine use? Example: Trigger assembly shipped separate with product in containers having tightly closed screw tops. Recommendation: Consider container safety when selecting products.	Ask supplier about spill resistant containers and packaging.
Refillable Container	Is the product container refillable? Example: Trigger bottles that can be refilled at a dispensing station. Recommendation: Use products that come in refillable containers.	Ask supplier about refillable containers and dispensing systems.
Container Made Of Recycled Material	Is the product container made of recycled plastic? Are shipping packages made of recycled cardboard? Example: Trigger bottles Recommendation: Use products whose shipping containers and trigger bottles are made of recycled materials.	Ask supplier about recycled content of containers and packaging.
Non-Aerosol Container	Is the product sold as an aerosol? Example: Baseboard stripper Furniture polish Glass Cleaner Graffiti Remover Recommendation: Where possible buy non-aerosol products.	Ask supplier for non-aerosol version of products.

E.4 How To Evaluate Product Ingredients

"Stop Using" or "Do Not Use"

Janitorial products with these ingredients pose unacceptable risks to the janitor, to building occupants, or to the environment. Gloves and goggles, may not be enough to fully protect the user from harm. In some instances the ingredients are illegal for janitorial products.

A "Skin Poison" can absorb through your skin and poison your liver, kidneys, and other internal organs. An "Inhale Poison" harms you when you breath the fumes. "Corrosive" means that the chemical will permanently destroy your eyes and skin.

"Avoid If Possible"

If at all possible, avoid janitorial products with these ingredients. They pose very high risks to the janitor using the product, to building occupants, or to the environment. If there are no substitutes available, then use with extreme care and assure that workers are fully trained in safe handling and use, and assure that protective gloves and goggles are worn at all times.

"Use With Extreme Care"

Ingredients of this kind are dangerous, but may have to be used because safer substitutes are not readily available. Assure that workers are fully trained in safe handling and use, and assure that protective gloves and goggles are worn at all times (particularly when handling concentrated solutions). Also take care when disposing of left over product, wastewaters, and empty containers.

"Use With Routine Care"

Some of these ingredients are dangerous, but risks of them entering into the body and causing harm are relatively low. For example, several of these ingredients have to be ingested in order for toxic effects to be felt. Others are toxic only at concentrations and quantities that are much higher than occur in janitorial products.

As with any chemical, assure that workers are fully trained in safe handling and use, and assure that protective gloves and goggles are worn at all times (particularly when handling concentrated solutions). Also take care when disposing of left over product, wastewaters, and empty containers.

E.5 Selecting Protective Equipment

The material safety data sheet should tell you what kinds of protection to wear for safe handling of the product. For most janitorial products the MSDS will tell you to wear gloves and goggles, and perhaps a plastic apron.

Gloves

Heavy duty chemical resistant gloves are the best. Buy various sizes so that your people can find a pair that fits.

If anyone has a problem with their hands sweating too much, then give them cloth glove liners. These absorb sweat and make the gloves more comfortable. Another thing to do to make gloves more comfortable is to use a hand cream before putting the gloves on. One choice is antibacterial hand cream similar to what is used in hospitals and doctors' offices. Such creams are available in drug stores.

Goggles

Plastic wrap-around soft-shell goggles are best for preventing chemical splashes from hitting your eyes. The soft edges fit closely to your face and prevent liquids from reaching your eyes. However, these goggles are uncomfortable, and can fog up. To deal with these problems, buy the softest rubber goggles you can find. Also get cleaning sprays that keep the lenses from fogging as badly (although nothing can keep lenses totally clear).

Impact goggles are meant primarily for protecting your eyes from flying objects. They provide some protection from splashed chemicals, but not as much as the wrap-around type. Because they are more comfortable and do not fog as badly, many people like these goggles better than the splash-proof kind. In deciding which goggles to buy you have to make a trade off between protection and comfort.

Apron

Using a plastic apron can be important when opening and mixing products. This is particularly true for when you are handling concentrated chemicals that you are diluting with water.

Eyewash and Shower

California OSHA requires that an eyewash and a shower be provided within a 10 second reach of any employee handling corrosive chemicals (like floor finish stripper or acid toilet bowl cleaner).

Appendix F Sample Outreach Materials

Based upon the needs assessment results, the Santa Clara team concentrated its local outreach efforts in four key areas. All of these items appear on the project website.

1. Information about cleaning work that uses the most hazardous chemicals, comprising seven fact sheets in English and one in Spanish.

2. Tools for people to use in evaluating their own chemical products, including forms, checklists, and guidance on how to find internet sites that feature chemical data.

3. Commentaries about the process of changing from strong chemicals to environmentally preferable ones. This category includes success stories, articles, and other items written by the project team, as well as materials furnished by other agencies.

4. Workbooks for use in training janitorial professionals about product health, safety, and environmental issues.

In addition, the team contributed to trade press articles, made public presentations, and furnished samples of environmentally preferable products to janitors and sites in Santa Clara County.

Example Fact Sheets included in this Appendix::

Toilet Cleaning / Highlights of Typical Fact Sheet

Highest Risk Cleaning Activities
- Toilet Cleaning
- Hard Floor Care
- Carpet Care
- Restroom Cleaning
- Glass Cleaning
- Metal Cleaning
- Disinfectants
- Limpieza Segura Y Efectiva Para Los Inodoros

Specific Ingredient Hazards
- Butoxyethanol
- Dibutyl Phthalate
- Ethanolamine (Mono-, Di-, Tri-)
- Hydrochloric Acid
- Monoethanolamine
- Nitrilotriacetic Acid
- Nonyl Phenol Ethoxylate / Octyl Phenol Ethoxylate
- Tetrachloroethylene

Example Tools included in this Appendix are marked *.

Finding Chemical Data (Exhibit 6-2)
High Risk Products List (Exhibit 4-4)
Product Risk Evaluation Form *
Product Test Evaluation Form *
Risk Evaluation Criteria (Appendix E)
Site Survey Form (Appendix C)

Example Commentaries included in this Appendix:

Safe & Effective Toilet Cleaning

Fact sheets focus upon safety messages

Many toilet bowl cleaners contain acids and other chemicals that are harmful. Use the mildest product you can find, and always wear gloves and goggles to protect yourself.

Most non-acid toilet cleaners are relatively safe to use, and have only a small impact on the environment. Disinfectants require a bit more care, but are still fairly safe. Acid cleaners are the most dangerous of all.

Ideas included for using less toxic products

Use a mild cleaner for daily toilet maintenance.

Unless the toilets are already in good shape, clean them first and then use a separate disinfectant.

Use acid cleaners only when you have really stubborn stains to remove.

Acid cleaners are very dangerous - always protect yourself by wearing gloves and goggles.

Regular Cleaning - Use a strong non-acid cleaning product for your daily toilet maintenance. Also use a disinfectant product that contains Alkyl Ammonium Chloride to kill germs.

Some suppliers combine the cleaner and disinfectant into one product. You can use a combined cleaner-disinfectant only if the toilet fixtures are not too dirty to start with.

Otherwise you should clean the toilets first, and then use a separate disinfectant. Leave the disinfectant in place for 10 minutes to get good results.

Boxes & Red Type used to highlight major safety points

Stain Removal - Sometimes lime stains, rust, or other stubborn deposits will form in the toilet bowl. Your regular daily cleaner might not remove these materials.

You have two choices: use a powdered cleaner and scrub pad to scour the bowl, or use an acid cleaner.

Acids corrode metal. Use acid cleaners only on porcelain toilet bowls.

Don't mix acids with bleach. This creates chlorine gas that can kill you.

Acids can cause harm very quickly, so always protect yourself with gloves and goggles. Pour the acid cleaner from low down so it won't splash. Use your scrub brush carefully to avoid splashes as well. Flush the toilet twice to remove excess cleaner when you are done.

Safety advice given on what to do if a strong product must be used

Highlights of A Typical Fact Sheet

Toilet Cleaning

Many toilet bowl cleaners contain acids and other chemicals that are harmful. Use the mildest product you can find, and always wear gloves and goggles to protect yourself.

Most non-acid toilet cleaners are relatively safe to use, and have only a small impact on the environment. Disinfectants require a bit more care, but are still fairly safe. Acid cleaners are the most dangerous of all.

Use a mild cleaner for daily toilet maintenance.

Unless the toilets are already in good shape, clean them first and then use a separate disinfectant.

Use acid cleaners only when you have really stubborn stains to remove.

Acid cleaners are very dangerous - always protect yourself by wearing gloves and goggles.

Regular Cleaning - Use a strong non-acid cleaning product for your daily toilet maintenance. Also use a disinfectant product that contains Alkyl Ammonium Chloride to kill germs.

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Otherwise you should clean the toilets first, and then use a separate disinfectant. Leave the disinfectant in place for 10 minutes to get good results.

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You have two choices: use a powdered cleaner and scrub pad to scour the bowl, or use an acid cleaner.

Acids corrode metal. Use acid cleaners only on porcelain toilet bowls.

Don't mix acids with bleach. This creates chlorine gas that can kill you.

Acids can cause harm very quickly, so always protect yourself with gloves and goggles. Pour the acid cleaner from low down so it won't splash. Use your scrub brush carefully to avoid splashes as well. Flush the toilet twice to remove excess cleaner when you are done.

Hard Floor Care

Hard floor care involves one of the most dangerous chemical products that janitors use - floor finish stripper. Stripper usually comes in two forms: a liquid concentrate for stripping large floor areas, and a ready-to-use aerosol for taking floor finish off of baseboards. Both of these strippers contain chemicals that can seriously harm the user, and may also affect building occupants and the environment.

FLOOR STRIPPER INGREDIENTS

This table lists chemicals that are found in most floor stripper products.

Floor Stripper Ingredients and Risks

	To The User	To Building Occupants	To The Environment
Butoxyethanol	Absorbs through skin; damages blood, liver, kidneys, & developing baby.	Usually no contact, so fairly low risk. However, some people are sensitive to its vapors or residues.	Usually none unless disposed of outdoors (which is illegal).
Monoethanolamine	Can damage eyes and skin. Absorbs through skin; damages blood, liver, kidneys, & developing baby.	Usually no contact, so fairly low risk. However, some people are sensitive to its vapors or residues.	Usually none unless disposed of outdoors (which is illegal).
Sodium Hydroxide or Sodium Metasilicate	Can cause blindness and severely damage skin.	Usually no contact, so fairly low risk. However, some people are sensitive to its vapors or residues.	High amounts usually prohibited by sewer agency (pH too high).
Zinc (from the floor finish removed)	None.	None.	High amounts usually prohibited by sewer agency.

Because of these risks it makes sense to limit the amount of stripper that you use, and to do everything possible to reduce the exposure of your workers to these harmful ingredients. How can that be done?

REDUCE THE AMOUNT OF FLOOR STRIPPER YOU USE

Reducing stripper use is a good idea for safety reasons and for saving money. Floor stripping takes lots of time and so it is expensive. Stripping should be done only when needed, and then done right so that no time or chemicals are wasted.

Prevention: You can cut back on the stripping that you have to do by keeping abrasive dirt particles from reaching the floor in the first place.

- Keep dirt outdoors. Use walk-in mats at each entrance to the building. Clean these mats frequently.
- Use dust mops and vacuums to sweep up dirt frequently.
- Wet mop the floor with a liquid cleaner or surface buffing product.

Monitoring: The next step for reducing stripper use is to carefully monitor the floor refinishing work that you do.

- Strip floor finish only when needed. Keep track of your floors - check them out monthly, or more often if they get a lot of traffic. Refinish only those areas where the surface is wearing out.
- With good records, you will easily spot patterns in the way that floors are wearing. Draw a sketch map of each building you maintain, and record your inspections of the hard floor areas. If you use a computer, make these sketches with your spreadsheet program and record your results each time you do an inspection.
- Keep track of the amounts of floor stripper that each crew uses. Your people will respond to what you measure, and so will use less floor stripper when they know that you will be checking.

STRIPPING FLOORS ON A FIXED TIME SCHEDULE CAN WASTE MONEY.

IF DONE TOO SOON YOU'LL REFINISH THE FLOOR BEFORE IT'S NEEDED, AND THAT WILL WASTE LABOR AND CHEMICALS.

IF YOU WAIT TOO LONG. TRAFFIC WILL WEAR THROUGH THE FINISH AND DAMAGE THE UNDERLAYING FLOOR MATERIAL. WHEN THIS FOUNDATION BECOMES WORN, YOU'LL EITHER HAVE TO REPLACE FLOOR TILES OR SPEND LOTS OF EXTRA TIME TRYING TO GET A SATISFACTORY NEW FINISH.

Training: Additional reduction in floor stripper use comes from training your staff on how to refinish floors correctly.

- Train your people to mix the stripper with as much water as they can while still getting the job done. Most stripper products are meant to be mixed with something like 10 or 20 parts of water to one part of concentrate.

  Try working at the high end of the dilution range suggested by the supplier. If that works, then try adding a bit more water - but not too much. If you add too much water the stripper will work too slowly, and extra time will be needed to get the job done.

- Help your employees to minimize mistakes, spills, and waste. For example, mistakenly using the same mop to apply stripper and floor finish can cause problems. One good idea is to use different colored buckets or colored heavy-duty trash can liners in the stripper, rinse water, and

floor finish buckets. Buy mop heads or handles that are the same three colors as the buckets or liners.

- Also train your people on how to apply stripper to the floor and then rinse it off. Be sure that a machine or hand scrubber is used to help lift the floor finish - simple agitation makes the stripper work more quickly and more uniformly.

  Follow set procedures to assure that the stripper will work properly, and thereby reduce the amount of rework that your people have to do.

One final thing to consider is product mixing stations. Automatic dispensers might make sense if you use lots of chemicals, and are working in a building with custodial closets. A well-designed dispensing system can save you money, and also can make chemical mixing safer for your employees. However, mixing units can have problems, particularly when filled with seldom used chemicals, so it is important evaluate your needs carefully before selecting a dispenser.

PERMANENT VISION LOSS STARTS WITHIN 10 SECONDS AFTER A WORKER SPLASHES STRIPPER CONCENTRATE INTO HIS EYES.

IMMEDIATELY FLUSHING THE EYES WITH WATER IS ESSENTIAL TO STOP THE DAMAGE FROM GETTING WORSE.

SKIN BURNS START TO DEVELOP IN SECONDS AS WELL. QUICKLY WASHING THE BURNED AREA WITH WATER USUALLY AVOIDS PERMANENT DAMAGE.

HARMFUL CHEMICALS IN STRIPPERS CAN BE ABSORBED THROUGH SKIN TO POISON THE USER.

REDUCE WORKER EXPOSURE TO HARMFUL INGREDIENTS

Floor strippers are most dangerous to eyes and skin. These risks are greatest when a worker is handling the concentrate, but the diluted product is still strong enough to cause harm.

- Train your employees in safe work procedures.
- Insist that protective gloves and goggles are worn, particularly when your employee is handling concentrated stripper products.
- Be aware of Cal/OSHA regulations that require a 15-minute full-flow eye wash station be provided in any area where workers are exposed to corrosive chemicals.
- Many accidents occur when a worker lifts a full mop bucket to pour its contents into a janitorial sink. Teach your employees safe lifting methods.

REDUCE IMPACT ON THE ENVIRONMENT

Some floor stripping products affect indoor air quality. However, strippers usually have their biggest potential impact if they are improperly disposed of outdoors.

- Use Ventilation: Some building occupants may be sensitive to the vapors or residues from floor stripping products. If that is the case, do your stripping work at night, on weekends, or during holidays. Also, open windows if possible and use fans to increase the amount of outside air flowing into the area where you are working. Take care that these fans don't make the new floor finish dry unevenly.

- Avoid Outdoor Disposal: Floor stripper products should never be disposed of outdoors. It is illegal to pour strippers or any other chemicals on the ground, in a parking lot, or any other outdoor area.

- Control Outdoor Use: If the floor you are refinishing is outdoors, be sure to keep the stripper and rinse water in the work area. Put up absorbent pads or other barriers. Have your janitors use a shop vacuum and wet mops to pick up all excess stripper. Also, have them wash their equipment and dispose of any left over product or rinse water at an indoor sink.

- Be Aware of Zinc Problems: Most modern floor finishes have zinc in them. Zinc is only about 1% of the total product, but it is an important ingredient that makes the floor finish harder. When your janitors strip the floor, this zinc is picked up by the stripper and rinse water.

  Some local sewer agencies have strict limits on the amounts of metals like zinc that you can put into the sewer. Why? Because their treatment plant cannot take these metals out of the sewage very well. Enough zinc gets through the treatment plant to harm shellfish and other animals living in the river or bay where the treated sewage is discharged.

  Check with your sewer agency to see what level of zinc they allow, and have some samples tested to see how much zinc is in your stripper and rinse water. You have three choices if your zinc levels are too high:

  1. Change to a floor finish that does not have any zinc. Although less durable, non-zinc finishes work well for low traffic floor areas.

  2. Dilute your floor stripper as much as possible when you mix it. Doing so will reduce the amount of finish that you pick up each time, and at therefore will reduce the amount of zinc that you put into the sewer.

  3. If using a dilute stripper doesn't get you beneath the limit that the sewer agency requires, then you will have to dispose of used stripper and rinse water as a hazardous waste rather than putting them into the sewer.

Carpet Care

Most carpet care products are relatively safe to use, and have only a small impact on the environment. However, some of these products do contain toxic chemicals that are harmful both to the janitor who uses them and to people who occupy the building.

It is best to select the mildest products you can find that work effectively.

Also, carpets that are cleaned less often require more and stronger chemicals that do carpets that are regularly maintained. It is a good strategy to set up a maintenance program that takes care of carpet needs throughout their useful life.

Using the wrong products or excess amounts of chemicals can easily damage carpets. Therefore, a successful maintenance program will feature the products suited to the work, and will thoroughly train janitors in proper cleaning methods.

Use mild products for regular cleaning.

Use stronger products only for deep cleaning.

Avoid ingredients that are poisonous or that harm the environment.

Wear protective gloves and goggles when mixing or using any cleaning products.

A successful carpet care program begins before installation, and then continues with routine vacuuming, maintenance cleaning, and periodic restoration efforts.

Carpet Design & Installation

Carpets are both functional and visually appealing. However, the wrong kind of carpet, or one that is poorly installed will require extra maintenance.

Generally you should match the carpet type, texture, and underlayment to its working environment. It is also important to keep carpets away from situations where water, chemicals, or other hard-to-clean materials are used. For example, locker rooms, kitchens, and copy centers are not good places to install carpet.

In addition, it's essential to consider how nearby, non-carpeted floors or walls will be cleaned. Chemicals used for that kind of maintenance can easily spill over and damage carpets.

Dust Prevention

Preventing soil from entering a building in the first place means carpet cleaning can be less frequent, thereby reducing the amounts of chemicals used.

Large, frequently cleaned walk-on mats should be placed at each high-traffic building entrance. These mats should be large enough to capture several footsteps. Experiment with different sizes and textures to see what

works best at each doorway. Every few days these mats will become “full” of soil. Therefore, it’s important to vacuum all doorway mats frequently so that they will continue to capture soil before it is carried into the building.

Some modern buildings are totally enclosed. If possible, the heating, ventilating, and air conditioning system in such a building should be operated so that the air pressure just inside each doorway is higher than that of the natural air outdoors. Doing so will push airborne dust back outside.

Vacuuming

Daily vacuuming with strong suction, tight filter, rotating brush machines removes up to half or more of the soil that falls onto carpets. How much effort does it take to attain this level of cleaning? Routine vacuuming, with up to four back and forth strokes of the wand across the carpet, is sufficient for low traffic areas. Up to ten wand strokes may be needed at outside doorways and other high traffic areas. Supplemental vacuuming will be needed along walls and carpet edges where soil tends to accumulate.

Other Prevention Techniques

Some building managers prohibit colored soft drinks, coffee, and other items that will easily stain carpets. Such a tight policy make building occupants unhappy at best. A compromise is to either to have hard floors instead of carpets in food service rooms, or to place sacrificial carpet mats in those areas.

It helps to think of carpets as large, flat air filters. Most light particles and airborne soil will eventually end up attaching to carpets. Unless something is done, significant amounts of carpet soil will come from kitchen fumes and other forms of building use. Properly maintained vents that exhaust outdoors can capture most materials that will otherwise fall out onto the carpets.

Carpet Spotters

Another form of prevention comes from reacting immediately to spills and spots before they have time to become semi-permanent stains. However, thorough training in spill clean-up is very important because using the wrong techniques or chemicals can smear the spilled substance or set the spot permanently. It is usually best to start with clear, cold water and blotting cloths, and then try stronger chemicals only if needed.

A special word of caution - carpet spot removal products contain some of the most dangerous chemicals found in carpet care products. Use these products sparingly, and only when wearing gloves and goggles. Provide extra ventilation, and if possible do the work when building occupants are elsewhere. In any case, avoid products that have highly dangerous ingredients such as hydrofluoric acid (rust remover), or tetrachloroethylene (Type 4 spot remover).

Maintenance Cleaners

Rotary bonnet cleaners and carpet shampoos usually are fairly mild products. However, it’s easy to misuse or over-apply these maintenance cleaners. Such improper use may make it necessary to do hot water extraction more often or more extensively. Use of excess chemicals or the wrong ones leads to more effort and expense.

The toxic ingredients that are in maintenance cleaners pose their greatest risks through inhalation (e.g., isopropanol) or skin contact (e.g., butoxyethanol or ethanolamine). Therefore, providing good ventilation and wearing gloves are very important to protect the janitor doing the work. It is also important to keep building occupants away from wet, freshly cleaned carpets so as to reduce their exposure to these chemicals.

Extractants

With some exceptions, presprays used with hot water extraction systems are also fairly mild products. Careful application, thorough agitation, sufficient contact time, and extraction before drying help these products do their job, and reduce the amounts of chemicals that would otherwise have to be used in reworking the carpet. Training and experience are needed to prepare the janitor for using these products effectively.

Hazardous ingredients used in hot water extraction products include acid rinses (e.g., hydroxyacetic acid), solvents (e.g., butoxyethanol), and detergents (e.g., alkyl phenol ethoxylates). The best strategy is to choose products without these problem ingredients. If that is not possible, than it is essential that the janitor wear gloves and goggles, and that building occupants are kept away from the area until the work is complete.

Mildewcides & Disinfectants

A few restoration products contain tributyl tin, formaldehyde, and other ingredients that are meant to kill microorganisms, but at the same time are highly toxic to humans. Some of these ingredients, such as tributyl tin, are banned from use in the San Francisco Bay Area because of their potential to cause harm in the environment.

Important Safety Tips

Use stronger chemicals sparingly and carefully so as to avoid harming the user or building occupants. Be sure that each janitor is well trained, and if possible, have your people work in buddy teams when using stronger chemicals. That way someone can get immediate help if an accident occurs.

Corrosive chemicals (acids or caustics) can blind you in seconds.
Always wear goggles to protect your eyes.

Corrosives can also damage your skin and leave scars.
Wear gloves to protect your hands.

Some poisonous chemicals absorb through your skin.
Always wear gloves when using products containing glycol ethers or ethanolamines.

Some poisonous chemicals are easily inhaled.
Be sure that your work area has enough ventilation.

Mixing different products together can create poisonous chemicals.
Avoid mixing products, and be sure to rinse out work buckets after each use.

Carpet Cleaning Ingredients

Manufacturers make several products for carpet cleaning. These products range from mild to strong, and have many different ingredients. Some of these cleaning products have acids and other chemicals that can harm you.

The following table lists chemical ingredients commonly found in strong carpet cleaners. Some are relatively safe if you wear gloves and goggles, while others are so risky that you should not use them. In addition, there are some chemicals that may be relatively safe to a janitor wearing gloves and goggles, but that can harm the environment.

Do Not Use - Severe Health Risk

Hydrofluoric Acid
Nitrilotriacetate
Nitrilotriacetic acid
Perchloroethylene / Tetrachloroethylene
Tributyl Tin

Use Extreme Care or Avoid - Health Risk To Janitor

Butane, Isobutane, or Propane (aerosol propellants)
Ethanolamines
Glycol Ethers (such as butoxyethanol)
Quaternary Ammonium Chloride
Sodium Bisulfate
Sodium Carbonate
Sodium Hydroxide

Avoid if Possible - Will Harm The Environment

Dibutyl Phthalate
CFC-22 (Now illegal for janitorial use)
HCFC-141 (Now illegal for janitorial use)
Nonyl Phenol Ethoxylate
Octyl Phenol Ethoxylate

Sewer districts prohibit discharges of some of these chemicals, such as phenol, tetrachloroethylene, and tributyl tin, as well as acids or bases that are corrosive (having a pH less than 4-5 or greater than 11-12). Avoid products that make your sewer discharge illegal. In the San Francisco Bay Area it is illegal to discharge any cleaning materials or wastewaters onto the ground or street.

Where to get more information

Here are four ideas for obtaining more information about the health and safety risks of the cleaning products that you use:

1. Read the product label and product data sheets. Carefully follow the directions these give for safe use.

2. Get a material safety data sheet for each product you use. Look for a phone number on the container label and contact customer service at the manufacturer. Or ask the store where you got the product.

   Read each material safety data sheet when you get it - don't wait for an accident. Focus on the risks the product presents to the user. Look for and use the personal protective gear that the supplier recommends.

3. Contact either your county health department or local sewer agency. Staff of these organizations can answer health, safety, and environmental questions that you have.

4. Search the Internet. You can find general information about chemicals and janitorial products on the Internet. One web site to visit is www.chemfiners.com. Another is www.Cleanlink.com. Many chemical companies also have web sites at which they provide product safety information.

This fact sheet was prepared for the Janitorial Products Pollution Prevention Project. Call (408) 441-1195 or (925) 283-8121 if you have any questions or comments. Acknowledgment is given to Jeff Bishop of Clean Care Seminars for carpet care ideas provided by his many articles and books.

Restroom Cleaning

Clean restrooms reflect positively on your employees, customers, and visitors. To reach this goal you need to use the right chemicals in the right way. Look for restroom cleaning products that:

- Easily remove soil from counters, floors, walls, and fixtures.
- Eliminate bacteria, germs, and viruses.
- Make the restroom appear and smell clean.
- Are safe to both the user and building occupants.
- Have minimal environmental impact.

Use mild products for regular daily cleaning.

Use stronger products only for weekly deep cleaning.

Avoid ingredients that are poisonous or that harm the environment.

Wear protective gloves and goggles when mixing or using any cleaning products.

You can maintain clean and sanitary restrooms by following a two-level cleaning schedule - a combination of regular daily cleaning and weekly deep cleaning.

Regular Daily Cleaning

Trash removal, surface cleaning, disinfection, and restocking supplies needs to be done daily for most commercial or office restrooms.

Facilities in airports, restaurants, and other high traffic sites may need more frequent touch-up cleaning and restocking of soap and paper supplies.

Routine cleaning involves the following tasks:

- Removing trash & replacing can liners;
- Refilling dispensers;
- Dusting high surfaces;
- Cleaning toilets & urinals with a non-acid bowl cleaner;
- Cleaning showers with a non-acid soap remover;
- Cleaning mirrors and other class surfaces;
- Cleaning walls, ceiling, partitions, doors, & light switches;
- Disinfecting all surfaces and fixtures; and
- Vacuuming floor and wet mopping with a cleaner/disinfectant.

Some products combine cleaning and disinfecting ingredients into one container. These combined products work well only on surfaces that are already relatively clean. For dirty surfaces it is important to clean first, and then apply a separate disinfectant. To work well, this disinfectant must remain in place for at least 10 minutes.

Fairly mild products are available for daily restroom cleaning. Such products are reasonably safe to use, and have little environmental impact. Check the supplier's directions, and mix the cleaning product with as much water as you can. A dilute product is usually safer to use than a concentrated one.

Deep Cleaning

Deep restroom cleaning needs to be done weekly in most cases. However, a deep cleaning may also be required when you do a restroom for the first time, or when you encounter particularly dirty situations. High traffic restrooms may need a deep cleaning once a day, even if routine cleaning is done more frequently.

Most deep cleaning can be done with your regular chemicals, perhaps mixed with less water so that they are stronger. In addition, it may be necessary to spend more time removing soils with brushes and scrub pads.

However, some deep cleaning tasks require stronger chemical products to remove stubborn deposits or stains. Examples include:

- Removing graffiti;
- Cleaning stained toilet bowls; or
- Removing shower tile deposits.

Important Safety Tips

Use stronger chemicals sparingly and carefully to avoid harming the user or building occupants. Be sure that each janitor is well trained, and if possible, have your people work in buddy teams when using stronger chemicals.

Corrosive chemicals (acids or caustics) can blind you in seconds.
Always wear goggles to protect your eyes.

Corrosives can also damage your skin and leave scars.
Wear gloves to protect your hands.

Some poisonous chemicals absorb through your skin.
Always wear gloves when using products containing glycol ethers or ethanolamines.

Some poisonous chemicals are easily inhaled.
Be sure that your work area has enough ventilation.

Mixing different products together can create poisonous chemicals.
Avoid mixing products, and be sure to rinse out work buckets after each use.

Restroom Cleaning Ingredients

Manufacturers make several products for restroom cleaning. These products range from mild to strong, and have many different ingredients. Some of these cleaning products have acids and other chemicals that can harm you.

The following table lists chemical ingredients commonly found in strong restroom cleaners. Some are relatively safe if you wear gloves and goggles, while others you should not use. In addition, there are some chemicals that may be safe to a janitor wearing gloves and goggles, but that can harm the environment.

Use Extreme Care or Avoid - Health Risk To Janitor

Butane or Isobutane (aerosol propellants)
Diphosphonic Acid
Ethanolamines
Glycol Ethers (such as butoxyethanol)
Hydroxyacetic Acid
Phosphoric Acid
Propane
Quaternary Ammonium Chloride
Sodium Bisulfate
Sodium Carbonate
Sodium Hydroxide

Do Not Use - Severe Health Risk To Janitor & Building Occupants

Bleach (Sodium Hypochlorite)
Hydrochloric Acid
Nitrilotriacetate
Nitrilotriacetic acid
Paradichlorobenzene
Perchloroethylene
Phenol
Tetrachloroethylene

Avoid if Possible - Will Harm The Environmental

DiButyl Phthalate
Nonyl Phenyl Ethoxylate
Octyl Phenyl Ethoxylate

In addition, sewer districts prohibit discharges of some of these chemicals, such as paradichlorobenzene, phenol, and tetrachloroethylene, as well as acids or bases that are corrosive (having a pH less than 4-5 or greater than 11-12). Avoid products that make your sewer discharge illegal.

Glass Cleaning

Most window and mirror cleaners are relatively safe to use, and have only a small impact on the environment. However, some cleaners contain glycol ethers and other chemicals that are harmful.

Use the mildest product you can find, and always wear gloves and goggles to protect yourself.

Use a mild cleaner with alcohol or ammonia for daily glass maintenance.

Avoid glass cleaning pro ducts that are flammable.

Use products that are packaged in a trigger bottle rather than an aerosol can.

Some degreasers contain butoxyethanol or similar toxic ingredients - always protect yourself by wearing gloves and goggles.

Regular Glass Cleaning - Use a mild alcohol or ammonia cleaning product for your daily glass maintenance.

Disinfection - If you need to disinfect the surface, use a product that contains Alkyl Ammonium Chloride to kill germs.

Grease Removal - Sometimes grease, fingerprints, or other oily deposits are found on the glass you are cleaning. Your regular daily cleaner might not remove these materials.

In that case, use a stronger degreasing cleaner with butoxyethanol. Apply the cleaner with a scrub pad if a rag or squeegee doesn't work. Afterwards, you may need to finish the job by using your regular cleaner to remove streaks left by the degreaser.

Degreasers with butoxyethanol and other strong ingredients can harm you, so always protect yourself with gloves and goggles.

Spray the degreaser onto your rag or brush, and then wipe the glass surface. If that doesn't work, then carefully spray the degreaser directly onto the glass. Hold your rag nearby to prevent overspray.

Do not use any degreasers made for auto repair work. These often contain flammable ingredients such as naphtha or hexane, or a dangerous cancer-causing chemical called tetrachloroethylene.

Metal Cleaning

Most metal cleaners are relatively safe to use, and have only a small impact on the environment. However, some cleaners contain chemicals that are harmful.

Use the mildest product you can find, and always wear gloves and goggles to protect yourself.

Use a mild cleaner for daily metal polishing.

Avoid metal cleaning products that are flammable.

Use products that are packaged in a trigger bottle rather than an aerosol can.

Some degreasing cleaners contain toxic ingredients - always protect yourself by wearing gloves and goggles.

Regular Metal Cleaning - Use a mild cleaning product for daily maintenance.

Disinfection - If you need to disinfect the surface, use a product that contains Alkyl Ammonium Chloride to kill germs.

Grease Removal - Sometimes grease, fingerprints, or other oily deposits are found on the metal you are cleaning. Your regular daily cleaner might not remove these materials.

In that case, use a stronger degreasing cleaner with butoxyethanol or a similar ingredient. Spray this degreaser onto your rag or brush, and then wipe the metal surface. If that doesn't work, then carefully spray the degreaser directly onto the metal, while holding your rag nearby to prevent overspray. Let the degreaser sit on the metal briefly, and then wipe it up. Afterwards, you may need to finish the job by using your regular cleaner to remove streaks left by the degreaser.

Degreasers with butoxyethanol and other toxic ingredients can harm you, so always protect yourself with gloves and goggles. In addition, take care to keep metal degreaser liquids out of the sewer system (for example, when cleaning sinks or drinking fountains.

Do not use degreasers that contain flammable ingredients such as naphtha or hexane, or cancer-causing chemicals such as tetrachloroethylene.

Disinfectants

According to the Federal Center for Disease Control, a thorough cleaning of sinks, toilets, doorknobs, and other hard surfaces that people frequently touch is the first and most important step in preventing the spread of disease.

Even though a good cleaning removes many of the germs living on these surfaces, the ones left behind soon begin to grow and reaccumulate. Therefore, to be safe most janitors also use a disinfectant product to kill the bacteria and viruses that are present. It usually isn't possible to kill everything, including spores. Doing so would require the use of a sterilizer (such as hospitals use for medical equipment).

Disinfectant products work by oxidizing the germs, breaking down their cell walls, or otherwise deactivating them. Different ingredients or combinations of ingredients kill different germs. Therefore you either need to select a disinfectant that works on the specific germs you are trying to get rid of, or select a broad-spectrum product that works on all of the germs that you might encounter.

Disinfectants can harm you - always protect yourself by wearing gloves and goggles.

Use a disinfectant that kills the specific germs in your building.

Follow product mixing instructions, and make up only as much as you need.

Leave the disinfectant in place long enough for it to do its job - up to 10 minutes or so for best results

Use an ultraviolet light to see how well you are disinfecting.

How can you tell what germs a disinfectant product will kill? Check the container label or product fact sheets for an EPA Number. Most commercially available disinfectants register their effectiveness claims with the EPA.

In order to kill germs your disinfectant must stay wet on the surface for about 10 minutes. Because this time is longer than what most janitorial situations allow, a thorough pre-cleaning of the surface is very important.

Regular Disinfection - So what should you do? Clean thoroughly. Use a mild but effective disinfectant product, and use as little of it as possible. Always wear gloves and goggles to protect yourself.

It is usually enough to use an institutional grade disinfectant product for daily hard surface maintenance. In addition, milder sanitization grade products may be used on carpets or in toilet tanks where the goal is to reduce germs to a safe level (typically 0.1%), rather than completely eliminate them.

Deep Disinfection - In some cases you may need to deeply disinfect a part of your building (for example, to clean up where someone has been injured). In that situation, or if you are working in a health care setting, it is important to use a hospital grade disinfectant product. Such products accomplish a more thorough

job and kill a broader range of pathogens; however, they are generally more hazardous than institutional grade disinfectants.

Combined Cleaning & Disinfection - Some products, primarily those containing quaternary ammonium chlorides, may be used for both cleaning and disinfecting. These products work best upon surfaces that are already fairly clean, or when they are used twice in a row - once to clean, then to disinfect.

Pollution Prevention Ideas - Because of the potential health risks and impacts on the environment it makes sense to minimize the amount of disinfectant that you use. There are four ways to accomplish this goal:

1. Select the right product. It is best to use a product that contains the specific EPA-registered ingredients needed to kill the germs found in your building. Using the wrong disinfectant wastes your time and money, and doesn't remove the germs.

2. Plan how often to disinfect. Evaluate the amount of traffic your building gets and identify the surfaces that people touch most often. Use an ultraviolet light to reveal how soon germs reappear after cleaning, and then schedule your disinfection work accordingly. Also check disinfection guidelines published for your situation by EPA, Center for Disease Control, and other agencies.

3. Control product mixing. Using full strength disinfectants may be reassuring, but this practice is seldom warranted so it just wastes chemicals. In addition, using the full strength product is more dangerous to the user. Therefore, make sure that your janitors dilute their disinfectants according to the manufacturer's directions. Typical dilutions are 1 part concentrated product to something in the range of 125 to 500 parts water.

4. Use correct methods. Disinfectants need to be in contact with the germs they are intended to kill. That means the surface must first be cleaned to the point where it is free of dirt, grease, and oil. Then the disinfectant must be thoroughly applied, and left in place for 10 minutes. It may be necessary to do the work in a new sequence so as to allow this longer contact time. For example, consider doing a pre-cleaning the surfaces and applying the disinfectant throughout a restroom, and then go on to empty the trash and refill paper dispensers.

Chemical of Concern - Six ingredients are commonly used as disinfectants in today's janitorial products, with the choice depending upon both the type of building being maintained and the specific pathogens present.

Each of these ingredients can impact the janitorial user, building occupant, and the environment in general. Careful storage, mixing, and use of disinfectant products can reduce these impacts.

	Potential Impacts			
Ingredient	User	Surfaces	Occupants	Environment
Quaternary Ammonium Chlorides	Eye & skin burns	Stains floor tile	Usually none	Medium
Phenols	Eye & skin burns	Corrodes plastic surfaces	Usually none	High
Sodium Hypochlorite (Bleach)	Eye & skin burns; Vapors harmful	Corrodes metal surfaces	Affects indoor air quality	Medium to High
Hydrogen Peroxide	Eye & skin burns; Vapors harmful	Corrodes metal surfaces	Affects indoor air quality	Medium to High
Alcohols	Absorb thru skin; Vapors harmful	Usually none	Affects indoor air quality	Low to Medium
Iodine	Eye & skin burns	Stains many surfaces	Usually none	High

Source: H. Temkin, Disinfectant Overkill Tempts Managers, <http://www.cmmonline.com>

Take care to review each product's material safety data sheet for other ingredients that may harm the user. For example, be wary of combined cleaner-disinfectants that contain butoxyethanol or ethanolamine.

Where To Get More Information - For information on a specific product, refer to supplier instructions and material safety data sheets.

In addition, read "Cleaning & Maintenance Management" , "Services", and other trade magazines that contain general information about disinfectant products and their ingredients. Some of these publications also list their articles on the internet. For example, refer to <http://www.cmmonline.com>.

You should also consider contacting your health department, county hospital, or local sewer agency. If you do a lot of disinfection work it might also make sense to retain the services of an industrial hygiene professional.

LIMPIEZA SEGURA Y EFECTIVA PARA LOS INODOROS

Muchos limpiadores para los inodoros o tazas del baño tienen ácido y otros químicos que son dañinos. Use el producto más suave que encuentre y siempre use guantes para protegerse.

La mayoría de los limpiadores que no tienen ácido son relativamente seguros para usar y sólo tienen un impacto pequeño en el medio ambiente. Los desinfectantes requieren un poco más de atención pero son bastante seguros. Los limpiadores que tienen ácido son los más peligrosos.

Use un limpiador suave para el mantenimiento diario de los inodoros.

A menos que los inodoros ya esten en buenas condiciones, límpielos primero y luego use otro desinfectante.

Utilice limpiadores ácidos sólo cuando haya manchas muy difíciles de sacar.

Los limpiadores ácidos son muy peligrosos, prtotéjase siempre con guantes y gafas (lentes que le cubran los ojos).

Los ácidos corroen el metal. Use limpiadores ácidos solo en inodoros de porcelana.

No combine ácidos con decolorantes. Esto crea un gas que le puede matar.

***La limpieza regular*-** use un producto de limpieza fuerte sin ácido para el mantenimiento diario de los inodoros. No use decolorante o cloro. En vez de eso, use un desinfectante que contenga cloruro de amonia para matar los gérmenes.

Algunos suministradores combinan un limpiador y desinfectante en un solo producto. Sólo se debería usar esta combinación si el dispositivo del inodoro no esta demasiado sucio.

De otra manera, se debería limpiar los inodoros primero y después utilizar un desinfectante por diez minutos para obtener buenos resultados.

***Sacando manchas*-** A veces, las manchas de cal, moho, u otros depósitos fuertes se pueden formar en el inodoro. Es posible que su limpiador regular no pueda quitar estos materiales.

Usted tiene dos opciones: Usar un limpiador de polvo y un cepillo para restregar la taza o usar un limpiador ácido.

Ya que los ácidos pueden hacer daño muy rápido, siempre se debe proteger utilizando guantes y gafas. Derrame el limpiador ácido en una manera que no salpique. Use su cepillo con cuidado para evitar las salpicaduras. Cuando usted haya terminado, bájele a la taza del inodoro dos veces para eliminar el exceso de limpiador.

Fact Sheets - Specific Ingredient Hazards

2-Butoxy Ethanol

Glycol alkyl ethers are commonly used as solvents. 2-Butoxy Ethanol is one of the most toxic of the glycol ethers. You should use products containing butoxyethanol with extreme care. It is a poison that can easily absorb through your skin to harm you. When working with it, always wear gloves and goggles and be sure that you have enough ventilation.

HAZARD SUMMARY [1]

* 2-Butoxy Ethanol can affect you when breathed in and by passing through your skin.

* Exposure can irritate or burn the eyes, nose, and throat. Higher exposures may cause you to become dizzy, lightheaded, and to pass out.

* High or repeated exposure can break down red blood cells, and cause anemia. It can also damage the liver and kidneys.

*Breathing the vapor can irritate the lungs and cause a build-up of fluid (pulmonary edema). This can cause death.

Acute Health Effects - The following acute (short-term) health effects may occur immediately or shortly after exposure to 2-Butoxy Ethanol:

* High exposures may cause you to become dizzy, lightheaded, and to pass out.

* 2-Butoxy Ethanol can break down red blood cells. This can cause a low blood count (anemia). It may also damage the liver and kidneys.

* Breathing the vapor may irritate the lungs, causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema). This can cause death.

* The liquid can cause eye burns and may cause temporary blurred vision. It may also irritate the skin, causing a rash or burning feeling on contact.

* Exposure to the vapor can irritate the eyes, nose, mouth, and throat.

Chronic Health Effects - The following chronic (long-term) health effects can occur at some time after exposure to 2-Butoxy Ethanol and can last for months or years:

Cancer Hazard According to the information presently available to the New Jersey Department of Health, 2-Butoxy Ethanol has not been tested for its ability to cause cancer in animals.

Reproductive Hazard According to the information presently available to the New Jersey Department of Health, 2-Butoxy Ethanol has not been tested for its ability to adversely affect reproduction.

Other Long-Term Effects Long-term exposure can cause the breakdown of red blood cells, resulting in anemia. 2-Butoxy Ethanol may damage the liver and kidneys. Very irritating substances may affect the lungs. It is not known whether 2-Butoxy Ethanol causes lung damage.

[1] New Jersey Workers' Right-to-Know Fact Sheet

Dibutyl Phthalate

Dibutyl Phthalate is used as a solvent in many janitorial products. Its harm to the user is limited because it usually must be eaten in order for the effects to be felt. However, dibutyl phthalate persists in the environment, and damages the hormone systems of animals. It is strongly suspected that humans eating these animals will be harmed as well.

HAZARD SUMMARY [1]

Dibutyl Phthalate can affect you when breathed in.

Dibutyl Phthalate may damage the developing fetus and may also damage the testes (male reproductive glands).

Contact may irritate the eyes and skin.

Exposure may irritate the nose and throat.

Acute Health Effects - The following acute (short-term) health effects may occur immediately or shortly after exposure to Dibutyl Phthalate:

Contact can irritate the skin, and the eyes. Exposure to the vapor or aerosol can irritate the eyes, nose, mouth, and throat.

Chronic Health Effects - The following chronic (long-term) health effects can occur at some time after exposure to Dibutyl Phthalate and can last for months or years:

Cancer Hazard - According to the information presently available to the New Jersey Department of Health, Dibutyl Phthalate has not been tested for its ability to cause cancer in animals.

Reproductive Hazard - Dibutyl Phthalate may damage the developing fetus in humans since it has been shown to be fetotoxic in animals. It may also damage the testes (male reproductive glands).

Other Long-Term Effects - Dibutyl Phthalate has not been tested for other chronic (long-term) health effects.

[1] This information is quoted from: New Jersey Workers' Right-to-Know Fact Sheet, which is on the internet at <http://www.state.nj.us/health/eoh/rtkweb/0773.pdf>.

Additional information regarding phthalates appears on the internet at:

http://www.greenpeace.org.uk/science/hdc/maff2.html
http://www2.ec.gc.ca/cceb1/eng/bbp_summary.htm
http://www.cooper.edu/~ahmed/intro.html#ToC
http://www.maff.gov.uk/food/infsheet/

Ethanolamine

Mono-, Di-, and Tri-ethanolamine are compounds that appear as surfactants in floor finish strippers, degreasers, and other janitorial products.

The following is quoted from the Fisher MSDS for Monoethanolamine, which may be obtained on the internet at <http://www.fisher.com>.

Danger! Causes eye burns.
Causes digestive tract burns.
Causes respiratory tract irritation.
Causes skin irritation.
Corrosive.
Combustible liquid.
May cause central nervous system depression.
May be absorbed through the skin.
May cause liver damage.
May cause kidney damage.

Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects

Eye: Causes severe eye irritation.
Causes eye burns.

Skin: Causes moderate skin irritation.

May be absorbed through the skin in harmful amounts.

Ingestion: Causes gastrointestinal tract burns.

Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation.

Chronic: May cause liver and kidney damage. Diethanolamine and related compounds are in the process of being declared to be carcinogenic.

Hydrochloric Acid

Strong acids are used in toilet bowl cleaners and in some specialty products such as rust removers. These acids are corrosive, and can cause instant and permanent blindness and skin injury to the unprotected user. Wearing goggles and gloves buys critically needed time to reach an eye wash or shower.

Nitrilotriacetic Acid

Nitrilotriacetic acid trisodium salt monohydrate is used in synthetic detergents - primarily in carpet shampoo. According to the NIEHS:

> “Nitrilotriacetic acid (NTA) is a synthetic amino-polycarboxylic acid chelating agent used chiefly as a replacement for phosphates in detergents. NTA sequesters magnesium and calcium ions present in hard water, which would normally inhibit the activity of detergent surfactants.” *

This ingredient is suspected of causing cancer. It is listed as such by California's Proposition 65 (Workers' Right-to-Know legislation), and by RTECS# AJ1070000.

* Source: US EPA
<http://ntp-db.niehs.nih.gov/NTP_Reports/NTP_Chem_H&S/NTP_Chem1/Radian18662-53-8.txt>

Octyl Phenol Ethoxylate / Nonyl Phenol Ethoxylate

These two members of the Alkyl Phenol Ethoxylate family of surfactants (APEs) appear in a number of janitorial products. The ability of APEs to harm to the user is limited because they usually must be eaten in order for their effects to be felt.

However, all of the APEs persist in the environment and even in very small amounts can damage the hormone systems of animals. It is strongly suspected that humans eating these animals, or drinking from supply systems that draw river water downstream of sewage treatment plants, will be harmed as well.

OSHA Regulations do not yet require that APEs be listed on material safety data sheets. Therefore, to find out about the presence of APEs in your products you must ask the technical service people at the manufacturer.

There is a great deal of emerging information on the impact of APEs on the internet:

http://www.epa.gov/endocrine
http://www.sdahq.org/sdalatest/html/techform1.htm
http://www.ciit.org/INSIGHTS/endomys.html
http://www.tmc.tulane.edu/ecme/EEHome/default.html

The Washington Toxics Coalition has issued a report regarding APEs. Copies may be ordered by contacting WTC at (206) 632-1545.

Canadian efforts to evaluate APEs are available in a report from:

Susan Sang, Ph.D.
Wildlife Toxicology Program
245 Eglinton Avenue East, Suite 410
Toronto, ON M4P 3J1
Tel: 416-489-4567 Ext. 260 • Fax: 416-489-3611
e-mail: ssang@wwfcanada.org

Other information is available from European sources:

http://www.foe.co.uk/camps/indpoll/suschem.htm

Tetrachloroethylene; Perchloroethylene; "Perc"; Dry Cleaning Fluid

Tetrachloroethylene is a chlorinated solvent found in metal cleaners and carpet spot removal products. It evaporates readily, is very easy to inhale, and causes cancer.

You should not use any product containing tetrachloroethylene.

Risks from Exposure *

- Tetrachloroethylene can affect you when breathed in and by passing through your skin.
- Tetrachloroethylene should be handled as a CARCINOGEN.
- It may damage the developing fetus.
- High exposure can cause you to become dizzy and lightheaded and to pass out.
- It can cause the heart to beat irregularly or stop. This can cause death.
- Severe liver and kidney damage can occur.
- High exposure may cause a build-up of fluid in the lungs (pulmonary edema).
- Contact can cause eye and skin burns.

Acute Health Effects - The following acute (short-term) health effects may occur immediately or shortly after exposure to Tetrachloroethylene:

High exposure can cause you to become dizzy, lightheaded, and to pass out. Overexposure can cause the heart to beat irregularly or stop. It can also damage the liver and kidneys enough to cause death.

Breathing the vapor may irritate the lungs, causing coughing and/or shortness of breath. Higher exposure can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency. The start of these effects can be delayed for many hours.

Contact can cause severe skin burns, and can cause eye burns.

Exposure to the vapor can irritate the eyes, nose, mouth and throat.

Chronic Health Effects - The following chronic (long-term) health effects can occur at some time after exposure to Tetrachloroethylene and can last for months or years:

Cancer Hazard

Tetrachloroethylene may be a CARCINOGEN in humans since it causes liver cancer in animals.

Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

Tetrachloroethylene may damage the developing fetus.

Other Long-Term Effects

Tetrachloroethylene may damage the liver and kidneys with high single exposures or lower repeated exposures.

Long-term exposure can cause drying and cracking of the skin.

* Source: USEPA, as reported by the New Jersey Workers' Right-to-Know series of chemical safety data sheets.

Example Tools

Example Commentaries

Adding Labels To Your Containers

Labels are essential to identify hazardous and non-hazardous materials. They identify what's inside. If the material is a waste, a label tells us how long it has been there. Labels are required for used material or waste collection containers.

If a container loses its label, or if you feel that the original label does not provide all the information you want, prepare a replacement. An example of such a label is provided below:

ABC Glass Cleaner

HAZARD - Moderate Eye Irritant
Flammable

Contains Isopropanol

CAUTION!
MAY CAUSE EYE IRRITATION
Avoid contact with eyes.
Wash thoroughly after handling
FIRST AID: In case of contact, immediately flush eyes with plenty of water.
Call a physician if irritation persists.

Use Instructions
Apply to surface with a sponge. Wait 5 minutes. Wipe off.

For additional information, see Material Safety Data Sheet for this chemical

ABC CHEMICAL COMPANY
One Industrial Drive
Anytown, NJ 08010

This page was adapted from the City of Phoenix training program for Hazardous Materials Inventory Management.

Buying Environmentally Preferable Janitorial Products

Purchasing of environmentally preferable (EP) products inevitably involves a process of behavior change. End users such as mechanics, custodians, and office staff have been using traditional products for many years, and are often satisfied with their results. When environmental managers suggest a switch to EP products, they are usually met with resistance simply because any change is difficult, and it is human nature to resist change. Yet behaviors can be changed, and attitudes towards new products and systems improved. Behavior change involves much more than just issuing a carefully-worded policy statement or telling janitors to switch product "A" for product "B".

A careful review of EP purchasing efforts across the country reveals a common approach in programs that have successfully changed purchasing behaviors. Listed below are the four common elements in these programs:

Management Support
Purchasing Agents
Environmental Staff
Training of End Users

We call this the "Sandwich Approach" to environmental purchasing. All elements must be in place or the "sandwich" will fall apart.

Obtain Management Support

Support from decision-level management is important if the program is to be successful. For small pilot projects, support from the facility manager of a single building may be adequate. For larger programs support from city administrators or elected officials may be required. Support at this level is imperative if busy managers and staff are to give sufficient time to implement the change.

Train End Users

No matter how well worded the policy or how effective the product, if the people implementing the change do not believe in the program, all efforts are doomed to fail. Attitudes like "if it doesn't smell like bleach it won't clean" or "if its got Environmental on the label it must be weak, and will result in more effort on my part to get the job done" must be addressed head on. These attitudes can also result in overuse of product, a practice which is potentially harmful to the user and is not good for the environment.

End users must be trained by a credible source, not by the environmental staff at their agency, who probably have never cleaned a public restroom. In addition, including these end-users early on in product selection and testing will turn skeptics into stake-holders. End users often become the best trainers, and should be used as models of success when approaching new departments.

Involve Purchasing Agents

In all large institutions, purchasing is done according to a complex and detailed set of regulations and policies. Bid processes are accountable to public scrutiny, and budgets are carefully guarded by elected officials and civil servants. Purchasing agents are skilled in locating almost any commodity, and are well trained in the evaluation of lowest cost bids.

Purchasing agents are usually not trained to develop environmental criteria or to read a material safety data sheet to evaluate the human health impacts of various product ingredients. However, these agents are critical to the success of any institutional purchasing program. They assure that the bid process goes smoothly, and can help with the enforcement of EP purchasing policies by rejecting requests for products that do not have the required approval of an environmental office.

Involve Environmental Staff

One of the most challenging and time-consuming aspects of EP Purchasing is defining what is meant by Environmentally Preferable. Unfortunately no universal definition exists for any product category, and each locality may find it has a unique set of priorities regarding human health and environmental protection. The environmental staff must provide the technical expertise and work with end users to determine product specifications. Purchasing agents and end-users do not have the time to develop technical specifications, and such details are rarely spelled out in the policy issued by top management. The environmental staff must become the accountable member of the team whose job it is to facilitate all elements of the “sandwich”.

Set Up The Purchasing System

Once the “sandwich” is set in place, the purchasing process is ready to begin. There are five key steps in this process of procuring EP products and services:

Step 1: Establish Desired Goals
Step 2: Design an Effective Bid Process
Step 3: Review and Score Vendor Responses
Step 4: Test Product Effectiveness
Step 5: Award Purchase Order(s)

Adopted from a forthcoming article in Pollution Prevention Review by Thomas Barron, Debbie Raphael, and Lara Sutherland.

City of San Jose Case Study

The Search For Safer Cleaning Products

Steve Lopez, Building Services Supervisor for the City of San Jose, has been involved for over 25 years in the building maintenance field, both with hands-on experience and in management. He has always stressed the importance of worker safety, and wanted to take a fresh look at products used in his department. As a result he asked the Janitorial Pollution Prevention Project team to review products that were being used by his custodians. This review led Mr. Lopez to decide that some of these products exposed his staff to unacceptable health risks. In hopes of finding alternatives for the City, he offered to assist the JP4 team in their search to find effective environmentally preferable cleaning products.

IDEAL TEST CREW Mr. Lopez had already established a test crew to evaluate all new products considered for City use. With plenty of prior experience assessing new products, the five member Main Library cleaning crew made an ideal test group. In three months they worked with project members and tested over 30 products for a range of cleaning functions including: General Purpose, Toilet Bowl, Tile/Bath, Glass, Disinfectant, Metal Polish, and Graffiti Remover.

WHAT MADE TESTING A SUCCESS Weekly meetings were a necessity for the crew to discuss successes and failures throughout the test process. Although the cleaning staff was accustomed to evaluating products, there were new things to consider when testing "green" cleaners. For example, green products sometimes need more surface exposure time to be effective. Test crew members were at first reluctant to use products that could negatively impact their productivity. However, the weekly crew meeting offered a forum to discuss this issue, and the crew members soon established a change in their daily cleaning routine to make the products work better. The crew decided that when using toilet cleaners, for example, each employee should apply the cleaner in the toilet bowl at the beginning of a restroom routine. The custodian would then proceed to empty trash cans and restock paper products before returning to scrub the toilets. After three months of similar routine changes and evaluations, the test crew established a list of 19 environmentally preferable cleaning products that work effectively.

EXPECTED RESULTS As a result of these tests, the City of San Jose is considering a number of safer cleaning products. Switching to these alternative cleaners would primarily reduce the use of: - Butoxy Ethanol (poisons blood, liver, and kidneys); - Sodium Hydroxide (corrosive to eyes and skin); - Alkyl Phenol Ethoxylates (affect hormone systems); and - Hydrochloric Acid (corrosive to eyes and skin). The project team estimates that changing away from products with these ingredients will decrease the Main Library's hazardous chemical use by at least 1300 pounds per year.

Conducting Effective Product Trials

We simplified our trials by limiting tests to the following 7 product types.

You might want to do the same at your facility. Start with a few products, and then work your way through the others after you have organized your test program and you have worked the bugs out of it.

- General Purpose Cleaner
- Toilet Bowl Cleaner
- Bath and Tile Cleaner
- Window / Glass Cleaner
- Graffiti Remover
- Metal Polish
- Disinfectant

We contacted our list of suppliers and invited them to submit any safer and environmentally preferable products that they offer for the above cleaning functions. Specifically, they were asked to submit a product sample, product MSDS, product instruction sheet and a bottle label for each product.

First, we reviewed product literature and eliminated products based on toxicology information. Our product screening questions are listed on another part of our web site.

It is important to note that many suppliers have "green" products that will not meet our suggested standards. For example, one vendor submitted an entire line of products that did not pass this first step.

Then we gave the products to professional cleaning crews to evaluate cleaning effectiveness. Three cleaning crews volunteered to assist us with our hands-on product evaluations:

- City of San José Main Library crew (5 members)
- City of San José Maintenance Yard crew (2 members); and
- County of Santa Clara Hall of Justice crew (4 members).

The product evaluation form we used is available as a PDF file.

The following are some additional lessons we learned while conducting our product trials.

Select the Right Test Crew - When selecting where to test new products it is important to chose a crew with consistent work attendance, with experienced senior employees, and with focused cleaning responsibilities. The San Jose City Main Library Crew was helpful because one of their regular job functions was to be the test crew for all new products for the City. The County Hall of Justice team was helpful because they had a well respected senior staff member.

Establish Crew Buy-In and Involvement - Before testing any products, have a team meeting with the test crew and emphasize why you are testing alternative products. Our testing was successful in large part because each

test crew knew that their upper management was looking for safer alternatives to current products. They also knew they were being asked to participate in a way that would directly influence the decision.

The following are examples of questions you can ask to help find ways to effectively involve the crew in the test process. Some of these questions are simple, but their answers can provide you with a lot of valuable information. You can use our survey form, or make one of your own.

- What products are you currently using? Answering this early on will help determine exactly what sample replacement products to offer for trial.

- How much product are you using on average? Cleaning crews vary in the amount of product used, so you need to know how much product you need to give your test crew.

  Example: Each member of the County of Santa Clara Hall of Justice cleaning crew uses a 32 oz bottle of glass cleaner each day, where it takes a month for the entire San Jose City Main Library crew to empty a 32 oz bottle of glass cleaner. This information will determine how much product to give the tester so they may conduct a fair evaluation. The County crew received a 32-oz bottle per product / per person while the 5-person City crew shared a 32-oz bottle.

- What is your daily cleaning routine? Answering this question will be helpful in establishing when a change to the routine is needed to adopt a product.

  Example: One crew member was understandably resistant to testing any products that would take more time for cleaning. She complained that she hardly had time to complete her current cleaning tasks.

  We verbally walked through her daily routine and discovered that she could spray the surface cleaner in the bathroom, spend 10 minutes emptying trash cans on her floor, and then return to wipe up the cleaner (rather than spraying and waiting idly while the product worked).

- What are your toughest cleaning challenges? These are the people who will be using the products you change to, so their buy-in is essential. If you can find a safer product to tackle their toughest problem that buy in will be accelerated.

  Example: One crew member complained about the oily residue left on metal from their current metal cleaner. His evaluation for one of the alternatives read "This is the best product I've ever used on stainless. It works super in the elevators." He was sure to share that experience with the rest of his crew and his buy-in was affirmed.

Introduce Your Test Phase Timeline & Hold Regular Meetings - Share with the test crew your suggested timeline for the hands-on test phase. Include plans for reviewing their test evaluations and discussing problems/questions that arise.

Our testing process included a weekly meeting where new products were given to the test crew and a discussion was held about the previous weeks' successes and failures. This discussion sometimes consisted of identifying barriers to the test process, and other times consisted of sharing mutual support of successful products.

Establishing the timeline provides a necessary structure for you and the test crew to work within, and can reinforce the spirit of a team collaborating on a project.

Give the Test Crew Products and Instructions - We determined that because our test phase involved numerous products for one cleaning function it was easier to test products according to cleaning function rather than according to vendor. For example, the cleaning crew first tested all glass cleaners, then all general purpose cleaners, etc.

Along with the product samples themselves, the crews were given a copy of each product MSDS and instruction sheet for reference. In addition each member of the crew received an evaluation form to give feedback on each product tested. A sample evaluation form is on the following page.

Do Hands-On Testing Yourself - Whenever possible, join the test crew for some of their cleaning. Nothing emphasizes the importance of the project more than getting in the dirt yourself and testing the products with them.

How Often Are Janitors Injured?

What injuries do your janitors actually experience, and how much do these injuries cost you?

Recent workers' compensation data from the < Site > show that six out of every hundred janitors have lost-time injuries every year. Some of these injuries are reported; most are not.

- 40% of these injuries involve eye irritation or burns;
- 36% involve skin irritation or burns; and
- 12% involve breathing chemical fumes.

How significant are these injuries? We found that each reported workers' compensation incident requiring medical treatment took the worker off of the job for an average of 18 hours. Medical costs averaged $375 per claim, while lost time for the worker and his or her supervisor are estimated as $240 per claim. That makes the total cost equal to $615 for each workers' compensation claim.

How Do Your Injuries Compare?

	Typical Contractor	Your Experience?
Number of Janitors	100	
Accidents Per Year	Up to 6 Accidents With Lost Time	
For Each Accident Lost Time	18 hours per accident	
Cost For Janitor's Lost Time	18 hours $180	
Supervisor Lost Time	4 hours $60	
Medical Cost	$375	
Cost Per Accident	$615	
Cost Per Year For 6 Injured Janitors	$3,690	

In addition, if your people have lots of accidents your workers' comp. premiums will go up.

How Accidents Happen

This is a fictionalized account of a typical eye injury.

Thomas anxiously stood with his fellow workers as the foreman explained what tonight's work would be. The small basement room was unfamiliar to him and captured his attention. He found himself looking at the pipes overhead and at the shelves covering the wall next to him.

Thomas wondered at the confusing collection of bottles and cans filling these shelves. Why does anyone need so many chemicals? After all, we are only cleaning this place. He heard his name, and again paid attention to the foreman.

"You three new people will be cleaning the restrooms tonight", the foreman said. "Julio will be your lead and will show you what to do. We are short handed because some of our regular staff didn't show up. So you will have to hurry."

Julio gathered his crew and helped them select chemicals and equipment they would need from the shelves. He explained each item as he picked it up and placed it on the work cart. "Eye goggles and Rubber gloves", Julio said. "Wear them all the time when you are working. Here. Try the goggles on, and adjust the fit."

Thomas unwrapped the glasses and put them on his face. He didn't like the way they pinched his ears and kept sliding down his nose, so he took them off and put them in his pocket.

Next Julio placed several bottles onto the cart. "This blue one is for cleaning the mirrors. This yellow one is for the sinks. And this white one is for the toilets. Be careful - it can burn your skin. If you splash any on yourself, wash it off!"

An hour later, Thomas was worrying that he would never figure out this job. His team members seemed to finish their share of the work much faster than he. They were always ready to move on while he still had more toilets to clean. I'll have to cut out some steps, do things quicker, he thought. These glasses are getting in my way and are slowing me down. I can move faster if I leave them off.

In the next restroom he put his plan into action. Taking the white bottle, he hurried from one stall to the next. He quickly poured some of the cleaner into each toilet, swirled his cleaning brush around the bowl, and moved on.

Thomas made it through four more restrooms before his luck ran out. The white bottle of bowl cleaner was almost empty, so he hurriedly poured all of what was left into the first toilet. Some of it splashed up into his face.

The next thirty seconds permanently changed his life.

What Happens During An Eye Injury?

Elapsed Time	What Thomas Feels	What His Eyes Suffer
1 second	The first thing he feels is the wetness on his face.	The toilet bowl cleaner was 23% hydrochloric acid.
3 seconds	Then his eyes begin to sting.	The acid spreads over the eye surface.
5 seconds	He stands up blinking away the tears that are flowing from his eyes.	Corrosive burns begin on the eye surface, including underneath the lid.
7 seconds	The stinging quickly becomes pain. It seems that his eyes are on fire.	Permanent eye damage has begun.
10 seconds	Acting on reflex he hurrys to the nearby sink, thrusts his face under the tap, and turns the water on full.	The eye surface is being corroded away.
15 seconds	He quickly switches the water from side to side washing each eye in turn.	The water begins to wash away some of the acid, but the pH in the eye is still less than 1. The under side of the eyelid starts to burn.
20 seconds	But the pain continues to increase.	Nerve cells in the eyelid begin to die.
1 minute	His coworkers join him at that point drawn by Thomas' painful cries.	One third to one half of the acid has been washed out of the eyes.
20 minutes	They help Thomas wash out his eyes for 20 minutes, at which point his pain becomes almost bearable.	All of the acid has been washed out of Thomas' eyes. Pain still prevents him from opening his eyes.
1 hour	The crew then take him to the emergency room at a nearby hospital.	Thomas discovers that he has permanently lost 15% of his vision. He can no longer drive at night, and has trouble reading.

Minimizing Use of Janitorial Products

The following are examples of successful pollution prevention strategies for reducing the use of janitorial chemicals. These examples are from a series of fact sheets published on the internet by the Janitorial Products Pollution Prevention Project. Two of these fact sheets are included at the back this section of the workbook.

- Chemical Substitutions - Changing from highly-toxic to less-toxic ingredients. A number of effective, easy-to-use, and low-toxicity janitorial products are now becoming available. Because earlier "green" products did not always meet janitors' expectations, extensive product trials are usually necessary to convince skeptical users to make a change.

  Specific examples include changing from:

  Carpet shampoo with nitrilotriacetic acid to one made with ingredients that are not carcinogenic;

  Glass cleaner containing butoxyethanol to one formulated with isopropanol or non-hazardous ingredients;

  General purpose cleaner with alkyl phenyl ethoxylates, ethanolamine, or butoxyethanol to one formulated with linear alcohol ethoxylates, citric acid, or non-hazardous ingredients.

- Chemical Use Reduction - Decreasing the amounts of products with toxic ingredients that janitors use. Some cleaning tasks must use hazardous products because there are no effective substitutes. In these instances the pollution prevention message is to ask the janitor to dilute the product as much as possible, and to use it only when absolutely necessary.

  Floor finish strippers often contain ammonium hydroxide, ethanolamine, and butoxyethanol, making this product one of the most dangerous handled by janitors. Minimizing floor stripper use by 50% or more is possible by:

  Scheduling floor renewal work according to wear patterns rather than simply following a calendar;

  Diluting the stripper with as much water as possible (but not so much that the floor finish is removed unevenly);

  Carefully and thoroughly applying the diluted stripper;

  Using a rotating pad scrubber wherever possible; and

  Thoroughly rinsing the stripped floor so as to neutralize the surface prior to applying the new floor finish.

  Acid toilet bowl cleaners are another of the most hazardous janitorial products. Formulated with hydrochloric, phosphoric, or hydroxyacetic acid, these cleaners are very effective in removing hard water deposits and stubborn stains. However, this much cleaning power is not normally needed every day. Therefore a good pollution prevention strategy is to use two cleaners - a mild product for daily cleaning, and an acid cleaner that is only used when absolutely necessary. Adopting this strategy will usually decrease hazardous material use by over 80%.

- Building Perimeter Strategies - Managing the entry of dirt into the building is another way of accomplishing source reduction. Cleanable floor mats, double-door entry chambers, and positive air pressure are all very effective in preventing foot-borne dirt from entering the building in the first place. Less soil in the building means less frequent cleaning, which in turn requires less chemical use.

- Change Cleaning Process - Modifying the techniques janitors use for applying their cleaning products can accomplish source reduction. Many environmentally preferable cleaning products work best when they are applied to the surface with some force, and are left in place long enough to loosen and lift the soil that is present.

  Work sequencing therefore is important for the product to be used successfully. For example, the first thing a janitor should do in daily cleaning of a restroom is to apply mild cleaners to the sinks and toilet bowls. These cleaners should be left in place while the trash containers are emptied and paper dispensers are refilled. Then the janitor can quickly scrub and rinse the fixtures once the cleaners have been in place for a few minutes. This sequence takes no more time than cleaning the fixtures separately before removing trash and stocking paper supplies.

Other, longer-term pollution prevention strategies include designing buildings with easy-to-clean architectural features (e.g., keep carpets out of locker rooms), taking care that features with incompatible cleaning needs are kept apart from each other (e.g., not situating carpets and vinyl tiles together), and operating building air conditioning systems so as to minimize the movement of dust.

Adopted from a forthcoming article in Pollution Prevention Review by Thomas Barron and Lara Sutherland.

Polaris Building Maintenance

Clean Up Your Janitorial Products

In 1994, Frank Schwarb, President and Roger Gomez VP, Operations at Polaris Building Maintenance, Inc. worked together with their vendor to reformulate more than half of their janitorial products to be safer to use. Polaris was at that time working from an inventory of over 30 cleaning products, most of them petroleum based. Today, Polaris has 10 water based cleaning products that it uses for all of its cleaning needs.

"I sleep better at night knowing I've made a good decision affecting the safety of my employees and the quality of the environment."

Frank Schwarb, President, Polaris Building Maintenance, Inc.

Polaris simplified the burden of inventory control with requiring so few products, and it now strictly manages the amount of product used by each cleaning crew. Today, the purchasing department orders each product as a concentrate, and then a trained crew foreman dilutes and bottles the solutions needed for his crew.

Polaris retrained their entire janitorial crew to work with the reformulated products. Initially not all employees wanted to change the products they used. However, company management maintained a strong commitment to the purpose of the changeover, and in time the new products were adopted by the entire janitorial crew.

Polaris' cleaning crews learned that with a little extra time and some better cleaning tools the job could be done just as well as with the old products. Mr. Schwarb advises that his new products can take a little more effort to do an effective cleaning job, but proper training can minimize the extra time needed.

Reformulating cleaning products should be a joint venture between vendor and customer.

The key to a successful product changeover is total management commitment.

Reformulating can reduce the number of products used, saving time and money in inventory and training new employees.