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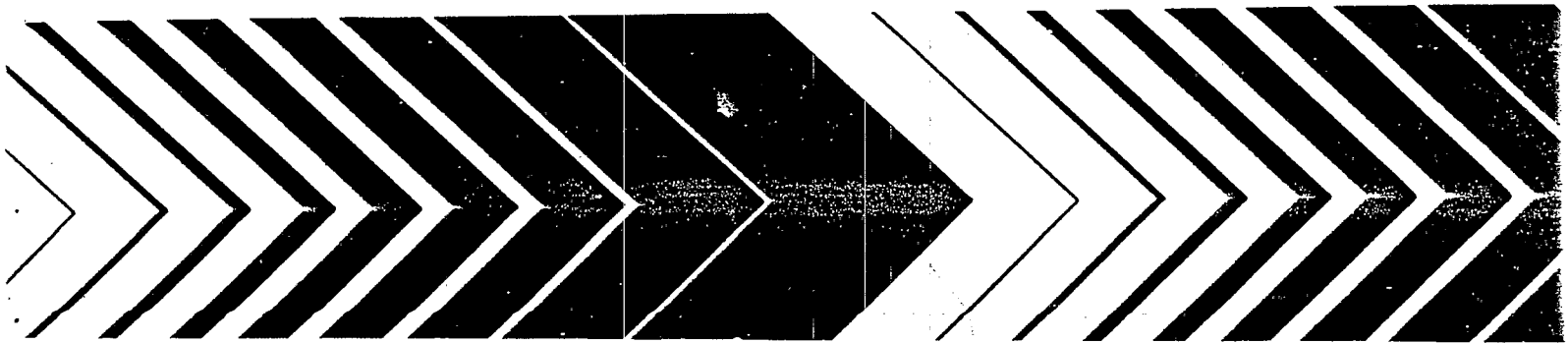
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Research and Development

Characterization of Household Hazardous Waste from Marin County, California, and New Orleans, Louisiana



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CHARACTERIZATION OF HOUSEHOLD HAZARDOUS WASTE FROM MARIN COUNTY,
CALIFORNIA, AND NEW ORLEANS, LOUISIANA

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NOTICE

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ABSTRACT

There is a growing concern that certain constituents of common household products, that are discarded in residential garbage, may be potentially harmful to human health and the environment by adversely affecting the quality of ground and surface water. A survey of hazardous wastes in residential garbage from Marin County, California, and New Orleans, Louisiana, was conducted in order to determine the amount and characteristics of such wastes that are entering municipal landfills. The results of this survey indicate that approximately 642 metric tons of hazardous waste are discarded per year for the New Orleans study area and approximately 259 metric tons are discarded per year for the Marin County study area. Even though the percent of hazardous household waste in the garbage discarded in both study areas was less than 1 percent, it represents a significant quantity of hazardous waste because of the large volume of garbage involved. The comparison of estimates for the New Orleans and Marin County Study areas shows that the types of hazardous wastes discarded in the two areas are very similar in both the rate of discard and composition, even though the communities are very different in socio-demographic structure.

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INTRODUCTION

There is a growing concern that certain constituents of common household products may be potentially harmful to human health and the environment by adversely affecting the quality of ground and surface waters. These household products are often discarded in residential garbage. The accumulation of these wastes in municipal landfills and other solid waste disposal facilities regulated under Subtitle D of the Resource Conservation and Recovery Act is of major concern. A survey of hazardous wastes in residential garbage from Marin County, California, and New Orleans, Louisiana, was conducted in order to determine the amount and characteristics of such wastes that are entering municipal landfills. A preliminary analysis of the survey data is reported here.

This report was prepared by the Environmental Monitoring Systems Laboratory of the U.S. Environmental Protection Agency at Las Vegas and the Center for Biomedical and Toxicological Research and Hazardous Waste Management at Florida State University from data and information supplied by the Garbage Project of the University of Arizona Bureau of Applied Research in Anthropology. The Garbage Project designed the study and collected the data under contract to Florida State University as part of the cooperative research program with the U.S. Environmental Protection Agency entitled "Monitoring Methods for Waste Management Facilities Located In or Near Wet Environments" (Cooperative Agreement number CR-813151-01-0). In Marin County, refuse collection and sorting were facilitated by the Association of Bay Area Governments and by the appropriate refuse collection agency; in New Orleans, refuse collection and sorting were facilitated by the Department of Sanitation of the City of New Orleans and by the Waste Management's Recovery I landfill operation.

CONCLUSIONS

There are hazardous household wastes in residential garbage, and even the most conservative estimates of the amount discarded for a large community are substantial. Based on measurements of household wastes discarded in the New Orleans and Marin County study areas, it appears that, at least, approximately 0.35 to 0.40 percent of the garbage being discarded is hazardous. The average household in this study discarded approximately 55 to 60 grams of hazardous waste per week (not including contaminated containers and articles such as used paint brushes, oily rags, etc.). This is approximately 642 metric tons of hazardous waste discarded per year for the New Orleans study area and approximately 259 metric tons per year for the Marin County study area.

MATERIALS AND METHODS

Household hazardous waste in residential garbage was sampled in Marin County, California, and in New Orleans, Louisiana. Marin County is a relatively affluent Bay Area community across the Golden Gate Bridge and to the north of San Francisco. It is essentially a bedroom community for many of the white collar workers in San Francisco and is home as well to a variety of service personnel. As a whole, the population is relatively homogeneous, mainly upper income, and predominantly white. The New Orleans study area was the City of New Orleans (Orleans Parish). This study area did not include East New Orleans.

According to the U.S. Bureau of Census (1983, 1983a), there are 49 and 177 census tracts in the Marin County and New Orleans study areas, respectively. Eight census tracts were selected for sampling in Marin County, and six were selected in New Orleans. A judgmental process was used to select the sample census tracts that (1) together represented the range of selected demographic characteristics (income, ethnicity, household size) in proportion to their relative proportion within the overall community and (2) were as homogeneous as possible internally relative to the distribution of selected characteristics. Once tracts were selected, sanitation collection personnel were interviewed to help verify that the census tract characteristics had not changed significantly since the 1980 census. Residential garbage from the various towns within Marin County is collected by several private companies. To minimize the logistical problems of sample collection and delivery to a single sorting facility, the selection of census tracts was limited to those serviced by the collection agency that collected residential garbage from the broadest range and largest number of census tracts.

A comparison of the characteristics of the sample census tracts to the whole study area from which they were selected is given in Table 1. The sample census tracts are very similar to the study area from which they were selected except for medium income for New Orleans. The reason for the divergence of medium income is that census tracts were selected with a bias toward tracts with single family dwellings with separate and identifiable garbage containers. Because low-cost apartments and other similar housing units do not have separate garbage containers for each household unit, garbage samples were not collected from the lowest income households in New Orleans. Characteristics of the individual census tracts sampled are given in Table 2.

In Marin County, residential garbage was sampled during three periods: (1) May 19 to 25, 1986, (2) May 26 to 29, 1986, and (3) August 4 to 15, 1986. The second period included the Memorial Day holiday. New Orleans was sampled only during the period from October 13 to October 25, 1986.

Permission to sample residential garbage was obtained from the appropriate government officials, and sorting facilities were provided by the solid waste collection agencies. Samples were collected by sanitation personnel who identified each sample by census tract and by date of collection. The person making the actual collection in both study areas was either the supervisor in charge of refuse collection operations or workers who were hand-picked for their competence and willingness to learn.

Sample collectors were told to select, using their judgment, an area within the census tract which was typical of the tract as a whole; however, the selection of which households to include in the sample was left up to the collectors. They were asked to select garbage from 30 individual households per census tract per pickup day in Marin County and from 150 in New Orleans. A map, with the sample census tract clearly drawn on it, was furnished to the sample collectors. The sanitation workers did not record the number of households that did not place garbage out for collection and that would have been included in the sample if they had placed garbage out for pickup. When a census tract was sampled twice, the sanitation personnel were instructed not to collect garbage from the same households that were previously sampled. Garbage was collected only from single family dwellings with separate and identifiable garbage containers. Each sample was placed in large 4-mil plastic bags, and a tag identifying the census tract and the individual household sample number was attached to each bag.

Sample household garbage pickups were unloaded at the analysis site and were placed in groups based on their census tract designation. Generally, the samples were analyzed the same day that they were collected; however, in some instances the residential garbage samples were placed in a secured metal dumpster and were stored for analysis on the following day. Trained student and staff sorters, garbed in laboratory coats and rubber gloves, processed the samples. Each individual household garbage sample was weighed, and its total weight, census tract designation, sample number, and the date of collection recorded. The number of household pickups by census tract and their total weight of the garbage is given in Table 3. As an independent check of the sampling procedure, the field supervisor confirmed that the samples were obtained from the proper census tract by randomly checking addresses on mail in the garbage; these addresses were not recorded in order to maintain anonymity of the source of the samples.

Next, each sample was carried to a sorting table where it was opened and where its contents were examined. Items on the hazardous waste list given in the Appendix were sorted into hazardous waste type groups (see the Appendix); all other items were discarded. For items that did not easily fit into the standardized groupings given in the Appendix, the sorters were instructed to consult with the field supervisor in order to obtain the proper designation for the item. At least two of the three primary investigators from the Garbage Project of the University of Arizona were at the analysis site during the recording process to answer any questions and to make sure that procedures were systematically followed. For each hazardous waste item the following information was recorded: (1) original purchase quantity in solid or fluid ounces (as marked on package labels), (2) brand name, (3) specific type of item (such as "oven-cleaner" or "pesticide"), (4) material composition of the container, and (5) waste characteristics.

Historically, studies of household hazardous wastes have only included that portion of the waste that contains the hazardous ingredients (e.g., County Sanitation District of Los Angeles County (1983), Association of Bay Area Governments (1985), and Cal Recovery Systems (1986)). The preliminary analysis of the data reported here only includes the weight of that portion of the waste that contains the hazardous ingredients. Therefore, the total weight of

hazardous waste reported in this study will represent a conservative estimate of the actual hazardous waste generated when compared to other EPA studies in which contaminated container weights, contaminated article weights, etc., were included in the hazardous waste estimates.

Residue was defined as the remains of the product adhering to the container that cannot under normal conditions of use be removed from the container for use. For example, when oil is added to a car, some residue remains in and on the can. Neither the residue nor the container were weighed as waste. When the quantity of the product remaining in a container could be considered usable under normal conditions, it was recorded as waste. One example of waste would be the caked and hardened paint in a paint can containing one-third of its original contents. The decision of whether an item was residue or waste was subjective, but when any recorder was in doubt, one of the primary investigators on site was consulted.

Where possible, the hazardous product was removed from its container and was weighed as waste; the container was not weighed. When the product could not be removed from the container, the gross weight of the total item was measured, and the weight of the package was subtracted; this left the weight of the hazardous material. For example, in the case of a paint can containing one-third of its original contents, the recorder would estimate that 33 percent of the paint was discarded as waste. The gross weight of the paint container and the waste together would be recorded, and an empty container of the same type would be weighed. The container weight would then be subtracted from the gross weight, and the remainder would be considered as the weight of the paint waste. In every similar case the recorder would also record an estimate of the percentage of the contents remaining as waste in case an empty container could not be found and weighed.

In those cases where hazardous waste and contaminated items (not containers) could not be easily separated (such as paint brushes with adhering paint or oil-soaked rags), no weights were taken. Their frequency of occurrence was recorded and is reflected in the estimates given in Tables 4 and 5; however, since such items were not weighed, the weight of such hazardous wastes is not reflected in the estimates given in Tables 6 and 7. It is important to note that this procedure consistently leads to an underestimate of the weight of hazardous wastes relative to other EPA hazardous waste measurements.

Most households do not always place garbage out for collection every pickup day. The garbage collectors did not record or sample the number of households with zero discards in either New Orleans or Marin County; however, these households should be accounted for in making projections. A previous study conducted in Tucson, Arizona, estimated the number of zero discards for 250 households (with the residents permission) over five-week periods throughout the year (Rathje et al., 1985). By assuming that the pattern of zero pickups in Tucson is representative of other cities, estimates of the number of households with zero garbage discard that should have been included in the sample can be derived for Marin County and New Orleans. In New Orleans where refuse collection occurs twice a week, the Tucson data suggest that 20.3 percent of the households will not place garbage out for one twice-weekly pickup. Thus, it is estimated that the 1,061 sample garbage pickups from New Orleans

represent the discard from 1,331 households. This number of households was then divided by two to obtain 666, the number of households sampled per week. In Marin County where the garbage is collected once a week, the Tucson data suggest that 7.2 percent of households will miss placing an entire week's garbage out for pickup. Thus, the 1,022 sample pickups from Marin County probably represent the discards from 1,101 households.

In this study the hazardous waste was grouped into the following categories: (1) household cleaning, (2) automotive maintenance, (3) household maintenance, (4) pesticide and yard maintenance, (5) batteries and electrical, (6) prescription drugs, (7) selected cosmetics, and (8) other.

The number of households sampled per week corrected to account for those households not discarding garbage was used to estimate the mean number and weight of hazardous items discarded per household per week. Using these generation factors and the total number of households in each study area, projections of the total number and weight discarded per week and year for individual hazardous household items and groups were made as follows:

$$M = n \cdot h^{-1} \quad (1)$$

$$E_{qw} = M \cdot H \quad (2)$$

$$E_{qy} = E_{qw} \cdot 52.18 \quad (3)$$

where M = mean number or weight per household per week;

n = number or weight observed;

h = number of households sampled per week corrected to account for those households not discarding trash during the sampling period: 666 for New Orleans and 1,101 for Marin County;

E_{qw} = estimated quantity (number or weight) per week;

H = number of households in the study area, 206,435 for New Orleans and 88,723 for Marin county; and

E_{qy} = estimated quantity (number or weight) per year.

RESULTS AND DISCUSSION

The estimated mean number and weight of hazardous items discarded per household per week, the projected total number and weight of hazardous items discarded per week and per year, and the percent composition by number and weight of the hazardous household items are given in Tables 4 through 7. A comparison between the New Orleans and Marin County study areas of the mean number and weight of hazardous items discarded per household per week by hazardous waste type groups as well as the percent composition of the hazardous waste type groups by number and weight is given in Table 8.

The results of this study should be interpreted with care because of some important limiting biases. First, only residential solid waste from single family dwellings with separate and identifiable garbage containers were sampled. As a result, community-level estimates may not accurately reflect the hazardous household waste discards from residents of apartments and similar dwelling units. Second, only actual products with hazardous ingredients were weighed, and not their packages or containers. Also, while paint brushes and oily rags were counted, they were not weighed when the contaminants were difficult to separate from them. As a result, the quantity of hazardous household waste is clearly under estimated and is not directly comparable with measurements of hazardous wastes discarded by "Small Quantity Generators" or "Industrial Generators." Third, because of the limited sampling time, seasonal differences were not considered in the analysis (Marin County was sampled in May and in August, 1986; New Orleans was sampled in October, 1986).

A total of 11.4 and 15.4 metric tons of household garbage was collected from the New Orleans and Marin County study areas, respectively (Table 3). Through the use of formulas 1 through 3, it was estimated that the New Orleans study area generated 17,120 grams of household garbage per household per week for a total of 3,533,572 kilograms per week or 184,381.8 metric tons per year. If this is compared to the estimated amount of discarded household hazardous waste in the New Orleans study area given in Table 6 (59.6 grams of household hazardous waste per household per week for a total of 12,310.5 kilograms per week or 641.7 metric tons per year), it appears that, at least, approximately 0.35 percent of the household garbage discarded is hazardous waste. Likewise, it is estimated that the Marin County study area generated 13,990 grams of household garbage per household per week for a total of 1,240,993 kilograms per week or 64,755.1 metric tons per year. When compared to the estimated amount of discarded household hazardous waste in the Marin County study area given in Table 7 (55.9 grams of household hazardous waste per household per week for a total of 4,969.3 kilograms per week or 259.0 metric tons per year), it appears that, at least, approximately 0.40 percent of the household garbage discarded is hazardous waste. Even though the percent of hazardous household waste in the garbage discarded in both study areas was less than 1 percent, it represents a significant quantity of hazardous waste because of the large volume of garbage involved.

The two most numerous hazardous waste type groups in both the New Orleans and Marin County study areas were (1) batteries and electrical and (2) selected cosmetics (Tables 4 and 5). It was estimated that the batteries and electrical hazardous waste type group was discarded at the rate of 0.1637 items per household per week for a total of 1,762,949 items per year and made up 29.9 percent of the hazardous household waste discarded in the New Orleans study area. In the Marin County study area, this group was discarded at the rate of 0.2834 items per household per week for a total of 1,311,921 items per year and made up 48.8 percent of the hazardous household waste discarded. The selected cosmetics hazardous waste type group was discarded at the rate of 0.1622 items per household per week for a total of 1,746,775 items per year and made up 29.7 percent of the hazardous household waste discarded in the New Orleans study area. In the Marin County study area, this group was discarded at the rate of 0.0999 items per household per week for a total of 462,536 items per year and made up 17.2 percent of the hazardous household waste discarded.

The predominant hazardous waste type group by weight in both the New Orleans and Marin County study areas was the household maintenance group (Tables 6 and 7). It was estimated that the household maintenance hazardous waste type group was discarded at the rate of 25.8 grams per household per week for a total of 278.4 metric tons per year and made up 43.4 percent of the total weight of hazardous household waste discarded in the New Orleans study area. In the Marin County study area, this group was discarded at the rate of 15.5 grams per household per week for a total of 71.9 metric tons per year and made up 27.8 percent of the total weight of hazardous household waste discarded. The second most predominant hazardous waste type group by weight in the New Orleans study area was the automotive maintenance group which was discarded at the rate of 12.6 grams per household per week for a total of 135.6 metric tons per year and made up 21.2 percent of the total weight of hazardous household waste discarded. However, in the Marin County study area, the second most predominant hazardous waste type group by weight was the batteries and electrical group which was discarded at the rate of 14.9 grams per household per week for a total of 69.0 metric tons per year and made up 26.6 percent of the total weight of hazardous household waste discarded.

The comparison of estimates for the New Orleans and Marin County study areas given in Table 8 shows that household hazardous waste discarded in both areas is very similar in both the rate of discard and composition, even though the communities are very different in socio-demographic structure. However, there were some differences, e.g., the batteries and electrical group and the pesticide and yard maintenance group were discarded at a higher weight per household in the Marin County study area while the automotive maintenance group and the household maintenance group were discarded at a higher weight per household in the New Orleans study area. The similarity between the two communities should be interpreted with care until further studies are conducted in other communities.

In summary, there are significant amounts of hazardous waste in household garbage, and even the most conservative estimates of the amount discarded for a large community are substantial.

**TABLE 1. COMPARISONS OF CENSUS TRACT
CHARACTERISTICS FOR ENTIRE COMMUNITY WITH
CHARACTERISTICS CALCULATED FROM REFUSE
SAMPLE AREA IN THAT COMMUNITY**

Community	Median Income(\$)	Percent White	Persons per Household
New Orleans			
Census Average	11,814	57.5	2.63
Refuse Sample Average	20,234	55.6	2.53
Marin County			
Census Average	24,554	95.6	2.01
Refuse Sample Average	23,522	91.3	2.22

TABLE 2. CHARACTERISTICS OF
CENSUS TRACTS SAMPLED*

Census Tract Number	Median Income(\$)	Percent White**	Persons per Household
I. New Orleans			
NO1	10,247	1.8	3.05
NO2	20,445	0.5	3.44
NO3	12,291	92.5	1.44
NO4	12,317	79.4	1.76
NO5	14,468	76.5	2.16
NO6	36,306	95.2	2.55
Refuse Sample Average	20,234	55.6	2.53
II. Marin County			
MC1	21,131	92.2	2.15
MC2	24,779	91.2	2.40
MC3	38,977	95.0	3.01
MC4	14,714	90.0	1.85
MC5	19,605	87.8	2.20
MC6	15,353	76.9	1.99
MC7	26,853	95.0	2.05
MC8	24,591	94.6	2.18
Refuse Sample Average	23,522	91.3	2.22

From U.S. Bureau of the Census (1983, 1983a)

* Calculation of sample community averages were weighted by number of sample pickups (see Table 3).

** Calculated from Tables in U.S. Bureau of the Census (1983, 1983a)
("White" minus "Persons of Spanish Origin: White") / "Total Persons."

TABLE 3. NUMBER AND WEIGHT OF SOLID
WASTE PICKUPS SAMPLED

Community	Number of Pickups	Total Solid Waste Sampled (Metric Tons)
I. New Orleans		
NO1	89	1.2
NO2	304	3.3
NO3	164	1.1
NO4	137	1.7
NO5	123	1.4
NO6	244	2.7
TOTAL	1,061	11.4
II. Marin County		
MC1	80	1.0
MC2	101	1.9
MC3	119	1.9
MC4	162	2.4
MC5	53	0.8
MC6	82	1.2
MC7	88	1.1
MC8	221	3.5
Unknown Location	116	1.6
TOTAL	1,022	15.4
III. New Orleans and Marin County		
TOTAL	2,083	26.8

**TABLE 4. NUMBER OF HOUSEHOLD ITEMS CONTAINING
HAZARDOUS WASTE IN NEW ORLEANS, LA**

Waste Type	Number Observed from Pickups	Mean Number per Household per Week	Projected Total Number		% of Total
			per Week	per Year	
Household Cleaners					
Toilet Bowl Cleaner	0	0.0000	0	0	0.0
Drain Opener	1	0.0015	310	16,174	0.3
Laundry Soap	5	0.0075	1,550	80,869	1.4
Bleach	2	0.0030	620	32,348	0.5
Dish Detergent	4	0.0060	1,240	64,695	1.1
Cleaner	6	0.0090	1,860	97,043	1.6
Ammonia Based Cleaners	2	0.0030	620	32,348	0.5
Polish	14	0.0210	4,340	226,433	3.8
Floor Finish	1	0.0015	310	16,174	0.3
Air Freshener	1	0.0015	310	16,174	0.3
Other Household	4	0.0060	1,240	64,695	1.1
Total	48	0.0600	12,400	646,953	10.9
Automotive Maintenance					
Oil	4	0.0060	1,240	64,695	1.1
Transmission Fluid	0	0.0000	0	0	0.0
Engine Treatment	1	0.0015	310	16,174	0.3
Antifreeze/Coolant	2	0.0030	620	32,348	0.5
Auto Wax	1	0.0015	310	16,174	0.3
Other Auto	4	0.0060	1,240	64,695	1.1
Total	12	0.0180	3,720	194,086	3.3
Household Maintenance					
Paint	9	0.0135	2,790	145,565	2.5
Paint Thinner	0	0.0000	0	0	0.0
Stain/Varnish	4	0.0060	1,240	64,695	1.1
Glue	7	0.0105	2,170	113,216	1.9
Other Maintenance	19	0.0285	5,889	307,303	5.2
Total	39	0.0585	12,089	630,779	10.7
Pesticides and Yard Maintenance					
Fertilizer	0	0.0000	0	0	0.0
Pesticides	4	0.0060	1,240	64,695	1.1
Herbicides	0	0.0000	0	0	0.0
Pet Maintenance	2	0.0030	620	32,348	0.5
Total	6	0.0090	1,860	97,043	1.6
Batteries and Electrical					
	109	0.1637	33,786	1,762,949	29.9
Prescription Drugs					
	37	0.0556	11,469	598,432	10.2
Selected Cosmetics					
	108	0.1622	33,476	1,746,775	29.7
Other					
Hobby Related	5	0.0075	1,550	80,869	1.4
Miscellaneous	8	0.0120	2,480	129,391	2.2
Total	13	0.0195	4,030	210,260	3.6
TOTALS:	364	0.5465	112,830	5,887,277	100

**TABLE 5. NUMBER OF HOUSEHOLD ITEMS CONTAINING
HAZARDOUS WASTE IN MARIN COUNTY, CA**

Waste Type	Number Observed from Pickups	Mean Number per Household per Week	Projected Total Number		% of Total
			per Week	per Year	
Household Cleaners					
Toilet Bowl Cleaner	4	0.0036	322	16,819	0.6
Drain Opener	0	0.0000	0	0	0.0
Laundry Soap	6	0.0054	484	25,229	0.9
Bleach	1	0.0009	81	4,205	0.2
Dish Detergent	10	0.0091	806	42,049	1.6
Cleaner	22	0.0200	1,773	92,507	3.4
Ammonia Based Cleaners	3	0.0027	242	12,615	0.5
Polish	10	0.0091	806	42,049	1.6
Floor Finish	2	0.0018	161	8,410	0.3
Air Freshener	4	0.0036	322	16,819	0.6
Other Household	3	0.0027	242	12,615	0.5
Total	65	0.0589	5,239	273,317	10.2
Automotive Maintenance					
Oil	9	0.0082	725	37,844	1.4
Transmission Fluid	1	0.0009	81	4,205	0.2
Engine Treatment	3	0.0027	242	12,615	0.5
Antifreeze/Coolant	0	0.0000	0	0	0.0
Auto Wax	5	0.0045	403	21,024	0.8
Other Auto	2	0.0018	161	8,410	0.3
Total	20	0.0181	1,612	84,098	3.2
Household Maintenance					
Paint	19	0.0173	1,531	79,893	3.0
Paint Thinner	1	0.0009	81	4,205	0.2
Stain/Varnish	8	0.0073	645	33,639	1.2
Glue	9	0.0082	725	37,844	1.4
Other Maintenance	26	0.0236	2,095	109,327	4.1
Total	63	0.0573	5,077	264,908	9.9
Pesticides and Yard Maintenance					
Fertilizer	1	0.0009	81	4,205	0.2
Pesticides	12	0.0109	967	50,458	1.9
Herbicides	0	0.0000	0	0	0.0
Pet Maintenance	11	0.0100	886	46,254	1.7
Total	24	0.0218	1,934	100,917	3.8
Batteries and Electrical					
	312	0.2834	25,142	1,311,921	48.8
Prescription Drugs					
	28	0.0254	2,256	117,736	4.4
Selected Cosmetics					
	110	0.0999	8,864	462,536	17.2
Other					
Hobby Related	5	0.0045	403	21,024	0.8
Miscellaneous	12	0.0109	967	50,458	1.9
Total	17	0.0154	1,370	71,482	2.7
TOTALS:	639	0.5802	51,494	2,686,915	100

**TABLE 6. WEIGHT OF HOUSEHOLD
HAZARDOUS WASTE IN NEW ORLEANS, LA**

Waste Type	Weight Observed from Pickups (gr)	Mean Weight per Household per Week (gr)	Projected Total Weight		% of Total
			per Week (kg)	per Year (M. Tonn)	
Household Cleaners					
Toilet Bowl Cleaner	0	0.0000	0.0	0.0	0.0
Drain Opener	3	0.0045	0.9	0.1	0.0
Laundry Soap	2,918	4.3814	904.5	47.2	7.4
Bleach	51	0.0766	15.8	0.8	0.1
Dish Detergent	205	0.3078	63.5	3.3	0.5
Cleaner	433	0.6502	134.2	7.0	1.1
Ammonia Based Cleaners	46	0.0691	14.3	0.1	0.0
Polish	973	1.4610	301.6	15.7	2.5
Floor Finish	136	0.2042	42.2	2.2	0.3
Air Freshener	22	0.0330	6.8	0.4	0.1
Other Household	480	0.7207	148.8	7.8	1.2
Total	5,267	7.9085	1,632.6	84.6	13.2
Automotive Maintenance					
Oil	7,484	11.2372	2,319.8	121.0	18.9
Transmission Fluid	0	0.0000	0.0	0.0	0.0
Engine Treatment	28	0.0420	8.7	0.5	0.1
Antifreeze/Coolant	596	0.8949	184.7	9.6	1.5
Auto Wax	91	0.1366	28.2	1.5	0.2
Other Auto	183	0.2748	56.7	3.0	0.5
Total	8,382	12.5855	2,598.1	135.6	21.2
Household Maintenance					
Paint	7,459	11.1997	2,312.0	120.6	18.8
Paint Thinner	0	0.0000	0.0	0.0	0.0
Stain/Varnish	1,133	1.7012	351.2	18.3	2.9
Glue	809	1.2147	250.8	13.1	2.0
Other Maintenance	7,815	11.7342	2,422.4	126.4	19.7
Total	17,216	25.8498	5,336.4	278.4	43.4
Pesticides and Yard Maintenance					
Fertilizer	0	0.0000	0.0	0.0	0.0
Pesticides	274	0.4114	84.9	4.4	0.7
Herbicides	0	0.0000	0.0	0.0	0.0
Pet Maintenance	114	0.1712	35.3	1.8	0.3
Total	388	0.5826	120.2	6.2	1.0
Batteries and Electrical					
	4,717	7.0826	1,462.1	76.3	11.9
Prescription Drugs					
	420	0.6306	130.2	6.8	1.1
Selected Cosmetics					
	1,971	2.9595	610.9	31.9	5.0
Other					
Hobby Related	130	0.1952	40.3	2.1	0.3
Miscellaneous	1,225	1.8393	379.7	19.8	3.1
Total	1,355	2.0345	420.0	21.9	3.4
TOTALS:	39,716	59.6336	12,310.5	641.7	100

**TABLE 7. WEIGHT OF HOUSEHOLD
HAZARDOUS WASTE IN MARIN COUNTY, CA**

Waste Type	Weight Observed from Pickups (gr)	Mean Weight per Household per Week (gr)	Projected Total Weight		% of Total
			per Week (lb)	per Year (M. Tons)	
Household Cleaners					
Toilet Bowl Cleaner	508	0.4614	41.0	2.1	0.8
Drain Opener	0	0.0000	0.0	0.0	0.0
Laundry Soap	806	0.7321	65.0	3.4	1.3
Bleach	80	0.0727	6.4	0.3	0.1
Dish Detergent	666	0.6049	53.7	2.8	1.1
Cleaner	3,885	3.5286	313.1	16.3	6.3
Ammonia Based Cleaners	509	0.4623	41.0	2.1	0.8
Polish	997	0.9055	80.3	4.2	1.6
Floor Finish	438	0.3978	35.3	1.8	0.7
Air Freshener	406	0.3688	32.7	1.7	0.7
Other Household	1,016	0.9228	81.9	4.3	1.6
Total	9,311	8.4569	750.4	39.8	15.0
Automotive Maintenance					
Oil	4,992	4.5341	402.3	21.0	8.1
Transmission Fluid	128	0.1163	10.3	0.5	0.2
Engine Treatment	793	0.7203	63.9	3.3	1.3
Antifreeze/Coolant	0	0.0000	0.0	0.0	0.0
Auto Wax	582	0.5286	46.9	2.4	0.9
Other Auto	680	0.6176	54.8	2.9	1.1
Total	7,175	6.5169	578.2	30.1	11.6
Household Maintenance					
Paint	5,778	5.2479	465.6	24.3	9.4
Paint Thinner	173	0.1571	13.9	0.7	0.3
Stain/Varnish	1,522	1.3824	122.6	6.4	2.5
Glue	1,019	0.9255	82.1	4.3	1.7
Other Maintenance	8,599	7.8102	692.9	36.2	13.9
Total	17,891	15.5231	1,377.1	71.9	27.8
Pesticides and Yard Maintenance					
Fertilizer	771	0.7003	62.1	3.2	1.3
Pesticides	3,782	3.3451	304.8	15.9	6.1
Herbicides	0	0.0000	0.0	0.0	0.0
Pet Maintenance	881	0.8002	71.0	3.7	1.4
Total	5,434	4.8456	437.9	22.8	8.8
Batteries and Electrical					
	16,407	14.9019	1,322.1	69.0	26.6
Prescription Drugs					
	1,982	1.8002	159.7	8.3	3.2
Selected Cosmetics					
	2,341	2.1263	188.6	9.8	3.8
Other					
Hobby Related	1,086	0.9864	87.5	4.6	1.8
Miscellaneous	841	0.7639	67.8	3.5	1.4
Total	1,927	1.7503	155.3	8.1	3.2
TOTALS:	61,668	55.9212	4,969.3	259.0	100

**TABLE 8. COMPARISON OF HOUSEHOLD HAZARDOUS WASTE
BETWEEN NEW ORLEANS, LA AND MARIN COUNTY, CA**

Waste Type	Mean Number of Hazardous Waste Items per Household per Week		% of Total Number of Household Hazardous Waste Items		Mean Weight (gr) of Hazardous Waste per Household per Week		% Weight of Total Household Hazardous Waste	
	New Orleans	Marin County	New Orleans	Marin County	New Orleans	Marin County	New Orleans	Marin County
Household Cleaners	0.0600	0.0389	10.9	10.2	7.9015	8.4569	13.2	15.0
Automotive Maintenance	0.0180	0.0181	3.3	3.2	12.5835	6.5169	21.2	11.6
Household Maintenance	0.0585	0.0573	43.4	9.9	25.8498	15.5231	43.4	27.8
Pesticides and Yard Maintenance	0.0090	0.0218	1.6	3.8	0.5826	4.8456	1.0	8.8
Batteries and Electrical	0.1637	0.2034	29.9	48.8	7.0826	14.9019	11.9	26.6
Prescription Drugs	0.0556	0.0254	10.2	4.4	0.6306	1.8002	1.1	3.2
Selected Cosmetics	0.1622	0.0599	29.7	17.2	2.9595	2.1263	5.0	3.8
Other	0.0195	0.0154	3.6	2.7	2.0345	1.7503	3.4	3.2
TOTALS:	0.5465	0.5802	100	100	59.6336	55.9313	100	100

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APPENDIX

HAZARDOUS CONSTITUENTS OF COMMON HOUSEHOLD COMMODITIES

Item	Known Examples of Hazardous Ingredients
Household Cleaners Toilet Bowl Cleaner	Trichloro-S-Triazinetrione Sodium Acid Sulfate or Oxalate Hydrochloric Acid Chlorinated Phenols
Drain Opener	Sodium Hypochlorite Sodium Hydroxide Trichlorobenzene Potassium Hydroxide Hydrochloric Acid Trichloroethane
Laundry Soap, Bleach, Dish-Washing Detergent, Bathroom Cleaners, Upholstery Cleaners, Floor Cleaners, Other General Purpose Cleaners	Surfactants (LAS and others) Ethoxylated Alcohols Methylene Chloride Tetrachloroethylene Sodium Hypochlorite Hexachloroethane
Ammonia Based Cleaner	Ammonium Hydroxide Surfactants (LAS and others) Ethoxylated Alcohols Xylenes Sodium Hypochlorite Phenols Ammonia Diethylene Glycol
Polish (Furniture, Wood, Metal, Vinyl, etc.)	Trichloroethane Petroleum Distillates Mineral Spirits Petroleum Solvents Oxalic Acid Denatured Ethanol Isopropanol Phosphoric Acid

Item	Known Examples of Hazardous Ingredients
Floor Finish	Diethylene Glycol Petroleum Solvents Ammonia
Air Freshener	Alkylphenoxypolyethoxy Ethanol Isobutane Propane
Other Household (Oven Cleaner, etc.)	Sodium or Potassium Hydroxide
Automotive Maintenance	
Oil and Transmission Fluid (Grease, Hydraulic Fluid, Motor Oil, All Purpose Oil, etc.)	Petroleum Distillates Lead
Engine Treatment (Transmission and Motor Oil Additives, Fuel Additives, Carburetor Cleaner, etc.)	Petroleum Distillates Mineral Spirits Trichloroethane Methylene Chloride Xylenes Toluene Methylene Chloride
Antifreeze/Coolant	Ethylene Glycol Methanol
Auto Wax	Petroleum Distillates
Other Auto (Grease Solvents, Rust Solvents, Refrigerants, etc.)	Toluene Chlorinated Aliphatic Hydrocarbons Potassium Dichromate
Household Maintenance	
Paint (Latex, Oilbase, Art and Model Paints, etc.)	Toluene Xylene Methylene Chloride Halogenated Aromatic Hydrocarbons Mineral Spirits
Paint Thinner and Stripper (Remover)	Toluene Chlorinated Aliphatic Hydrocarbons Esters Alcohols Chlorinated Aromatic Hydrocarbons Ketones

Item	Known Examples of Hazardous Ingredients
Stain/Varnish/Sealant	Pentachlorophenol Methylene Chloride Mineral Spirits Petroleum Methyl and Ethyl Alcohol Benzene Lead
Glue (Model, Epoxy, General Purpose, etc.)	Toluene Methyl Ethyl Ketone Acetone Hexane Methylene Chloride Asbestos Fibre (Asbestos Cement)
Other Maintenance (Asphalt, Caulking, Tar Paper, etc.)	Methylene Chloride Toluene Trichloroethylene Benzene Asbestos Ketones
Pesticide and Yard Maintenance Fertilizer	Concentrated Potassium, Ammonia, Nitrogen, Phosphorus
Pesticides	Aromatic Petroleum Hydrocarbons Petroleum Distillates Naphthalene Xylenes Carbamates Chlorinated Hydrocarbons Organophosphates Urea Uracil Triazines Coumarin
Herbicides	Chlorinated Phenoxys Dipyridyls Nitrophenols
Pet Maintenance (Flea and Tick Treatment Powders and Liquids, Flea and Tick Collars, etc.)	Carbaryl Dichlorophene Chlordane Other Chlorinated Hydrocarbons

Item	Known Examples of Hazardous Ingredients
Batteries and Electrical Auto and Flashlight Batteries, Solder, etc.	Mercuric Oxide Sulfuric Acid
Prescription Drugs	Diverse Ingredients
Selected Cosmetics Nail Polish Remover, Hairspray, Make-up Remover, Dyes, etc.	Aromatic Hydrocarbon Solvents Acetone Ethyl and Butyl Acetate Toluene Alcohols Dibutyl Phthalate
Other Pool Chemicals (Acid, Chlorine) Hobby Related Activities, etc.	Sodium Dichloro-S-Triazinetrione

Compiled from: Geraghty and Miller (n.d.); Curtis and Anderson (1981);
 Ridgley (1982).

