Safe Storage & Mixing

The following are ideas you can use to make your chemical storage and mixing safer.

Incompatible Products - Products with incompatible ingredients should be stored separately. For example keep glass cleaner with ammonia away from tub & tile cleaner containing bleach. “Away from” means in a separate room, in a separate cabinet, or on separate shelves (but not one over the other).

Strong Ingredients - If you have space, consider storing products with acids or other strong ingredients in plastic tubs so that any leaks will not harm the storage rack or janitorial closet.

Stock Rotation - Rotate your stock of stored products so that the oldest ones are used first. Some janitorial products (for example, bleach) have a shelf life. Be sure all such products are used before this time expires.

Spill Kits - Keep spill clean-up kits in each building, and train your workers in their use.

Dispensers - 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. Because of its simplicity and ease of maintenance, a manual dispensing system is usually best.

Safe Mixing - Floor strippers and other products with strong chemicals pose the greatest risks when your worker is handling the concentrate. To reduce these risks during mixing:

- Train your employees in safe work procedures.
- Have a supervisor do all mixing.
- Insist that protective gloves and goggles are worn when your employee is handling concentrated 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.

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 like 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 shower be provided within 10 seconds reach of any employee who is handling corrosive chemicals (like floor finish stripper or acid toilet bowl cleaner).

Stanford University Housing Case Study
Quest for Safer Residential Cleaning

Stanford University is committed to strong programs of accident and injury prevention and to complying with all environmental and health and safety laws. The first three guiding principles in their Injury and Illness Prevention Plan commit to protecting the health and safety of Stanford University faculty, staff and students; providing safe workplaces for faculty, staff and students; and providing information to faculty, staff, and students about health and safety hazards. In line with that commitment, Heather Perry, Environmental Health and Safety Coordinator for Student Housing Services contacted the Janitorial Products Pollution Prevention Project to learn more about safety and health related risks regarding products used by the janitors in her department.

THE HOUSING LAYOUT Student Housing Services has a staff of nearly 70 full-time janitors that clean and maintain 3.2 million square feet of residential living space for over 9,000 students. There are 11 cleaning crews comprised of a crew lead and 4-7 janitors, each with their own challenges. One crew of 6 works with the row houses and struggle with the inconvenience of lugging supplies from house to house daily, not to mention the challenges of cleaning fixtures over 50 years old. Another crew maintains the common living areas for graduate housing, leaving it up to the student to clean their own room.

It isn't until a student vacates a room that the cleaning crew comes in and does a thorough cleaning. With such variances in cleaning needs it is difficult to have everyone use a simple list of cleaning products. At the beginning of the year Ms. Perry worked with Tom Barron of the project team to review 80% of the products used by the 11 cleaning crews. Of the 50+ products reviewed Ms. Perry arranged for the cleaning crews to completely stop using a dozen products with serious health and/or environmental risks. Among those eliminated were products with ozone depleting substances, cancer causing ingredients and reproductive hazards. Although it was easy to make these initial changes, further product adjustments would prove to be more challenging.

ONE CREW AT A TIME With no formal central purchasing policy in place for the Student Housing Services staff, it is difficult to make changes across the board in products used by the cleaning crews. To work around this issue Ms. Perry focused on working with one group at a time. She asked for volunteer crews to test an array of environmentally preferable products in hopes that initial group successes would serve as example to those who would follow later. Initially, two crews of 6 janitors tested products for restroom, window and general purpose cleaning. As other crews learned about the testing process two more volunteered for the process.

SAFETY AWARENESS TRAINING In addition to looking for safer products Ms. Perry and other management staff continually look for ways to increase safety awareness for and with the employees. Regular informal training sessions are held twice a month with nearly half of the meetings directly related to product safety issues. Pocket sized bilingual cheat sheets with dilution ratios, mixing instructions and safety precautions are provided to staff trained to mix from concentrate. On July 29th, Ms. Perry attended a half-day workshop where she learned how to conduct her own technical product reviews among other things. Since then, Ms. Perry has

advised against the use of a few new products based on safety risks and is searching for possible alternatives. The project team estimates that each cleaning crew that decides to switch to the suggested alternative products will reduce their handling of hazardous ingredients by about 4,200 pounds per year.

What's Needed Next?

Environmentally preferable purchasing is an important step toward reducing the impacts of building maintenance products upon the janitorial user, building occupant, and the environment in general.

There are three major problem areas that need to be addressed jointly by environmental professionals, janitorial product suppliers, and the specialty chemicals manufacturing industry.

We invite you to become involved. Tell your suppliers, associates, and anyone else who will listen what your opinions are.

We Need Better MSDSs

To be at all useful for making health and environmental decisions, material safety data sheets need to voluntarily list all ingredients in the product, not just those mandated by regulations. The relative quantity of each ingredient also needs to be stated, although providing a range such as "15% to 20%" is sufficient for most purposes.

In addition, printed MSDSs need to be clearly written, well organized, and legible. About a tenth of all MSDSs we have evaluated either cannot be read because of small or distorted type, or are hard to use because some of the information is in non-standard locations.

Finally, we encourage all product suppliers to publish their MSDSs on the internet. Direct and instant access is far better than waiting weeks or months to receive a requested data sheet.

We Need Better Technical Information

We suggest that vendors begin providing more information to janitors who wish to use their products. For example, we think that product literature should emphasize:

- How to store, mix, and use products;
- How to avoid incompatibilities with other products;
- How to easily access the supplier's customer service system with health, safety, and environmental questions; and
- How to properly dispose of unused product, wastes, and containers.

We Need Better Product Labels

We encourage nation-wide development of standard janitorial product labels like those now being used for food packaging. Key information to display includes explicit identification of dangers that the product poses, a list of toxic ingredients, recommended personal protective equipment, and guidance for proper emergency response. Containers should also explain where to get more information.

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

Appendix G Results Forecast Calculations

The following tables summarize the amounts of hazardous materials that janitors use today and the reduced amounts that may result from the project's outreach efforts. The team made its extrapolations in the following steps:

1. The ratio of 25% hazardous materials weight to total product weight was based upon the 19 janitorial products that the team studied in detail.

2. This ratio was used to estimate the amount of hazardous ingredients encountered in 1,137 products used by 47 organizations that were reviewed. The amount of reduction the sites can potentially accomplish is also shown.

3. The reviewed organizations employ about 25% of all janitors who work in Santa Clara County. The estimate of County-wide hazardous materials use is based upon this ratio, as is the amount of potential reduction that could occur.

G.1 Estimate Of 25% Hazardous Materials Content

Table G1 - Annual Use Of 19 Key Janitorial Products

	Estimates per person at one typical janitorial contractor							
	Use/person/yr [1]		Hazmat/person/yr [2]		Total Product Reduction/pers		Potential Hazmat Reduction/pers	
	gal/pers/yr	lb	%	lb	%	lb	%	lb
Hard Floor Care								
Sealer	2.94	24.54	20%	4.91	50%	12.27	50%	2.45
Finish	5.00	41.73	20%	8.35	50%	20.86	50%	4.17
Stripper	1.94	16.22	50%	8.11	50%	8.11	50%	4.05
Baseboard Stripper	0.24	2.01	75%	1.50	50%	1.00	50%	0.75
General Purpose Floor Cleaner	1.17	9.80	33%	3.23	20%	1.96	20%	0.65
Dust Mop Spray	0.08	0.63	75%	0.47	10%	0.06	10%	0.05
Carpet Care								
Pre-Spotter	0.35	2.95	20%	0.59	50%	1.48	50%	0.30
Traffic Lane Cleaner	2.31	19.30	20%	3.86	50%	9.65	50%	1.93
Shampoo	1.62	13.48	25%	3.37	10%	1.35	10%	0.34
Chewing Gum Remover	0.30	2.48	50%	1.24	10%	0.25	10%	0.12
Mildew Treatment	0.08	0.63	20%	0.13	10%	0.06	10%	0.01
Restroom Cleaning								
Acid Bowl Cleaner	0.81	6.76	25%	1.69	80%	5.41	80%	1.35
Non-acid Bowl Cleaner	0.38	3.13	10%	0.31	10%	0.31	25%	0.08
Disinfectant Cleaner	3.72	31.04	10%	3.10	10%	3.10	10%	0.31
Metal Cleaner	0.26	2.15	20%	0.43	10%	0.22	25%	0.11
Glass Cleaner	0.67	5.60	20%	1.12	10%	0.56	50%	0.56
Spray Deodorizer	0.48	3.96	33%	1.31	50%	1.98	50%	0.65
Other Products								
Graffiti Remover	0.21	1.71	75%	1.28	50%	0.85	50%	0.64
Wood Furniture Polish	0.69	5.74	50%	2.87	25%	1.43	25%	0.72
Total (gal or lb/Person):	23.25	193.86		47.87		70.91		19.24
Est. Hazardous Materials Content:				**25%**				

[1] Amount of product used per total person in company, not just utility crew workers.
[2] This % is for a single representative product, not yet discounted for how frequently that product might be in use.

G.2 Hazardous Materials Use At 47 Reviewed Sites

Table G2 - Annual Use Of Janitorial Products (47 Reviewed Sites)

Site/Firm Data				Existing Chemical Use (Est.)		
No.	Type	Workers	Sq. Ft.	No.	Total (lb/yr)	Haz Mat (lb/yr)
1	Contr.	30	725,825	26	5,815	1,436
2	C	30	725,825	20	5,815	1,436
3	C	620	11,000,000	37	120,179	29,680
4	Staff	31	1,100,000	33	6,009	1,484
5	C	5	125,000	16	969	239
6	C	25	604,854	24	4,846	1,197
7	S	6	225,000	18	1,163	287
8	C	16	387,107	18	3,101	766
9	C	21	692,000	10	4,071	1,005
10	C	1,179	28,340,993	10	228,534	56,439
11	S	33	421,000	37	6,397	1,580
12	C	70	2,000,000	43	13,569	3,351
13	C	40	967,766	11	7,753	1,915
14	C	52	1,258,096	38	10,080	2,489
15	C	4	75,000	19	775	191
16	C	1	5,000	11	194	48
17	C	4	96,777	15	775	191
18	S	16	387,107	18	3,101	766
19	S	12	300,000	57	2,326	574
20	S	15	375,000	22	3,004	742
21	S	17	250,000	13	3,295	814
22	C	32	2,100,000	38	6,203	1,532
23	C	52	1,258,096	27	10,080	2,489
24	C	843	10,516,079	27	163,405	40,355
25	S	72	1,800,000	24	13,956	3,447
26	C	10	240,000	17	1,923	475
27	C	900	31,260,000	17	174,469	43,087
28	S	2	48,388	19	388	96
29	S	14	200,000	15	2,714	670
30	S	54	19,883	27	10,467	2,585
31	C	349	3,274,175	56	67,649	16,707
32	C	695	12,000,000	56	134,717	33,270
33	C	6	145,165	21	1,163	287
34	S	3	72,582	12	582	144
35	S & C	10	240,000	24	1,923	475
36	C	41	1,000,000	21	8,012	1,979
37	C	32	2,100,000	38	6,203	1,532
38	S	35	846,796	25	6,784	1,675
39	C	80	3,000,000	12	15,507	3,830
40	S	70	3,200,000	40	13,569	3,351
41	C	115	2,782,329	24	22,291	5,505
42	C	7	160,000	47	1,282	317
43	C	1	6,358	9	194	48
44	S	4	96,777	14	775	191
45	S	1,200	29,032,993	9	232,605	57,445
46	C	2	50,000	8	388	96
47	C	1	24,194	14	194	48
	Totals	6,857	155,536,165	1,137	1,329,213	328,266 (25%)

Table G3 - Reduced Use Of Janitorial Products (47 Reviewed Sites)

No.	Site Data		Forecast Changes (lb/yr)	
	Haz Mat (lb/yr)	Potential (lb/yr)	Will Probably Do (lb/yr)	(%)
1	1,436	574	62	11%
2	1,436	574	80	14%
3	29,680	11,872	562	5%
4	1,484	594	58	10%
5	239	96	26	28%
6	1,197	479	112	23%
7	287	115	41	36%
8	766	306	34	11%
9	1,005	402	193	48%
10	56,439	22,576	3,386	15%
11	1,580	632	219	35%
12	3,351	1,340	349	26%
13	1,915	766	446	58%
14	2,489	996	144	14%
15	191	77	18	24%
16	48	19	3	14%
17	191	77	10	13%
18	766	306	26	8%
19	574	230	63	28%
20	742	297	43	15%
21	814	326	120	37%
22	1,532	613	181	29%
23	2,489	996	280	28%
24	40,355	16,142	4,260	26%
25	3,447	1,379	230	17%
26	475	190	50	26%
27	43,087	17,235	1,521	9%
28	96	38	3	7%
29	670	268	101	38%
30	2,585	1,034	144	14%
31	16,707	6,683	2,238	33%
32	33,270	13,308	4,456	33%
33	287	115	21	18%
34	144	57	13	22%
35	475	190	24	13%
36	1,979	791	52	7%
37	1,532	613	181	29%
38	1,675	670	139	21%
39	3,830	1,532	357	23%
40	3,351	1,340	456	34%
41	5,505	2,202	321	15%
42	317	127	34	27%
43	48	19	4	22%
44	191	77	14	18%
45	57,445	22,978	3,511	15%
46	96	38	11	28%
47	48	19	6	32%
	328,266	131,306	24,599	19%

G.3 Extrapolation To Other Janitors In Santa Clara County

The project team estimates that the 26,831 janitors in Santa Clara County use about 750,000 gallons of concentrated and ready-to-use chemical products every year. At an average of 8.34 pounds per gallon, these chemicals weigh a total of just under 6,300,000 pounds.

As shown by Table G4, the amount of hazardous materials in this annual total is estimated to be just over 1,284,000 pounds, or about 48 pounds per person per year. Were future pollution prevention outreach efforts to reach all 26,831 of the janitors working in Santa Clara County, the potential amount of hazardous materials reduction would be 513,765 pounds per year. Based upon site interviews, the team expects that 82,497 pounds per year of this reduction will occur.

Table G4 - Reduced Use Of Janitorial Products (Santa Clara County)

		Hazardous Materials (lb per year)		
		Amounts	Forecast Reduction	
	Janitors	Used Before	Possible	Expected
Contractors				
47 Sites	4,629	221,593	88,637	16,606
Others	3,324	159,122	63,649	5,962
Total	7,953	380,714	152,286	22,568
Site Employees				
47 Sites	2,228	106,673	42,669	12,654
Others	16,650	797,026	318,811	47,275
Total	18,878	903,699	361,480	59,930
Combined Totals				
47 Sites	6,857	328,266	131,306	29,260
Others	19,974	956,148	382,459	53,237
Total	26,831	1,284,414	513,765	82,497

This hypothetical extrapolation assumes that organizations who didn't participate in the project would have the same potential hazardous materials use reduction as the 47 reviewed firms did, but that these other sites would actually implement only half of the relative number of changes suggested to them. In other words, the firms that didn't participate in the project are assumed to have the same numbers of potential changes, but are less likely to actually make them.