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Pollution Prevention Opportunity Assessment for Building 922 Solid Office Waste

N. M. Phillips

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**POLLUTION PREVENTION OPPORTUNITY ASSESSMENT
FOR BUILDING 922 SOLID OFFICE WASTE**

**Norman M. Phillips
Environmental Protection Department
Sandia National Laboratories/California**

ABSTRACT

This Pollution Prevention Opportunity Assessment was conducted to evaluate the solid waste stream generated in a typical SNL/California office. The office building evaluated was Building 922, which houses the environment, safety, and health departments at SNL/California. This assessment documents the waste generated by the ES&H personnel in their daily activities. It also includes recommendations for possible ways to minimize office waste, in general.

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POLLUTION PREVENTION OPPORTUNITY ASSESSMENT FOR BUILDING 922 SOLID OFFICE WASTE

Introduction

Department of Energy (DOE) orders 5400.1 and 5400.3 mandate the development of a waste minimization program.^{1,2} The program's goals are to:

- reduce volumes of hazardous wastes and toxicity,
- implement a system of tracking and reporting improvements, and
- devise a method for performing assessment and minimization tasks.

Initially, process waste assessments (PWA) were conducted to document the process, identify wastes generated, and identify waste minimization opportunities. The DOE has replaced the term "Process Waste Assessment" (PWA) with a new, more positive term: "Pollution Prevention Opportunity Assessment" (PPOA). The new term avoids the implication that assessments should be limited to process wastes; rather, they should address all releases to the environment.

In 1993, the SNL/California PPOA program was audited by the DOE. The overall results of the audit were positive, but the DOE had some suggestions for improving SNL/California's Process Waste Assessment Plan. One of the suggestions was to include a nonhazardous office waste PPOA in the assessment plan (now the *Pollution Prevention Opportunity Assessment Plan* for SNL/California).³ This PPOA is the result of the suggestion. It documents the amounts and types of waste generated by Building 922's staff during a one-week period.

Because this PPOA is unusual compared to other PPOAs, the format normally used for PPOAs was altered to fit the needs of this assessment.

Summary

Building 922 houses all of SNL/California's ES&H departments: Health Protection, Environmental Protection, Safety, and Environmental Operations. It covers approximately 10,000 square feet and houses about 80 people. The office personnel generate nonhazardous solid office wastes in their daily activities.

To determine the types and amounts of waste generated, a special PPOA sorting team sorted all of the trash collected from the building for a period of one-week (including paper and aluminum cans in the recycling bins). The team sorted the trash into major categories: paper, plastic, metals, glass, wet garbage, restroom waste, and miscellaneous materials. They then sorted it into subcategories within each major category. Restroom waste was collected but not sorted. The waste in each category was weighed separately. The total amount of trash collected during the week was approximately 168.8 kg (371.4 lbs.).

The results of this PPOA indicate that SNL/California is minimizing most nonhazardous office waste and reductions planned for the near future will add significantly to the minimization efforts.

Additionally, the percentages of waste materials found in this PPOA compare favorably (except for manuals, which appeared to be atypically high) to the results found in other studies and waste generation statistics.^{4,5}

Table 1 lists the average amount of waste generated in one week per person in a typical SNL/California office environment, based on the data collected in this assessment.

Table 1. Average Amount of Waste Generated Per Week.

Type of Waste	Waste Generated per Person (lbs.)
Paper:	
Recycled	1.25
Recyclable paper in trash	2.64
Nonrecyclable: napkins, tissues, plates, dark colors, carbons, fluorescent, etc.	0.45
Subtotal Paper	4.34
Plastic:	
Recyclable	0.005
Nonrecyclable: bags, styrofoam products, wrap	0.25
Subtotal Plastic	0.255
Metals:	
Aluminum cans from recycling bin	0.009
Aluminum cans/foil in trash	0.01
Miscellaneous	0.017
Subtotal Metals	0.036
Glass:	
Clear/colored	0.16
Wet Garbage:	
Food, packaging (nonrecyclable)	0.56
Restroom waste:	
(Nonrecyclable)	0.23
Miscellaneous:	
Computer diskettes, shoes, string, toothbrush (nonrecyclable)	0.14
Total	~5.7

Pollution Prevention Opportunity Assessment

Background

Because the DOE has changed the original PWAs to PPOAs and broadened the scope of PPOAs to include all discharges to air, water, and land as pollution prevention objectives, nonhazardous solid municipal waste or wastes generated by office operations have become targets for waste minimization.

The DOE, State of California, and local governments are working to minimize all nonhazardous solid wastes disposed of in municipal landfills.

In 1989, California enacted the California Integrated Solid Waste Management Act (Assembly Bill 939). This law requires all cities and counties to reduce solid wastes going to municipal landfills by 25% by 1995 and by 50% by the year 2000.

The central body overseeing the management of solid waste in Alameda County is the Alameda County Waste Management Authority. The Authority comprises fifteen jurisdictions and two sanitary districts in the county, including the City of Livermore. It focuses on solid waste management and waste reduction, particularly in the commercial and industrial sectors. According to the Authority, 8,607 lbs. of garbage was buried in county landfills every minute of every day in 1993.⁴

The City of Livermore is working aggressively to achieve waste reduction goals. In cooperation with its franchised solid waste hauler, Livermore/Dublin Disposal, the city is providing recycling service to residential, multifamily, and commercial business customers. However, SNL/California is located just outside the Livermore city limits and is not eligible to participate in the city-sponsored recycling programs. Yet, Livermore/Dublin Disposal will pick up recyclable materials from SNL/California on a contract basis.

SNL/California is working on reducing its office-generated solid municipal waste through waste minimization programs. SNL/California has a formal program to recycle office paper and an informal voluntary program to recycle aluminum cans. Approximately 29% of the office waste paper is recycled. Additionally, programs to recycle cardboard and glass are under evaluation. These programs are discussed in this report. SNL/California also has other programs to recycle metals, toner cartridges, and other materials; however, these programs are not within the scope of this assessment.

The purpose of this PPOA is to document and characterize for future waste minimization programs, the office waste generated in a typical SNL/California large office environment.

Process Description

Building 922 is an office building that covers approximately 10,000 sq. ft. It houses the four SNL/California ES&H departments:

- Health Protection, 8641
- Environmental Protection, 8642
- Safety, 8643
- Environmental Operations, 8644

About 80 employees and on-site contractors occupy Building 922. This number fluctuates daily depending on travel schedules, vacations, and other absences. During the week of this assessment, an average of 65 people per day were in the building. Figure 1 shows the layout of the building and its offices.

During their daily activities, the people in Building 922 generate nonhazardous solid wastes, such as various types of office paper, newspapers, food, aluminum cans, and other materials. Computer, copy, and other white paper is recycled. Other types of paper products are not recycled yet, but will be soon. Aluminum cans also are recycled. Figure 2 shows the waste generation process flow.

PPOA Methodology

Waste Collection

All of the solid office waste (including recyclable waste) generated by the ES&H personnel in Building 922 was collected by the janitorial staff for one week. Janitors collect the waste three times a week—Monday, Wednesday, and Friday. They were requested to double-bag all of the trash and save it for the PPOA trash sorting team. At the end of each collection day, the bags of waste were taken to an enclosed area for storage and sorting. The restroom waste was bagged separately and was not opened for sorting. The janitors emptied the white paper recycling bin at the beginning of the week and did not collect paper for recycling during the week. The bin was weighed at the end of the week. The same procedure was followed for the aluminum can recycling container.

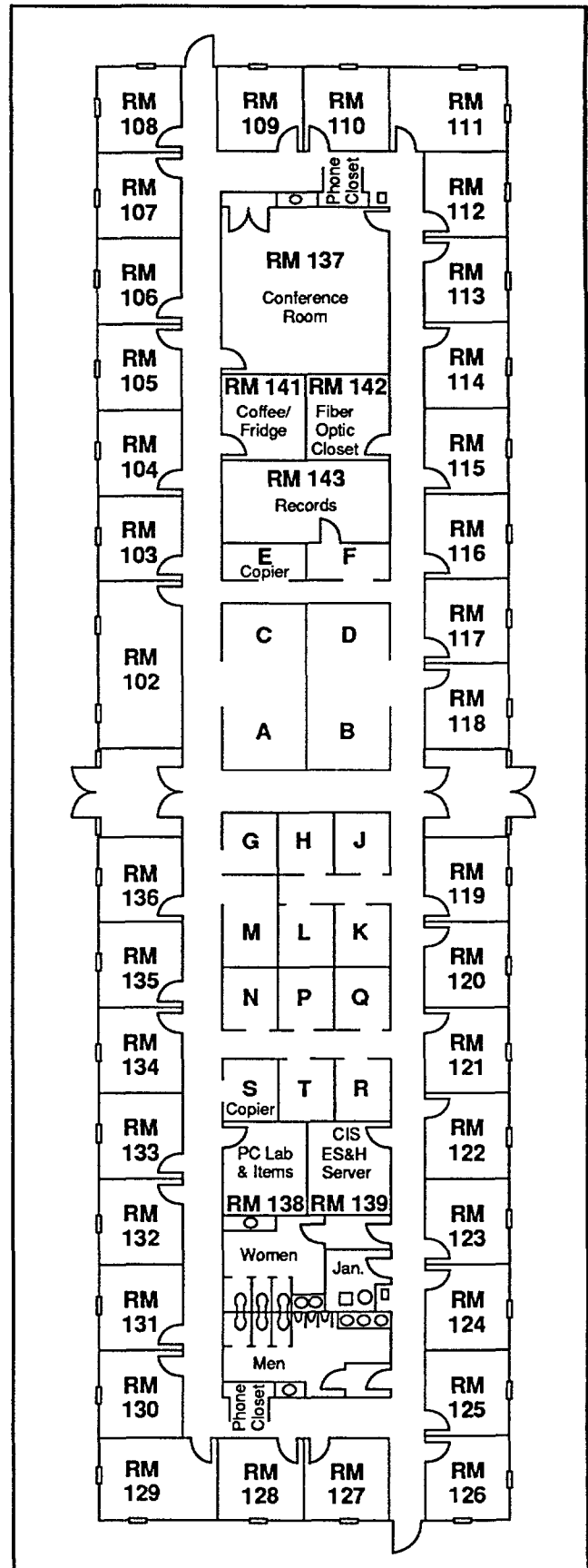


Figure 1. Layout of Building 922.

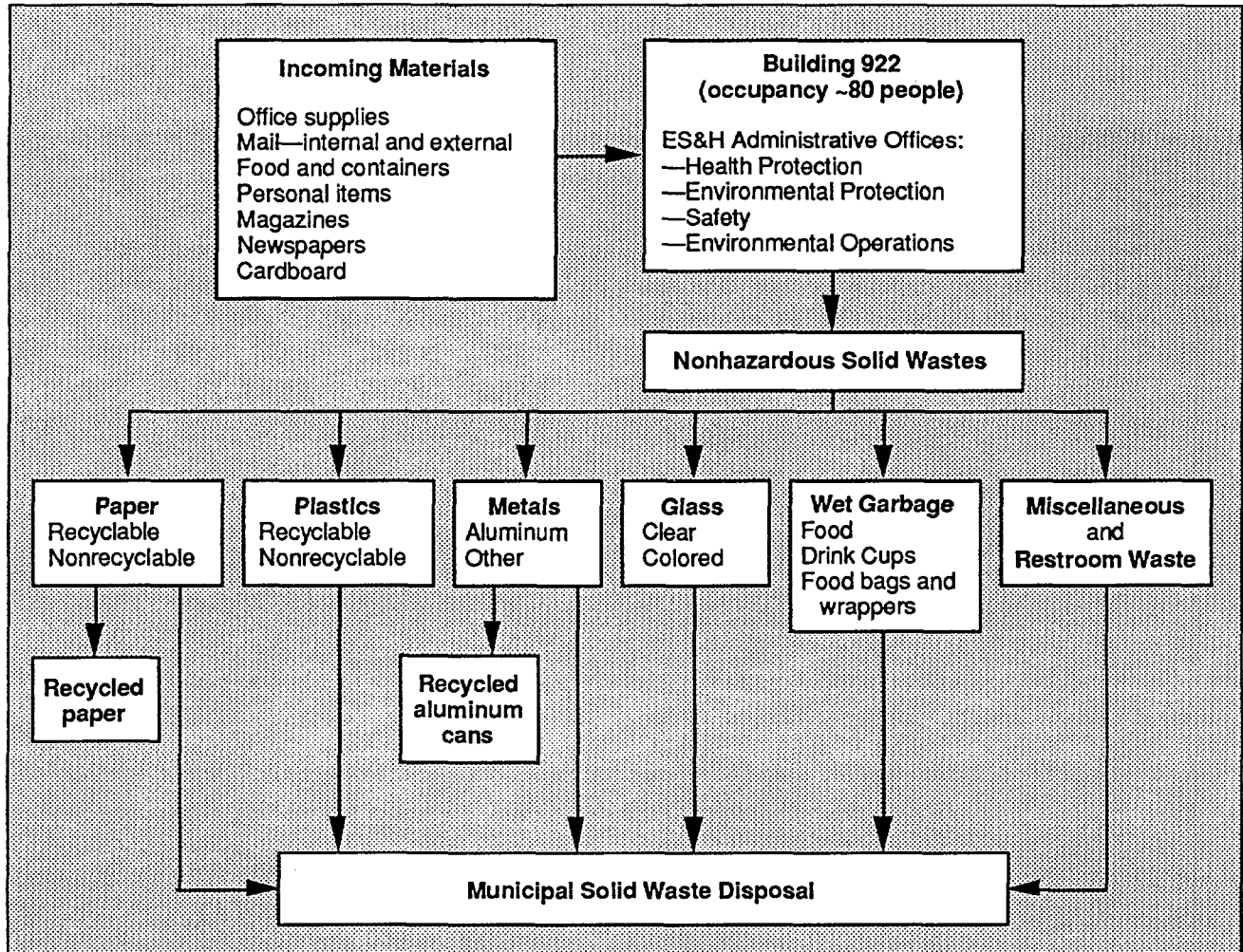


Figure 2. Process flow diagram for Building 922 solid office waste.

Categorizing and Sorting of Waste

Initially, the sorting team selected categories of typical office waste based on process knowledge and literature.^{5,6,7} During the sorting process, additional categories were added and some of the original categories were eliminated because none of those types of waste were found. Seven major categories were finally selected, and in each major category, sub-categories were assigned, as follows:

- Paper
 - Paper from recycling bin
 - Recyclable paper found in trash
 - Cardboard/paper board
 - Magazines
 - Newspaper
 - Nonrecyclable: napkins, tissues, plates, dark colors, carbons, fluorescent

- Plastic
 - Recyclable
 - Nonrecyclable: bags, food containers, wrap, and styrofoam
- Metals
 - Aluminum cans from recycling bin
 - Aluminum cans/foil found in trash
 - Miscellaneous metals (anything other than aluminum cans or foil)
- Glass: Clear and colored
- Wet Garbage: food and food containers
- Restroom Waste
- Miscellaneous: computer diskettes, string, personal items (e.g., shoes, toothbrush)

To begin the sorting process, the PPOA sorting team dumped the waste from a bag onto a table covered with plastic sheeting. The team then sorted the waste into categories by placing the items into plastic trash bags, which had been taped around the table and labeled with the appropriate categories. The sorting team members wore gloves and protective lab coats and used tongs for sorting some of the materials. After all of the waste had been sorted, the bags were weighed on an electronic scale. The weights (minus the weight of the bag) were recorded on a worksheet. The volume of the waste was not calculated because the measurement method available to the sorting team was not considered to be accurate.

Waste Generation

The types of waste and the quantities found during the sorting operation are shown in Table 2. Approximately 168.8 kg (371.4 lbs.) of waste was generated during the one-week period of the assessment.

The largest waste stream was paper and paper products (76% of the total). Approximately 42% of the total paper items was recyclable paper—29% was white paper collected from the recycling boxes located around the office areas and another 13% was mixed paper, which currently is not recycled, but will be recycled soon. Thirty-two percent of the paper items comprised magazines and large computer manuals. This quantity may be artificially high because an abnormal number of manuals were discarded during the assessment period. Corrugated cardboard, paper board, and newspapers—about 15% of the waste stream—are all recyclable, but are not recycled by SNL/California. A program to recycle cardboard is now under evaluation. Approximately 11% of the paper waste is not economically feasible to recycle. This waste comprised napkins, tissues, paper plates, dark and fluorescent-colored paper, and carbon paper. A reduction in this waste would require a voluntary effort by employees to use recyclable and reusable products. Approximately 60 to 68% of the total office waste is recyclable paper products.

The plastic waste stream accounted for 4% of the total waste, but only 2% of that was recyclable (less than half a pound). Therefore, collecting it for recycling would not be practical.

Table 2. Waste Generation Summary.

Type of Waste	Total (kg)	Total (lbs.)	% of Subtotal	% of Total
Paper:				
White paper from recycling bin (copier, computer paper)	37.00	81.40	29	
Recyclable paper in trash: colors	16.98	37.36	13	
Cardboard/paper board	11.77	25.89	9	
Magazines/Manuals	41.45	91.19	32	
Newspaper	7.71	16.96	6	
(Subtotal Recyclable Paper)	(114.91)	(252.80)	(89)	
Nonrecyclable: napkins, tissues, plates, dark colors, carbons, fluorescent, etc.	13.38	29.44	11	
Subtotal Paper	128.29	282.24	100	76%
Plastic:				
Recyclable	0.16	0.35	2	
Nonrecyclable: bags, styrofoam products, wrap	7.28	16.02	98	
Subtotal Plastic	7.44	16.37	100	4%
Metals:				
Aluminum cans from recycling bin	0.27	0.59	25	
Aluminum cans/foil in trash	0.30	0.66	28	
Miscellaneous	0.50	1.10	47	
Subtotal Metals	1.07	2.35	100	1%
Glass:				
Clear/colored	4.66	10.25	100	3%
Wet Garbage:				
Food, packaging (nonrecyclable)	16.48	36.26	100	10%
Restroom waste:				
(Nonrecyclable)	6.83	15.03	100	4%
Miscellaneous:				
Computer diskettes, shoes, string, toothbrush (nonrecyclable)	4.06	8.93	100	2%
Total	168.83	371.43	—	100%

Metals and glass accounted for 1% and 3%, respectively, of the total waste. Both are recyclable. Aluminum cans are already recycled voluntarily, except for a few that are misplaced in the trash. Glass drink containers are not recycled, but a pilot program to recycle clean glass hazardous waste containers has just begun, and the recycler also will accept nonhazardous glass containers.

Approximately 14% of the total waste stream is nonrecyclable garbage and restroom waste. Miscellaneous waste accounted for about 2% of the waste stream. It included personal items and a number of computer diskettes.

Figures 3 and 4 show the overall and the paper waste streams.

Figure 3. Breakdown of overall waste stream by weight.

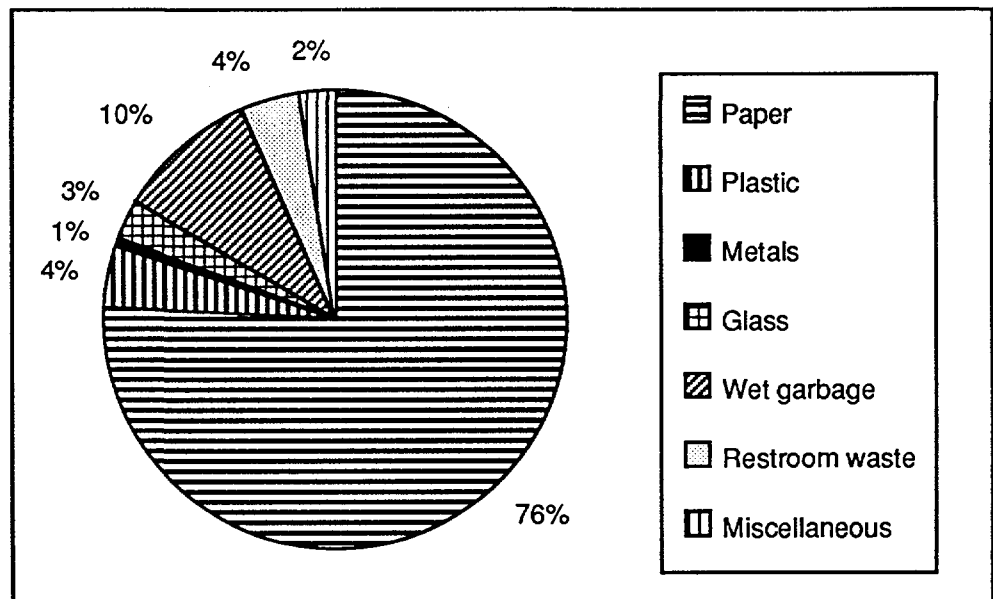
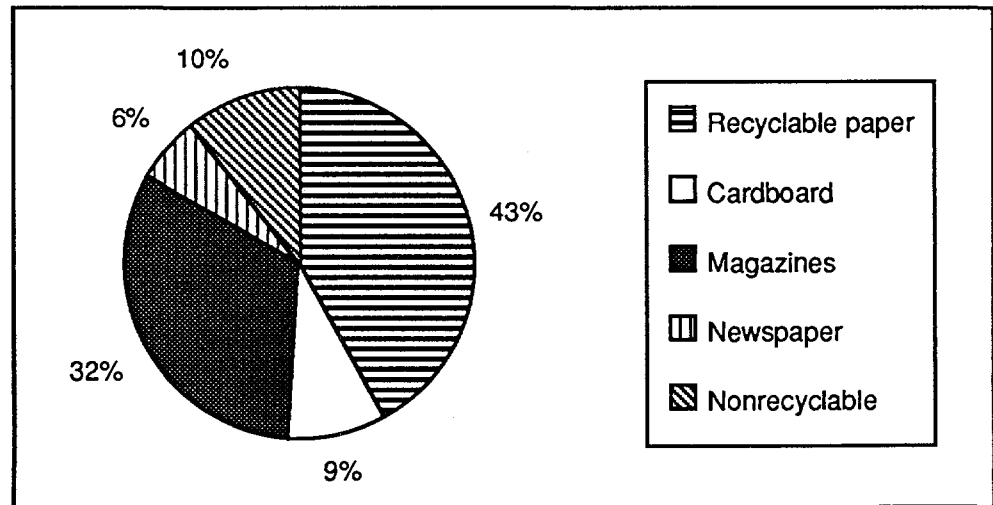


Figure 4. Breakdown of paper waste stream by weight.



The sorting team found some items in the trash that should not have been discarded as trash, such as the following:

- A new head cleaner for a Bernoulli computer disk drive was found and rescued by one of the sorters. (It could be reused.)
- A number of heavy-gage, red pressed-board prong binders were found in good condition and could be reused.
- Some white paper is ending up in the trash instead of the recycling bin. Employees need to be reminded to recycle this paper.
- A few aluminum cans were discarded in the trash.

Waste Minimization Recommendations

Paper

- **Recyclable Paper:** SNL/California has a program to recycle white (computer and copier) paper, but this program does not include other types of paper. A program to include most types of recyclable paper now is being evaluated. Starting this program will bring the amount of recycled paper up to 40 to 45% of the paper waste stream (from 29%).
- **Cardboard/Paper board:** Cardboard is not recycled at SNL/California; however, evaluation of a program to do so is planned. One potential option is for Livermore/Dublin Disposal to pick up corrugated cardboard in bins (they will not accept any other type of cardboard). Also, a few recyclers will accept paper board, but it must be dropped off at their facilities.
- **Magazines/Manuals:** This waste stream accounted for more than 30% of the paper waste stream. However, SNL/California does not have a program to recycle these items. In most cases, they can be recycled, but they must be collected and dropped off at a recycler's facility. The volume of magazines can be minimized if employees have the journals sent to their homes and recycle them after use. Also, if more than one employee needs to subscribe to a publication, one subscription can be ordered and the issues can be passed among the employees. A list of manuals available in different office areas could be circulated or issued on a cc:Mail bulletin board to avoid duplication.
- **Newspaper:** Newspaper is not recycled at SNL/California. Because it only makes up about 6% of the paper waste, a formal newspaper recycling program may not be practical. However, a voluntary program asking employees to take newspapers home and recycle them through local recycling programs would help reduce this waste stream.
- **Nonrecyclable:** This waste stream can be reduced through an employee awareness program to inform personnel how they can reduce the amount of nonrecyclable waste disposed of in the landfill. For example, employees could use recyclable paper products, reusable containers for food, and washable cloth napkins, plates, cups, and utensils.

Plastic

- **Recyclable:** The quantity of recyclable plastic found in the waste stream was small. Setting up a program to recycle it would not be practical. However, employees may wish to participate in a voluntary program. The best method of reducing a small waste stream such as this probably would be for the employees to take any recyclable plastic home and recycle it through their local recycling programs.
- **Nonrecyclable:** This waste stream can be reduced by encouraging employees to use reusable or recyclable materials. Styrofoam pellets could also be recycled by returning them to Material Management for reuse.

Metals

- **Aluminum cans and foil:** SNL/California has a program to recycle aluminum cans. Aluminum foil is recyclable, but is not included in the program. Most local collection programs include foil, so employees could take foil home for recycling.

Glass

- Glass containers (nonhazardous) could be recycled with clean, glass hazardous waste containers, which SNL/California is going to begin recycling.

Wet Garbage

- Employees could be encouraged to use reusable plastic food containers and reusable bags. For the dedicated recycler, food waste could be taken home and composted.

Restroom Waste

- The best recommendation for reducing restroom waste is to install energy-efficient electric hand dryers. These dryers would reduce the volume of paper hand towels generated and would save Sandia money on the purchase of the disposable towels.^{6,7} The purchase price of an industrial model electric hand dryer is about \$350. According to janitorial records, the two restrooms in Building 922 use approximately 70–80 rolls of paper hand towels per month. The cost to purchase the towels is \$115–130 per month.⁸ The savings on hand towels would pay for two dryers in less than a year.

Miscellaneous

- Items such as folders and other office supplies could be reused. However, computer software cannot be transferred to a different user because of licensing agreements required by the manufacturers.
- Miscellaneous reusable items could be listed on a cc:Mail bulletin board.

Note: A good resource for determining what types of materials are recycled and who recycles them is the *Alameda County Recycling Guide*, which is published by and available from the Alameda County Waste Management Authority.⁴

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