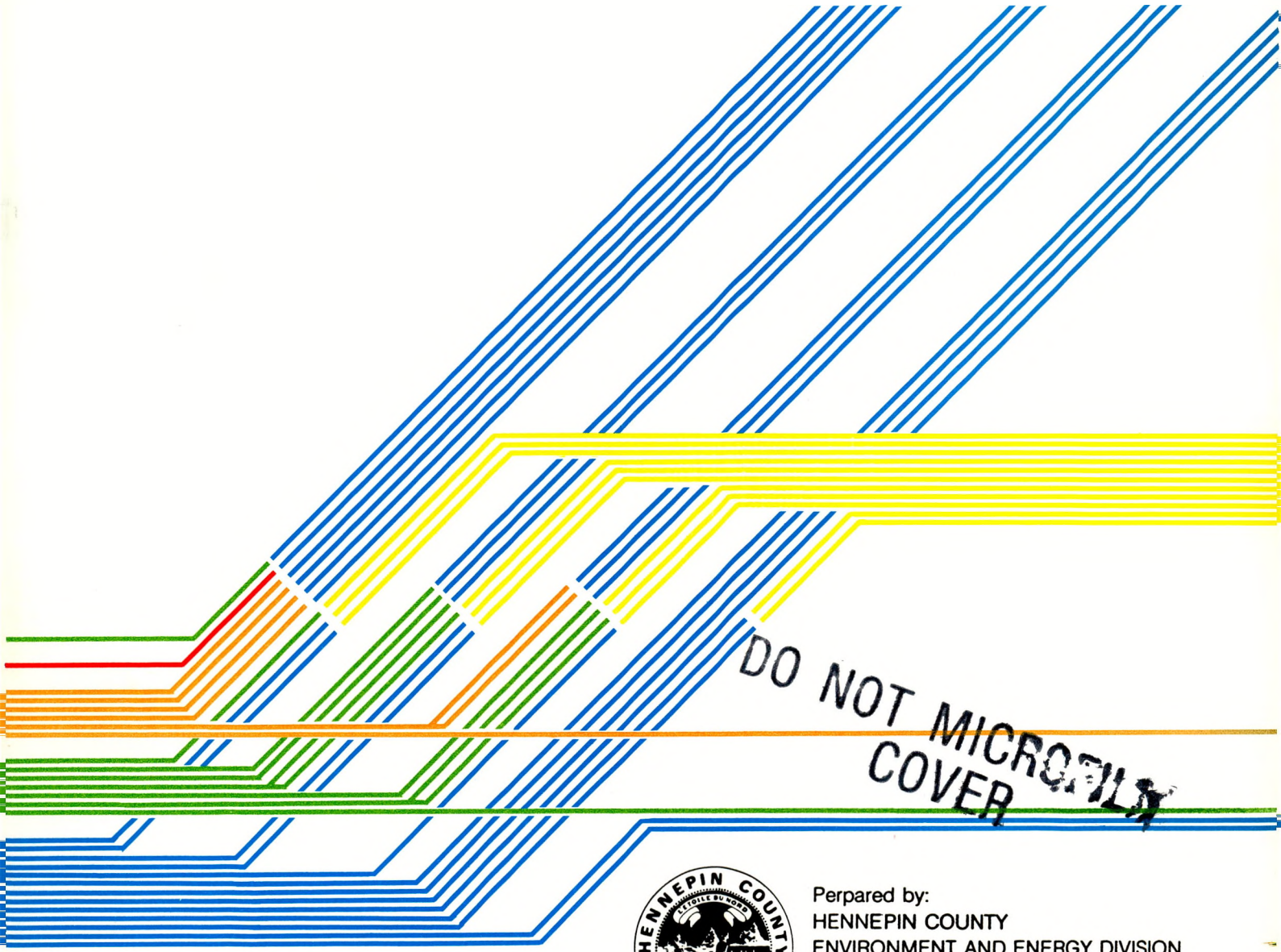
HOUSEHOLD HAZARDOUS WASTE MANAGEMENT PLANNING



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URBAN CONSORTIUM NINTH YEAR (1988-89) ENERGY PROGRAM

DISCLAIMER

PREFACE

The Urban Consortium for Technology Initiatives was formed to pursue technological solutions to pressing urban problems. the Urban Consortium conducts its work program under the guidance of Task Forces structured according to the functions and concerns of local governments. The Energy Task Force, with a membership of municipal managers and technical professionals from twenty-one Consortium jurisdictions has sponsored over 180 energy management and technology projects in forty-six Consortium member jurisdictions since 1978.

To develop in-house energy expertise, individual projects sponsored by the Task Force are managed and conducted by staff of participating city and county governments. Projects with similar subjects are organized into *Units* of four to five projects each, with each Unit managed by a selected Task Force member. A description of the Units and projects included in the Ninth Year (1986-89) Energy Task Force program follows:

UNIT -- LOCAL GOVERNMENT OPERATIONS

Energy used for public facilities and services by the nation's local governments totals about 1.5 quadrillion BTU's per year. By focusing on applied research to improve energy use in municipal operations, the Energy Task Force helps reduce operating costs without increasing tax burdens on residents and commercial establishments. This Ninth Year Unit consisted of six projects:

- **Kansas City, Missouri** -- *Direct Digital Control of an Air Washer System*
- **Memphis, Tennessee** -- *The Use of Transportation Management Associations to Achieve Energy Conservation Benefits in Urban Areas*
- **Montgomery County, Maryland** -- *Requirements for Energy Efficient Building Construction*
- **Phoenix, Arizona** -- *Energy Cost Reduction in Comfort Cooling Through Cogeneration*
- **Phoenix, Arizona** -- *HVAC Equipment Replacement for Best Size and Efficiency (Technology Transfer)*
- **San Jose, California** -- *Energy Master Planning for Local Government Facilities*

UNIT -- COMMUNITY AND ECONOMIC DEVELOPMENT

Of the nation's estimate population of nearly 240 million, approximately 60 percent reside or work in urban areas. The 543 cities an counties that contain populations greater than 100,000 consume 50 quadrillion BTU's annually. Applied research by the Energy Task Force helps improve the economic vitality of this urban community by aiding energy efficiency an reducing energy costs for the community as a whole. This Year Nine unit consisted of six projects:

- **Chicago, Illinois** -- *Chicago Energy Demonstration Zone*
- **Houston, Texas** -- *The Feasibility of Incorporating Alternative/Innovative Technologies in Mass Single Family Housing Rehabilitation Strategies*
- **New Orleans, Louisiana** -- *Small Business Assistance Program to Reduce Energy Consumption Through Innovative Financing Methods (Technology Transfer)*

- **New Orleans, Louisiana** -- *Development of an Energy Information an Referral Service*

- **New York, New York** -- *Marketing Energy Efficiency Programs to Commercial an Industrial Firms*

- **San Francisco, California** -- *Energy Planning for Economic Development*

UNIT -- ENERGY AND WASTE MANAGEMENT

Effective use of advanced energy technology an integrated energy systems in urban areas could save from 4 to 8 quadrillion BTU's during the next two decades. Urban governments can aid the capture of these savings an improve capabilities for the use of alternative energy resources by serving as test beds for the application of new technology. This Year Nine unit consisted of four projects:

- **Albuquerque, New Mexico** -- *Hazardous Waste as an Energy Manager's Issue*

- **Baltimore, Maryland** -- *Ammonia Oxidation by Separable Micro-supported Biomass for Nitrification of Sewage*

- **Denver, Colorado** -- *Regional Workshops on Waste-to-Energy and the Management of Special Wastes*

- **Detroit, Michigan** -- *Feasibility Assessment: Conversion of Resource Recovery Steam to Hot and Chilled Water Systems*

- **Hennepin County, Minneapolis** -- *Special Household Waste Management*

- **Seattle, Washington** -- *Implementation of Hazardous Waste Collection Option*

- **Seattle, Washington** -- *Computerizing Municipal Procurement Choices (Technology Transfer)*

Reports from each of these projects are specifically designed to aid the transfer of proven experience to staff of other local governments. Readers interested in obtaining any of these reports of further information about the Energy Task Force and the Urban Consortium should contact:

Applied Research Center
Public Technology, Inc.
1301 Pennsylvania Avenue, NW
Washington, DC
(202) 626-2400

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Donald Seeberger, Project Manager

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Chapter 1

Introduction

Project Purpose

In 1985, Hennepin County entered into an agreement with Hennepin Energy Resource Co., Ltd. for the construction and operation of a 1000-ton-a-day waste-to-energy facility. Under the terms of this agreement, the County is obligated to ensure that only acceptable wastes are delivered to the facility. The contractual definition of "unacceptable waste" requires that the County remove materials that can contaminate ash emissions. In an effort to ensure that the new incinerator operates as safely as possible, Hennepin County is currently examining various methods of removing unacceptable materials from the waste stream; household hazardous wastes (HHW) are one stream being considered for diversion.

As with any new program, a number of policy and design issues must be addressed prior to implementing a permanent HHW collection system. In an effort to address these questions and share information from its experiences, Hennepin County applied for, and was awarded a grant from the Urban Consortium Energy Task Force. The grant research plan detailed a three-phase approach for developing and implementing a HHW collection. The Year IX grant from the Urban Consortium allowed the County to conduct the first phase of the work plan. In phase one, the County examined planning issues affecting program design and drafted a set of recommendations that included establishing a pilot collection program in phase 2. The pilot collection center would gather data to guide the development of a permanent county-wide

collection program. Based on the results of the pilot program, an operating manual would be developed for integrating the permanent household hazardous waste program into the county waste management system. In the final phase of the project, the operating manual would be used to initiate development of permanent HHW collection centers and local waste processing options.

This report describes the results from the first phase of the project grant, moving from a broad examination of what HHW is, to detailed findings from surveys and focus groups addressing county residents' needs and opinions about a specialized HHW disposal system.

Report Organization

The term "household hazardous waste" has been coined within the last ten years to describe a broad category of materials commonly found in people's homes which may pose a threat to human health and the environment. While descriptive, household hazardous waste is unclear, and therefore often misunderstood. Chapter 1 discusses the federal government's technical but vague definition of household hazardous waste and then offers a working alternative. Using the alternative definition, the discussion examines specific categories of materials considered to be hazardous. Detailed descriptions of the materials and risks they pose provide a stepping- stone to understanding the issues.

HHW collections programs are explored as a means of reducing the potential risks associated with incineration of residential wastes. The chapter describes the results of the County's pilot collections which led to the realization that permanent collection programs would be necessary. To meet the needs of the County, it was decided that permanent HHW collection centers would be incorporated into three transfer stations now being constructed.

The event collection held during 1988 provided an opportunity to survey participants about their HHW disposal needs and behaviors as well as to gather data concerning the materials they continue to use and store around

their homes. Chapter 4 provides a detailed description of the HHW Participant Survey and Home Inventory form, presenting major findings of the study. While the survey provided valuable information about residents participating in HHW collections, it provides no information about the households who did not participate in the collection events.

In order to obtain specific information about households which had not participated in the collections, a focus group study was conducted. A series of focus groups were held to identify the variety and volume of materials stored in area residences and to determine design features that can motivate and involve a broader base of residents. The result of this study are present in Chapter 5 along with a discussion of the methodology used for selecting the participants. The recommendations received from the focus group study will aid in structuring a comprehensive management plan for the County's household hazardous waste stream. They can also be used as guidelines by other jurisdictions considering the establishment of permanent HHW collection centers.

The final chapter details the lessons learned by Hennepin County, offering guidelines to other jurisdictions in considering a HHW collection and disposal effort.

CHAPTER 2

WHAT IS HOUSEHOLD HAZARDOUS WASTE?

Introduction

Almost everything we do these days seems to be a threat to either our health or the environment, or both. Household hazardous wastes fall into the last category. That certain household materials are hazardous is not news. For many years poisonous, flammable or corrosive consumer products have been identified with warning labels to warn users of the potential for physical injury. Recently, however, a new awareness of the environmental problems that these materials can cause when disposed of improperly has given rise to special programs for collecting and diverting HHW from the normal waste stream.

In 1982, the Municipality of Metropolitan Seattle began a study to determine what effects, if any, various household products might have on the environment. The study focused on four categories of toxic consumer products--pesticides, paint products, household cleaners and automotive products. In their report Toxicants in Consumer Products, it was noted that "while toxic substances are widespread in consumer products, information on the specific constituent chemicals is often difficult or impossible to obtain." The report concludes that "even when specific chemical constituents are known...environmental effects are patchy" (Ridgley, 1982).

In the six years following this report, the effects of household hazardous wastes on the environment have continued to receive attention. However, the attention has not brought with it the research to verify that HHW is a cause of environmental pollution. Leachate tests conducted at municipal solid waste landfills throughout the United States imply that chemicals often found in consumer products are contaminating groundwater, but fail to establish the

origin of the pollutants. Without a clear understanding of the problem, it is difficult to define what materials should be considered as "household hazardous waste" and to develop programs for safe disposal (Ridgley, 1987).

The Environmental Protection Agency (EPA) has recently developed a legal definition of household hazardous waste that combines the definitions of household and hazardous waste found in the Resource Conservation and Recovery Act (RCRA). The EPA defines Household Hazardous Waste as a waste from homes or similar sources that are either:

- o hazardous waste as listed by the EPA in 40 CFR Parts 261.33 (e) or (f);

  or

- o wastes that exhibit any of the following characteristics as defined in 40 CFR Parts 261.21 - 261.24: ignitability, corrosivity, reactivity and Extraction Process toxicity.

This definition classifies household products as hazardous when they are commercially pure grades of a compound found listed within the regulations of 400 CFR 261.33 (e) or (f) or in which a chemical is the single active ingredient (Ridgley, 1987). Household products that are ignitable, corrosive, reactive or toxic are also considered to be hazardous.

The EPA's definition was designed to be broad, yet manageable. It specifies neither the product names or the quantities of the active materials necessary to be included in this definition as hazardous. Nor does the definition make clear distinctions between materials that could cause harm to the environment, humans or both. The ambiguity of this definition assures that its applicability will not soon be jeopardized. This ambiguity, however, makes it difficult for individuals and program planners to easily determine what constitutes household hazardous waste materials.

For the purposes of this report household hazardous waste will be defined as:

> Materials found in or around the home that are either toxic, corrosive, flammable or reactive and can threaten human health or the environment when improperly used, stored or disposed of.

This definition identifies not only the properties of a material which make it hazardous but incorporates the potential threat these materials can cause both to human life and the environment. The clause "when improperly used, stored or disposed of" implies that consumers, manufacturers and government have a responsibility to inform and be informed of potential hazards and risks involved with various products. Understanding the composition of materials being used, their proper handling and storage methods, and having a safe means of disposal will reduce the risk these materials pose.

Hazardous materials are found most frequently in six general categories of common household products: pesticides, cleaners, paint products, fuels and automotive supplies, hobby materials, and batteries (excluding car batteries). Materials in these categories may be gases, solids or semisolids, or liquids. The degree of risk posed by a specific material is judged by measuring its chemical characteristics. If a product exceeds a specific limit for flammability, corrosivity, toxicity or reactivity, it is considered hazardous. In a diluted form, some materials are not considered harmful.

Household Hazardous Waste Categories

Pesticides

The word "pesticide" originates from the Latin "cida" and "pestis" which mean "to kill a plague." Pesticides are chemical compounds formulated to prevent, destroy or repel insects, rodents, fungi, weeds or other forms of plants or animals. The EPA currently estimates that there are 34,000

pesticides which are derived from approximately 600 basic chemicals. Most pesticides can be classified into three types: insecticides, rodenticides and herbicides (see Appedix 1) (Allegri, 1988).

The EPA has been given the authority to regulate the manufacturing, use and disposal of all pesticides. As amended, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requires pesticides to be registered with the EPA before they can be marketed. Misuse of registered compounds is considered unlawful. The FIFRA legislation mandates that the EPA determine whether a pesticide can perform its intended function without causing unreasonable adverse effects on human health or the environment. The intent of the law is to allow the EPA to assure that the risks associated with a pesticide do not outweigh the benefits; creating a balance between the pros and cons (Allegri, 1988).

All registered pesticides are placed into one of two categories--general (approved for household use) or restricted (for commercial use by a certified applicator). Registration and classification of a pesticide does not mean that it has been tested and is environmentally safe. Nor does classification mean that a restricted pesticide will not be found in some households. When FIFRA was amended to include registration, pesticides already on the market were given registered status or "grandfathered" in. Grandfathering and the large numbers of new products entering the market every year have hindered the EPA's ability to analyze and assess all pesticides (Ridgley, 1982).

Most pesticides are applied directly to plants and soils. Even correct applications of small amounts can be affected by the climate and physical characteristics of the land. Rains can wash away pesticides and steep slopes can increase water run-off. Surface and ground water pollution are, therefore, the major threats posed by pesticides.

This risk continues when a pesticide is disposed of in a landfill. As the containers for the pesticide deteriorate, the pesticides can become a

formidable threat to the environment. Although the amount of pesticide being disposed of by a single homeowner may be small, the accumulative effect of all pesticides leaching from landfills could be substantial.

Cleaners

Keeping today's clothes, fabrics and homes dirt-free requires a host of cleaners and disinfectants. These cleaners range from spot removers for "delicates" to caustic drain cleaners. Not only do cleaners remove dirt but they bleach, polish, scour, deodorize and sanitize. To work effectively, cleaners and disinfectants contain chemicals that can, and have caused environmental problems.

Chemical compounds found in cleaners generally fit into one of three categories: detergents, disinfectants or inert ingredients. Detergents promote cleansing by lowering surface tension, adding wetting, emulsifying or dispersing particles, and creating foam. Typical chemicals contained in detergents include alkyl sodium sulfonate, benzalkonium chloride, and glyceryl monostearate. Disinfectants are chemicals that destroy harmful micro-organisms. Two of the chemicals used in disinfectants (cresols and phenols) are extremely toxic. The third category, inert ingredients, contains the most difficult chemicals to identify. Consumers often assume, erroneously, that these chemicals are harmless. "Inert ingredients could be methylene chloride in a disinfectant, or toluene in a spot remover" (Ridgley, 1982). Some inert chemicals are harmful and require proper disposal when they become waste.

When properly used, most cleaners do not pose an environmental problem. Chemicals that are hazardous in concentrated form are often benign when diluted. Organic solvents and degreasers cause the greatest concern because they tend to be stable chemicals that are slow to evaporate or break down. The extended shelf life and high toxicity of degreasers, when combined with their use in septic systems and drain field cleaning, pose a high risk for groundwater contamination (Laderman, 1985).

Paint Products

The "paint products" category encompasses a wide variety of materials that are designed to provide a decorative or preservative surface coating. Included in this category are paints, stains, enamels, lacquers and varnishes as well as solvents, strippers and thinners. Print products can be subdivided into products that are solvent (oil) or latex (water) based. The most common paint products currently found in the home are latex paints, which pose little threat to the environment (Ridgley, 1982).

The paint industry has made a concerted effort to eliminate highly toxic materials from most paint products. Materials such as benzene, lead and mercury have either been replaced by less harmful chemicals or have been greatly reduced by volume. Yet, the solvents in oil based paints are flammable and toxic, yellow and orange pigments can contain chromium and additives to prevent mildew contain heavy metals such as mercury. In liquid form, the component chemicals still found in paints constitute a highly mobile waste that can pollute groundwater if landfilled. While the paint industry has been able to make major changes in the materials used in paints, it has had little success in altering other products.

Solvents and wood preservatives are materials posing significant health and environmental concerns. Many solvents are acutely toxic and pose health risks if used or disposed of improperly. Toluene and Perchloroethylene are solvents that are suspected of causing liver and kidney diseases with repeated and prolonged exposure. Wood preservatives contain hazardous pesticides which can create an environmental risk when disposed. The preservative chemical of greatest concern is pentachlorophenol which is highly toxic and slow to breakdown in the environment. Currently, there are no federally approved methods of disposing of pentachlorophenol (Ridgley, 1982).

Fuels and Automotive Products

In 1987, the United States consumed 113,507,440,000 gallons of gasoline and spent $79.9 billion on petroleum products (National Petroleum News, 1988). Most gasoline is used completely and only small amounts become waste. But gasoline is only one of the hundreds of automotive products that use petroleum as a base. Used motor oil, brake and transmission fluids, and other lubricants are among the items most often found in people's garages. Surveys of homeowners have shown petroleum products are also among the materials most often disposed of improperly (Ridgley, 1982).

Petroleum products are flammable and toxic, but the greatest hazard is their potential for pollution of the environment. The effects of petroleum products on the environment are both immediate and long-term. Petroleum can pollute water by coating the surface, being suspended throughout a body of water or by forming a bottom sludge. Whenever petroleum is found in water, it blocks out the oxygen needed for plants and animals to survive. Over long periods of time, oil pollution has been found to cause reproductive disorders and cancer in wildlife. Petroleum also collects in organisms and soils which are passed through the food chain to humans (Ridgley, 1982).

Other chemicals used in automotive products are glycols (used in antifreeze and brake fluid), sulfuric acids (found in car batteries), and a host of petroleum additives (tetraethyl lead, amines and alkylated phenols). Ethylene glycol, or antifreeze, is toxic in concentrated form but a less serious hazard when diluted. Similarly, sulfuric acid is water soluble and generally will not cause environmental damage. Petroleum additives cause a variety of detrimental effects ranging from a mild skin irritant to being carcinogenic.

Household Batteries

Americans own some 900 million battery-operated devices. To keep these electronic devices running, over $2.5 billion a year is spent to replace the power source--batteries (Consumer Reports, 1987). Estimating that every person in the United States purchases eight batteries per year, it can be projected that 1.6 billion batteries are consumed annually (Sax, 1975). Batteries are a convenient portable source of energy that most people take for granted and few would identify as hazardous.

A battery is a device that uses chemicals to produce electrical energy. Batteries are designed to store electricity in the form of potential chemical bonding between two active ingredients. As electricity is drawn from the battery, the chemical composition is changed and discharging takes place. Depending on the chemical composition of the battery, it can be classified either as primary (those which cannot be recharged) or secondary (those that can be recharged, reversing the chemical reaction) (Perez, 1985). Secondary batteries are becoming increasingly popular because they can be recharged many times, thus giving the user a sense of "recycling".

Figure 2.1
Chemical Compositions of Household Batteries

Battery Type	Anode	Cathode	Electrolyte
Nickel Cadmium Rechargeable	Nickel	Cadmium	Potassium hydroxide
Zinc-Carbon Cell General Purpose	Zinc	Manganese dioxide	Ammonium chloride Zinc chloride
Alkaline-Manganese	Zinc & Mercury	Manganese dioxide & Graphite	Potassium hydroxide
Mercury Cell	Zinc	Mercuric oxide	Potassium hydroxide
Silver Oxide Cell	Silver oxide	Silver oxide/ Silver peroxide	Potassium hyroxide Sodium hydroxide Zinc oxide

Hundreds of electrochemical pairs can be used to construct a battery but few of these pairs are feasible for the retail markets. The five most common types of batteries sold commercially are: zinc/carbon, alkaline/manganese, mercury, silver oxide, and nickel/cadmium. All of these batteries are constructed of corrosive chemicals which are hazardous if they leak from their casings. Batteries are also a major source of two heavy metals found in the waste stream: mercury and cadmium. Long-term exposure to heavy metals can cause severe health problems ranging from brain damage to cancer. Mercury Cells are lethal when ingested.

The casing of a household battery can be made from paper, plastic or metal. Regardless of the material used, the casing will eventually deteriorate and leak its contents. In a landfill, this process occurs over long periods of time and could contribute to ground water pollution. Batteries that enter an incinerator will explode during burning, releasing metals directly into the ash emissions. When products containing heavy metals are burned, the constituent metals are concentrated in the ash in direct proportion to the volume in which they entered the incinerator (Brunner, 1985). The large quantities of batteries used every year and a lack of consumer information concerning the hazards posed creates a major barrier for developing a convenient and economic disposal system.

Hobby Materials

Hobby and craft materials are a unique category of household hazardous waste. Many of the materials used for crafts could easily fit into one of the other five categories. Artists oils, acrylics and mediums could be classified as paints, gun metal polishes as petroleum-based cleaners, and flea powders for pets as pesticides. Hobby materials tend to be formulated for specialized uses. Ingredients no longer legally used in consumer products will often be found in hobby materials.

Some of the more hazardous hobby materials are the pigments and solvents used in painting, ceramics and wood finishing. Artists' pigments often contain highly toxic heavy metals including lead, arsenic, cadmium, and chromium. Use of these materials requires an awareness of the hazards so that precautions can be taken to prevent exposure. Solvents are used to dissolve,

mix or remove a variety of materials used in crafts. Solvents can be flammable or toxic, and may pose a health risk if they enter the body. Chlorinated solvents are known carcinogens. Solvents also contribute to air and groundwater pollution.

Photographic processing chemicals pose a similar hazard to the individual user and, if disposed of improperly, to the environment. Developers, fixatives and bleaches contain ferrocyanide, hexavalent chromium and benzene. These chemicals are flammable or can cause skin, eye and lung irritation. Photographic products containing benzene, a known carcinogen, can be especially hazardous to use.

Figure 2.2

Partial List of Hazardous Hobby Materials

Paints				
Pigments --	Arsenic	Cadmium	Lead	Manganese
	Antimony	Chromium	Mercury	
Vehicles --	Quicklime			
Varnishes include a wide variety of solvents see the list below.				
Ceramics				
Colorants --	Antimony	Chromium	Vanadium	
	Cadmium	Uranium		
Glazes --	Alkali	Barium	Lead	
	Asbestos	Carbonate		
Woodworking				
Solvents --	Acetylene tetrachloride		Ethylene	
	Benzene		Methyl Chloroform	
	Chloroform		Perchloroethylene	
	Dichloride		Toluene	
	Dichloromethane		Trichloroethylene	
Glues --	Epoxy			

This table was compiled using information found in "Health Hazards Manual for Artists" by Micheal McCann.

Hobbies are usually chosen as a means to relax and enjoy ones' leisure time. It is, therefore, easy to overlook the potential problems posed by the materials being used. It should be remembered that hobby materials are often more toxic than other household products. Proper handling and disposal methods need to be considered when pursuing a craft.

Chapter 3

A Historical Perspective of Hennepin County's

Designing waste management regulations and practices to address the characteristics of the waste stream is a recent development. Prior to 1970, there was little segregation of solid, hazardous and special wastes. Most waste materials were sent to open burning dumps. In Hennepin County, 10 dumps operated with little or no regulation; some were located on floodplains, in gravel pits or in wetland areas. Surface water contamination, methane gas migration, and nuisances such as odor, noise, dust and litter were common problems with the open dumps. Testing indicated that ground water contamination had occurred at all sites.

In 1970, prompted by the federal Resource Conservation and Recovery Act (RCRA), the state of Minnesota passed legislation requiring the upgrading or closure of open dumps. State agencies urged the counties to shift to sanitary landfilling and to move quickly to give closure notices to nonconforming dump operators. Many dumps were subsequently closed. Later legislation strengthened the Minnesota Pollution Control Agency's (MPCA) authority to prohibit the disposal of hazardous waste in sanitary landfills. (Metropolitan Council, 1985)

RCRA legislation was also the impetus for governmental waste management policies oriented toward seeking alternatives to landfilling. In the mid-70's, Hennepin County developed a policy establishing a hierarchy of waste management options. The now common model called for waste reduction, source separation and waste processing as the preferred order for developing a waste management system.

Further direction for seeking alternatives to landfilling was given by the Minnesota Legislature when it enacted the Waste Management Act in 1980. The

act mandates political subdivisions to coordinate solid waste management, setting objectives for the deliberate development and financial security of waste facilities. Subsequent amendments to the act have further defined the intent of the legislation by banning the landfilling of unprocessed waste by 1990. Counties are also required to incorporate into their solid waste master plans the most feasible and prudent reduction in both the need for and practice of land disposal of mixed solid waste (Metropolitan Council, 1985).

With a legislative mandate to reduce landfilling and the completion of the feasibility studies of alternative processing methods, a final Hennepin County report, "1981 Feasibility Report: Solid Waste Resource Recovery and Disposal Implementation," concluded that the County should proceed with either a large-scale refuse derived fuel plant or a mass burn facility.

Following purchase of a site and the request for proposals, negotiations were entered into with Blount Energy Resource Corporation of Alabama. The Blount Corporation's limited partnership, Hennepin Energy Resource Co. (HERC) will design and construct a $70 million Mass Burn waste processing facility by January 1990.

Household Hazardous Waste Collections

Under the terms of the HERC agreement, the County is obligated to use reasonable efforts to assure that only acceptable waste is delivered to the facility. Unacceptable wastes, according to the agreement, include "Hazardous Waste, and any materials, which if processed at the facility would cause the bottom ash produced at the facility to be classified as Hazardous Waste." To meet this obligation and ensure that the new incinerator operates as safely as possible, Hennepin County is examining methods of removing various types of unacceptable waste. Household Hazardous Waste (HHW) is one waste stream being considered for diversion.

In the fall of 1986, the County conducted a two-day, single site HHW collection program. Three suburban communities were targeted for the pilot program to estimate the potential need for and viability of alternative methods of gathering designated household wastes. Using recycling drives as a model, residents were offered an opportunity to bring specific HHW

materials to a County Public Works facility in one of the first ring suburbs of Minneapolis. When the waste arrived at the drop-off center a trained volunteer sorted and inventoried the materials according to waste type. Sorted waste was moved to a controlled work area for lab packing and transporting to a licensed hazardous waste disposal facility for final treatment.

Information from collections operated by the Minnesota Pollution Control Agency (MPCA), was used to estimate that 550-600 residents would bring materials to the County's collection site. During the two collection days, however, 1,070 people brought in hazardous waste materials. One of the factors that greatly affected participation was the amount of community publicity that the collection effort received. Two unanticipated promotional sources expanded the dissemination of information beyond the three targeted suburban communities. Information describing the project was reported in the Minneapolis newspaper after the Board of Commissioners passed a resolution approving project funding. The newspaper article was picked up and reported in the residents' newsletter published by the City of Minneapolis. More than 400 people from Minneapolis attended the collection event.

With this demonstration of public interest in appropriately disposing of household hazardous waste, the County decided to conduct a second and expanded collection in 1987. The second collection effort provided readily accessible drop-off points for all County residents by locating fifteen collection sites in the rural, suburban, and urban areas of the County during three consecutive autumn weekends. Participation rates at the various sites were monitored to identify high use areas.

Again, the promotional approaches used to inform local residents played a major role in the results achieved during the collection days. The second-year collection event relied on the door-to-door distribution of flyers to inform residents of the program. A poor distribution network and a lack of control over the carriers caused inconsistent distribution of the flyers. It was later discovered by County staff that many neighborhoods had not received information about the collections. As a result, although more than 4,500 people brought waste materials to the event, the level of participation was disappointing at some of the sites.

A third HHW collection event was held in the fall of 1988. This one-day collection was held at five sites throughout the County and 4,500 residents were expected to participate. The limited number of sites and hours were expected to hold participation at the same level as 1987. A Sunday newspaper insert was used to promote the event instead of door-to-door distribution of flyers. The change in promotion method helped to increase interest and more than 6,500 residents visited the collection sites. The waste materials collected included 23,000 gallons of paint, 3,500 car batteries and 6,200 tires.

Growing awareness of the problems posed by HHW has led to increasing participation in the event collections and a public demand for their continuation. The significance of removing these wastes from the waste stream entering the County's new incinerator has also been recognized. To meet the needs of the County, it has been tentatively decided that permanent HHW collection centers will be incorporated into three transfer stations now being constructed. The County has also made a commitment to continue using event collections as a method of building public awareness and gathering information for designing an on-going program.

As part of the continuing effort to design and implement an effective household hazardous waste collection system, the County received a grant from the United States Department of Energy and the Urban Consortium Energy Task Force to plan its permanent HHW program. Using the grant funds, surveys were designed to gather data from the participants attending the 1988 fall collections and to conduct a focus group study assessing marketing strategies for implementing a permanent program.

Surveys conducted during the collections were designed to gather participant demographics and assess disposal preferences. During the 1988 collection, the questionnaire was revised to add questions on recycling, public opinion and quantities of materials being stored in people's homes. Early findings indicate that an extensive education program will be needed to explain what HHW is and why it should be disposed of in a safe manner.

Chapter 4

Household Hazardous Waste Participant Surveys

The Resource Conservation and Recovery Act (RCRA) was designed to address the problem of safely disposing of municipal and industrial waste. Within the legislation, Subtitle C excludes the management of hazardous waste generated by households. Generation of hazardous household wastes (HHW) was considered to be too broad a problem to be effectively dealt with through legislation. The issue has, therefore, been left to local jurisdictions to determine if household materials within their waste stream are problematic and, if they are, how to best deal with the problem.

Awareness of the problems posed by all types of hazardous waste has led a growing number of states and local authorities to examine alternative disposal methods for home-use pesticides, paints, cleaners, automotive products, hobby materials and batteries. In 1981, Lebanon, Kentucky conducted the first collection event for a household product. The following year, two general household material collections were held in Seattle, Washington and Lexington, Massachusetts.

In the six years since the first household hazardous waste collections (HHWC) were held, the number of communities conducting collections has mushroomed. In 1988, 427 communities held HHWC events and 27 municipalities had implemented permanent collection programs (Duxbury, 1989). One-day event collections have proven to be an excellent way of increasing community awareness of a potential problem. But awareness has created a need to provide

the public with on-going convenient disposal methods for HHW. Before a community establishes a permanent HHW collection program the potential clients' needs and motivations must be understood.

Collection Methods

Hennepin County initiated its HHWC program in an effort to evaluate the need for establishing a permanent program. If it could be demonstrated that significant amounts of problem materials could be removed from the waste stream entering the incinerator, establishing a permanent program might be feasible. A second goal of the collections was to increase public awareness of the need to dispose of all wastes in a proper and responsible manner. Successfully implementing a responsible waste management system that includes recycling, composting and waste-to-energy requires the cooperation of all County residents. Assuring that citizens receive clear, accurate information concerning the program is one means of building program support.

To achieve the main program goal of evaluating the need to remove HHW from the normal waste stream, Hennepin County assumed responsibility for planning, implementing, operating and financing the collections. Planning for the 1988 project began eight months prior to the collection with the authorization by the County Board of Commissioners to conduct a pilot HHWC. Information was gathered from the Minnesota Pollution Control Agency (MPCA), the State Waste Management Board, citizens groups and officials from Cities and Counties that had previously conducted HHW collections. From these discussions and data gathered during earlier collections, participation projections were made for various collection sites.

Five sites that met four qualifying criteria were selected for the 1988 program. Collection project sites were selected on the basis of:

1. Demographics: The sites had to be located in or near areas that were predominately single family residences.
2. Geographic location: The site had to be located near a major roadway(s) and be easily accessible.

3. Physical Characteristics: A large space was necessary to permit a waiting area for traffic, four collection tables, and a sorting and packaging area. The work area also required an impermeable surface, a telephone, running water and sanitary facilities.

4. Municipal Support: The municipality had to be willing to provide the facility and municipal support staff to manage the collection.

With the collection sites selected, the next step was to issue a request for bid to perform the final segregation, packaging and disposal of the collected waste. Hennepin County assumed responsibility as the generator of the waste, and therefore, ultimate liability for proper disposal of the materials collected. Bid specifications were prepared which outlined anticipated types and quantities of materials to be collected, establishing a heirarchy of preferred disposal methods. For the majority of wastes, incineration at a RCRA certified facility was the stipulated disposal method. Only two bids were qualified and a contract was awarded for a total cost of $472,000.

Approximately 150 community volunteers were recruited by a local environmental group to help staff the collection sites. Volunteers were provided with a 2-hour workshop on material identification, handling techniques, use of safety equipment and site operation. Thirty County employees completed the collection work force.

During collection day, the County Project Director was responsible for coordinating support services for all five sites. A County Environmentalist was assigned to each site to act as a lead worker. Prior to opening the site, the lead worker was responsible for reviewing material handling and safety procedures, assigning work stations, and assuring that the site and safety equipment were prepared. Volunteers and County employees worked together to control traffic, inventory and sort waste, distribute surveys and educational pamphlets and package materials.

Arriving vehicles were directed by volunteer traffic controllers into one of several approach lanes and were given a questionnaire with clipboard and pencil. While waiting to drop off their waste materials, participants could complete the survey and review a packet of educational literature. Completed questionnaires were collected at the inventory tables.

Before unloading the waste, it was first inspected by a County staff person or a trained and experienced volunteer to assure that all of the materials were acceptable. Materials that could not be disposed of by the hazardous waste contractor were not accepted. Accepted waste materials were then moved to an inventory table where they were inspected for contents, sorted by waste type and inventoried. The waste was then moved to a testing and packaging area where the hazardous waste contractor prepared the materials for transportation.

Car counts kept at the five collection sites indicated that 6,048 people brought in waste materials. Because of the overwhelming attendance during the collection day, it was decided to extend the event for an additional two days at a County facility. Five hundred and fifty people brought materials in during these two days, bringing the total attendance to 6,598. This count does not, however, reflect the number of households served. Approximately 30% of the participants completing a survey indicated that they were bringing waste from more than one household. Adults often brought in materials from both their own home and that of their parents. Several people reported that they were bringing in waste materials from three or four of their neighbors' homes.

Adjusting for this "under-reporting", it has been estimated that approximately 8,700 households dropped off 80 tons of household hazardous wastes. During the collection event, materials accepted included 6800 used tires, 4,800 car batteries, 23,760 gallons of paint and 742 drums of chemical waste. Chemical wastes were grouped into five categories: flammables, corrosives or oxidizers, poisons, aerosols and special wastes. Table 4.1 lists the types of materials placed in each category and the percentage it represented of the chemical waste received.

TABLE 4.1

Chemical Wastes Categories

from the Household Hazardous Waste Collection

in 1988

Category*	Type of Material	% of Chemical Waste
Special Wastes	Solvents, Cleaners, Glues	28%
Flammables	Gasoline, Lighter Fluids	26%
Aerosols	Spray Paint, Weed Spray	17%
Poisons	Pesticides, Herbicides	16%
Corrosives/Oxidizers	Drain Cleaners, Acids/Bases	13%

* Paint is considered as a separate waste type.

Preparing the waste materials to be transported to a certified disposal site continued for several weeks after the collection event ended. Paint was by far the largest category of materials collected, requiring the most time to sort and prepare for shipping. Chemical wastes were removed from the site by the contractor and taken to a storage facility where they were re-sorted and lab packed for incineration. Six semi-trailer truck loads of waste tires were shipped for shredding and use in crumb rubber products produced by a Minnesota manufacturing plant. Car batteries were the only items of economic value collected and were sold to a regional smelter of metal processing.

Survey Design

An additional goal of the collections has been to gather information concerning the quantities and types of materials that would be delivered to the site. The collections also provided an opportunity for the County to gather data about participants' needs for disposing of HHW. Surveys conducted during the collections were designed to gather participant demographics and assess disposal preferences. During the 1988 collection, the questionnaire was revised to add questions on recycling, public opinion concerning disposal options for HHW as well as quantities of materials which continue to be stored in homes after attending the HHWC.

The first questions on the survey were designed to gather general program information such as: how participants had heard of the program. The second section asked four questions which could be used as baseline information for structuring permanent or on-going HHWC. Respondents were asked: How often they would use a collection center; which hours would be most convenient; and how far participants would be willing to drive to use a collection. This section was followed by a series of questions designed to assess respondents' opinions on several policy issues.

Respondents indicated their degree of agreement with each of nine items on a six-point scale, with 1 = "strongly agree" and 6 = "strongly disagree". Disposal and product labeling were the focus of the opinion section. It should be noted that this section of the questionnaire proved to have major flaws in the structure of the questions.

Participant demographics closed the questionnaire. Using the zip codes recorded in this section, response levels from various parts of the county could be mapped. This information will help planners to estimate the distance individuals are willing to travel to bring in HHW.

Survey Findings

It was initially planned that every vehicle arriving at the collection site would complete a questionnaire. Extremely high participation at all five of the initial sites exhausted the supply of questionnaires by mid-day. It was also decided not to survey the participants attending the extended collection days. Approximately 46% (2,604) of the individuals dropping off waste

materials completed the survey. Of the 46%, 80% responded to all of the questions. Analysis of the 1988 responses show that:

Participation in Hennepin County's collection events has been limited to a small group of residents who tend to be well-educated, established homeowners from a higher income range. Although the collection projects have been conducted for three consecutive years, the characteristics of the participants have not changed. The demographics of the participants are consistent with the findings that occur when any new product or program is initially introduced - those who are first to take advantage of the opportunity are the better educated and more established residents of the community. The challenge for the HHWC program will be to broaden its base of support to include a more representative cross-section of the County's population.

Residents attending the County's collections were participating because of their concern for having a clean environment. Environmental interest is also reflected in the respondents' participation in alternative waste-management programs. During the last collection event, 69% of the participants responding to the survey stated that they were actively recycling at least one type of material. In 1987, participants were asked if they would be willing to pay more for environmentally safe products and if so, how great an increase would they accept. Thirty-four percent of the respondents said they would pay up to 10% more for environmentally safe projects. Care must be taken in interpreting this finding because the upper income levels of the respondents may be biasing the limit for acceptable cost increases.

Waste materials brought to the collections have often been stored for long periods of time. Thirty-three percent of the respondents estimated that their household hazardous materials had been stored for six years or more. The desire to remove waste materials from their homes and the absence of alternative disposal methods prompted many to use the collections. When asked if they had ever contacted a public agency to seek advice on proper disposal, 35 percent responded positively. The next survey question asked how often they would use a permanent HHWC site. Seventy-four percent felt that they would bring in waste materials one or two times per year. Several commented that a permanent disposal site should be operated five days a week year-round.

Residents are willing to bring HHW materials to a collection site, if the site is within a convenient distance from their home. By mapping the distance traveled by participants attending the event collection, it was determined that the urban collection site drew 60% of its participants from within one-and-a-half miles of the site. This compares to suburban and rural sites which drew only 40% of the participants from the same distance. This finding indicates that geographic convenience may be defined in different ways for different residents within the county.

Home Inventory

The third objective of the collection project was to learn about the types and quantities of materials being stored by residents in their homes. By knowing this information, program planners can estimate the amount of hazardous materials generated and eventually disposed of by the residents. This allows development of a program that collects the most prevalent materials and has the capacity to effectively service the expected demand.

Several methods can be used to determine waste generation and disposal. The most elaborate method is to conduct a waste characterization study. A waste characterization study examines waste that enters the solid waste stream at either the individual household site or at the landfill. Waste is sorted and categorized by type and then it is weighed, counted or measured to determine specific amounts. This methodology is effective for normal waste streams but tends to underestimate less frequently disposed of waste.

Telephone surveys are a second approach used for gathering information on household hazardous materials. Randomly selected households are called by trained interviewers and asked a series of questions concerning the types of materials they purchase and are storing in their homes. In a survey conducted by the City of Seattle, residents were asked if they had any of ten substances in their homes. In a more refined format, the State of Massachusetts asked respondents if they had disposed of specified types of waste in the past year. The common finding of these surveys is that household hazardous materials are routinely stored in homes for long periods of time. Disposal, therefore, tends to be infrequent but in large amounts when it occurs.

The reliability of data gathered by telephone surveys for estimating quantities of specific household materials has been questioned. Accuracy of the information relies on the memory of the respondent, not on actual inventory of materials. To address this issue, the University of Minnesota's Center for Urban and Regional Affairs (CURA) developed an in-home interview and inventory to try and estimate the quantities of hazardous materials found in peoples homes. Interviewers met with considerable resistance. Residents

would not allow interviewers to conduct the survey and in-home inventory. It is possible that the interviewer conducting the materials-inventory was seen as invading the individuals' privacy. Regardless of the reason, the accuracy of the information was deemed to be unreliable and the project was abandoned.

To meet its objective, Hennepin County designed and tested an inventory for determining the types and quantities of household hazardous waste being stored by residents. Recognizing the flaws of various survey methods, it was decided that a home inventory form should be developed that could be completed by any member of a household. The form was structured to briefly explain the purpose of the project, list common categories and items which are considered hazardous, provide standard measures and gather basic demographic data. Although the form was only two pages in length, it required approximately 30-45 minutes to complete.

One barrier in gathering accurate information was to find individuals who were interested enough to take the time to complete the inventory. Residents attending the HHWC were one potential population. Twenty-six hundred participants at the five collection sites were given the inventory with a letter of explanation and a self-addressed stamped envelope. With no incentive given, it was anticipated that only 10% of the inventories would be returned. Surprisingly, 698 forms (27%) were returned.

The methodology used to gather this data is biased by the fact that the population was self-selected. The respondents' income and education levels were as high as those of the larger collection survey group and significantly higher than the average County resident. Therefore, the data regarding specific materials cannot be generalized to the population as a whole. The data does gives new insights concerning the amounts of materials stored in the home by participants in a HHW project.

Materials reported in the home inventory are not "waste items" but are still usable products. Participants bringing waste materials to the collection events were asked in the survey to report only items that are still needed and in usable condition. Many residents who did not attend the collections are probably storing household hazardous materials that are not yet considered waste. The information provided by the respondents gives some

indications of what materials are regularly stored and for how long.

Inventory Findings

The survey of home inventories indicates that participants in the collection retain fairly large amounts of various materials. Much of the household hazardous material will be depleted through use in and around the home and will not enter the waste stream, but some of these materials will end up as wastes. Items such as household batteries, used motor oil and aerosol cans create large volumes of waste which require special disposal methods. The results of the inventory point to items that may be disposal problems.

Latex-base paint was the material most often reported as being stored in the home. Eighty-six percent of the respondents indicated that they continued to store latex paints after having attended the HHWC. Oil-based paints were being kept by 56% of those responding. One respondent noted that the paint was for "touch-ups" around the house. But amounts reported would seem to indicate that large quantities are common. Forty-three percent of those storing latex paint were storing 3 or more gallons.

The amount of oil-based paint being stored was much smaller: 60% of the individuals having oil-based paint reported storing one gallon or less. With the continued storage of large quantities of paints, it can be expected that paint will continue to be a major special waste disposal problem.

Aerosol cans containing all types of materials were the second most frequently stored item. Aerosol products were found in 84% of the respondents homes. Nearly 40% of the individuals having aerosols had more than 10 cans. The primary safety hazard posed by aerosols cans is their ability to explode and release their chemical contents if mishandled. Assuring that residents understand the proper method of using, storing or disposing of aerosols should be one focal point of a community education program.

Gasoline, used to fuel home power equipment, was stored in over 75% of the respondents' homes. As a power source for lawn mowers, snowblowers, chainsaws and boat motors gasoline is often kept in quantities of 3 or more gallons. While gasoline is kept in significant quantities around most homes, little of it will become waste. Other fuels, such as kerosene and propane, are common fuels in secondary heating systems, camping equipment and household tools. Although only 20% of the respondents reported quantites of these fuels, their specialized uses increase the potential for them to go unused and become wastes.

Residents who have used motor oil tend to have other related automotive supplies stored in their garages or homes. Cross tabulation of used oil

with transmission and brake fluid indicated that individuals who change their own oil are likely to do other work on their automobiles which require specialized supplies. These supplies may eventually become waste items requiring appropriate disposal.

Summary

While the HHW participant survey and home inventory provides insights into the attitudes, behaviors and need for appropriate disposal alternatives for HHW by residents attending the collections, questions remain concerning the county residents who have not participated in a collection. Before a continuing program is initiated, more information is needed on the type of products that are likely to be collected and the criteria that residents will use in determining whether or not to participate in a local collection program. The questions that must be answered include:

- Do County residents know which products in their homes are hazardous?
- What types of hazardous wastes are being stored and disposed of by homeowners?
- Is the information about hazardous material disposal that is presently available to residents adequate?
- Which disposal options are homeowners currently using?
- Are homeowners aware of proper ways to dispose of hazardous products?
- How much hazardous household waste could potentially get into the waste stream for the incinerator?
- What are the major barriers that will need to be overcome if a collection program is to be successfully implemented?

To address these questions, the Environment and Energy Division decided to conduct several focus groups of local homeowners. Experienced moderators for the groups were selected from outside the department, and participants were sought from a randomly selected list of homeowners stratified by the city in which they lived. Data from the focus group study will be used during the Year X Urban Consortium project to structure an on-going permanent HHW collection program for the County. In the next chapter, the focus group study is discussed and the findings to these questions are presented.

Chapter 5

A Focus Group Study: Defining the Non-participant in HHW Collections

What is a Focus Group?

A focus group is a special type of group in terms of purpose, size, composition and procedures. Groups generally have six to ten participants who have been selected because they have certain characteristics in common that relate to a topic but who are not familiar with other group members. Participants are led through a carefully planned discussion designed to obtain perceptions on a defined area of interest using a permissive, nonthreatening environment. Several group discussions are held with similar types of participants to assure that trends and patterns that emerge are consistent. Careful and systematic analysis of the discussions provide clues and insights as to how services or programs are perceived.

Focus groups work because they identify human tendencies relating to the use of a service, product, or program. Traditional survey methods assume knowledge of what an individual or group is feeling and provide a fixed list of responses. Focus groups allow the moderator, program planners and managers to listen to the opinions of the people for whom the program or service is being planned. The groups allow program planners, managers and evaluators to obtain more detailed and complete information about prospective "customer" preferences than a less interactive survey and research approach. Focus groups were used in the planning process for the permanent household hazardous waste drop-off sites to identify program design options and marketing techniques. This technique was used to augment the already

collected data from the roundups and collection event participant surveys. The group specifically "focused on" was the group on which the least was known--County residents who had not participated in a HHW collection.

Methodology

Ninety-seven percent of the respondents to a survey of participants in 1988's collection events were owners of single-family dwellings. The geographic areas of residence varied by collection site. Based on this information, municipality of residence and home ownership status were selected as the criteria to be used in defining the population from which focus group members would be selected. Separate focus groups were held for homeowners from Minneapolis, inner-ring municipalities and outer-ring municipalities so that differences in products stored, receptivity to a collection option and the potential for participation could be assessed. Three separate sets of focus groups were established of homeowners from: Minneapolis, first-ring municipalities and outer suburbs. In 1980, the three groups contained a comparable number of single-family homes: 79,171; 65,393; and 84,922, respectively.

With the population for the focus groups defined, the next step was to select the specific individuals to be invited to participate. A computerized random selection program was used to identify records where the name of the property owner and the homeowner were the same in the County's Property Information System. Two hundred such records were drawn for each of the three groups. The consultant then phoned homeowners, in the order of their selection, until six focus groups of no more than eight members each had been formed. Forty-three homeowners (approximately one out of every four contacted) agreed to participate in the discussion groups; 13 from Minneapolis, 16 from the inner-ring municipalities and 14 from the suburbs in the outer portion of the County. Of this group of volunteers, thirty-four actually attended the focus group sessions; illness and adverse weather conditions were responsible for the absences of nine individuals.

Following a brief introduction and explanation of the purpose and ground rules for the focus groups, participants were asked a series of questions about their household's hazardous waste disposal behaviors. A summary of the responses to each question follows.

Findings

Question #1

WHAT WAS THE LAST HAZARDOUS HOUSEHOLD PRODUCT THAT YOU DISPOSED OF? WHAT DID YOU DO WITH IT?

Responses to this question showed that participants interpreted the phrase "hazardous products" very broadly. The items mentioned included:

- used motor oil
- Malathion
- "plastic containers"
- paint (oil and latex)
- a charged fire extinguisher
- thinner
- an old TV set
- aerosol cans
- insecticides

Paint and used motor oil were the most frequently mentioned items; at least half of the participants in every group indicated that this was the hazardous material they had most recently disposed of or were storing for disposal in the near future. The disposal options for used motor oil were consistently indicated as "a neighborhood gas station" or a "local collection site". No other disposal methods were mentioned for this waste.

Several participants indicated that they had tried to get information about proper disposal of their waste materials but had not been able to find any source of information that was helpful. The majority of the participants were unaware that County-sponsored collections had taken place. Even when the participants knew that "a collection had been held" there was confusion about who had sponsored it, when it was done and whether or not it was going to be repeated. As a result, most participants had disposed of their

household hazardous wastes in their regular trash.

Question #2

WHAT MATERIALS DO YOU PRESENTLY HAVE IN YOUR HOME THAT YOU CONSIDER HAZARDOUS?

The responses to this question indicated that a wide variety of potentially hazardous products are present in most homes. The items mentioned by participants were:

- cleaning products (of all types)
- gasoline
- paint (mostly latex, but some oil)
- plastic food containers
- aerosol cans
- Scotchguard
- styrofoam insulation panels
- leather tanning solution
- photographic chemicals
- microwave ovens
- paint strippers
- peroxide
- motor oil
- soaps
- smoke detectors
- tires
- batteries (car & household)
- insecticides
- varnish
- DDT
- weed killers

The variety of items identified further indicated that participants did not have a clear understanding of the definition of "hazardous household products". One of the participants commented during this discussion that "the burden is on the consumer to know what is safe and what isn't".

When asked "What makes these items hazardous?" the participants generally interpreted "hazardous" to mean "having the potential for harming the environment or jeopardizing one's health". Phrases such as "potential for contaminating the water and soil", "toxic fumes", "poisonous", "not natural", flammable", "contains acids or strong chemicals" and "label warnings" were used to describe "hazardous" products. Participants believed that the responsibility for defining the hazard and addressing the problems associated with use and disposal of hazardous household products should be shared by consumers, manufacturers, distributors, retailers and "government".

One group viewed government as the "enforcer of manufacturer and retailer responsibilities" and "the source of accurate information". A significant amount of discussion in several groups focused on the ability of consumers to use their purchasing power to influence the type of products manufactured and sold. Participants suggested that changes in packaging and corporate ethics encouraged by consumer purchasing decisions and public pressure may help reduce the hazards of marketplace products in the long term. Public education and corporate responsibility for at least part of the cost of disposal may also help stimulate the search for less hazardous but equally effective household products.

When asked "What do you do when you can no longer use these products or have no need for any more of the product?" most participants indicated that they disposed of them in their regular garbage. **Limits on time, limited information on disposal alternatives, difficulties in accessing alternatives and inconvenience were cited as reasons that participants did not use more appropriate methods of disposal for their hazardous wastes.**

Up to this point, the participants had operated within the parameters of their own definition of "hazardous materials". Before requesting responses to the remaining questions, the Home Inventory of Chemical Products (Appendix 1) was distributed to the participants for their review. Participants in each group expressed surprise about the inclusion of cosmetics in the list and indicated that their personal definition of "hazardous household products" would have to be modified. The number and type of items in the list appeared to shock the participants.

Question #3

DO YOU HAVE ANY OF THE PRODUCTS LISTED IN YOUR HOME AT THIS TIME? WHERE ARE THEY STORED? HAVE YOU HAD TO DISPOSE OF ANY OF THESE PRODUCTS IN THE PAST FOUR MONTHS?

All participants were asked if they had any of the products listed in the inventory and where the products were stored. They were also asked if they had disposed of any of these products in the past four months.

- Aerosol cans were present in almost all of the households, with storage ranging from the basement to the kitchen. Disposal occurs regularly and in the garbage.

- Outdated prescriptions were present in a number of households. When disposed of, "flushing down the toilet" was the preferred method. Most of the outdated drugs, however, are simply being stored in a bathroom or hall closet.

- Household batteries are disposed of in the garbage and are disposed of fairly frequently. They are stored in many areas of the house.

- Gasoline is stored in all but a few of the households and can usually be found in the garage. Disposal was not viewed as a problem since gasoline is seldom disposed of but instead is "used up in lawn mowers, snow blowers and chain saws". Propane, for camp stoves and torches, and kerosene are being stored for use in a few households. Storage for these items was in the garage or basement.

- Other automotive supplies, such as motor oil, brake and transmission fluids and antifreeze, are being stored "until they are needed" in many garages. Since these products are "used up", the disposal issue that needs to be addressed is the handling of empty product containers.

- Paints are present in all but one of the households, with storage in either the basement or the garage. Disposal has generally been in the regular garbage and occurs only sporadically. Only a few of the participants had used "evaporation" to dry out their paint cans before disposal.

- Garden supplies, including insect and weed killers and fertilizers, are present in most of the households and are usually stored in the garage. Disposal was very infrequent and, when it did occur, in the regular garbage. One participant had emptied the remains of a Malathion container down the sink drain and another group member is still storing some DDT.

- Cleaners are present in all of the households and are stored in the kitchen, basement or bathroom. As with automotive supplies, products are usually "used up" before disposal occurs. Empty product containers are disposed of frequently and in the garbage.

- Hobby supplies were present in some of the households represented. In most cases, these supplies are stored in the basement. Disposal of "used up" or "unusable" items is generally in the garbage.

- Cosmetics, especially nail polish and nail polish remover, are present in every household and are found in bathrooms and bedrooms. Disposal is frequent and in the garbage. Perfumes, though present in all of the households, are seldom "trashed".

Paints, gasoline, cleaning products and cosmetics were the items most frequently stored in the homes of the participants.

Question #4

HOW DO YOU DETERMINE THAT THESE PRODUCTS ARE NO LONGER OF USE?

Participants were able to clearly identify the conditions that triggered disposal. Products in the home were disposed of when they were:

-"no good"
-"used up"
-"dried up"
-"in the way"
-"no longer working"
-"no longer needed to solve a problem"
-"infrequently used"

Homeowners look for products meeting these criteria when they:

-"are moving"
-"are looking for something to do"
-"grow tired of the product"
-"do spring or fall cleaning"
-"need space"
-"move kids out of the house"
-"complete a project"

"Cleaning up the house" appears to stimulate a need for a disposal option for hazardous household products, products, but only for some types of items (i.e.,

paints and garden supplies). **All participants indicated that "spring and fall cleaning" were particular activities when areas such as the basement, garage and kitchen are searched for products that meet their criteria for disposal. Adverse publicity about the dangers of a product, promotion of a hazardous material collection event or the introduction of a new product that is less costly and more effective can also trigger disposal.**

April/May and September/October were the time periods when participants indicated that they needed access to facilities that take the hazardous wastes generally "discovered" during spring and fall cleanings. Availability of a disposal site during these time periods, however, may not affect disposal of products such as cosmetics and cleaning product containers. Participants indicated that they will dispose of these small volume items by using the most convenient method available: their regular trash pickup. One of the participants commented, "I would not want to keep anything in the house that was a danger, either to myself or anyone else." If a product constitutes a significant hazard, then it needs to be disposed of as soon as possible after it outlives its usefulness.

Question #5

WHAT DO YOU THINK WOULD ENCOURAGE YOU TO USE A PARTICULAR DISPOSAL OPTION?

Convenience was consistently identified as the most critical factor in deciding which disposal option would be used by participants. Convenience was defined as "an easily accessible location", "being able to get rid of your items when you get to a disposal site", and "evening/weekend hours of operation".

The participants generally viewed most residents, themselves included, as "well-intentioned" but "basically lazy" - they will do what is right and what they should do, if it is convenient for them to do so. Members of the groups often indicated that they were very willing to drive a limited distance to a disposal site if they could be sure that the site was open and would take all of their materials. One comment summed up the participants' concerns about a new program - "Is it there when you need it?"

Participants also indicated that education and information were major factors that influenced product disposal decisions. If people don't know what is hazardous and what they should do to dispose of problem wastes, they cannot act responsibly - even if safe disposal options are available. Advertising could be effective in generating interest and participation. Many of the homeowners felt that advertising should focus on the problems created by household hazardous wastes and the impact that individuals can have if they dispose of their waste products properly. A dominant point of view was that any "advertising" efforts should be educational as well as motivational. Advertising is perceived as being an effective way to transfer knowledge and information to people about the where, when and how associated with any program that is initiated.

Additional suggestions were made concerning program promotion:

- Include disposal instructions on the labels of hazardous products
- Emphasize the difference in safety between the existing and planned disposal programs
- Use simple words, concise sentences and large print in whatever medium is used to convey a printed message.

The use of financial incentives received a mixed response from the groups. Some members felt that it would be a good idea and help motivate residents who are "borderline" in their commitment to preserving the environment. Others thought that the results would not justify the expense.

The reaction to imposing a mandatory program was more uniform. All six groups expressed the opinion that mandatory programs would have little impact and could cause a backlash of negative publicity, especially if people trying to do the right thing can't access an appropriate disposal site. How the program would be enforced and what the penalties would be for noncompliance were issues that were consistently raised. Most of the participants felt that enforcement would be both costly and ineffective.

Question #6

IF YOU HAD TO IDENTIFY TWO FACTORS THAT WOULD ACT AS BARRIERS TO PROPER DISPOSAL OF YOUR HOUSEHOLD HAZARDOUS WASTES, WHAT WOULD THEY BE?

The groups had little difficulty identifying the factors that served as barriers to proper disposal of household hazardous wastes:

- Inconvenience. In previous collections, participants had to haul their products to a site distant from their home on a weekend. Several participants suggested that curbside collection be considered.
- Collections that are held too infrequently and are poorly publicized.
- Information on what to dispose of, where and when that is very scarce and difficult to obtain.
- Consumers that are basically lazy. People will "do what is right if it is reasonably convenient". Most will not, however, participate if it "will be a hassle for them".
- An absence of understanding in the community of the seriousness of the problem. Most members of the groups felt that homeowners are unaware of the serious consequences created by improper disposal of household hazardous wastes.

The members of the groups thought that a new program would have to be "well publicized, easy to understand, effectively communicated, well run and, most importantly, convenient" in order to be successful. If it does not have these characteristics, it will appeal to only a small percentage of the County's population. Education of all age groups was suggested as a major initial thrust of the program. When educated, however, the members emphasized that appropriate disposal options will need to be readily available for resident use. The statement that most completely summarized the reactions of the participants was that "the program should make it convenient for residents to act responsibly".

Question #7

WHAT COULD THE COUNTY DO THAT WOULD CONVINCE YOU OF THE NEED FOR YOU TO DISPOSE OF YOUR HOUSEHOLD HAZARDOUS WASTE APPROPRIATELY?

Several groups were asked this additional question. Interestingly, the general reaction was that the County did not have to do anything to convince the attendees to do something - participants need to know what to do and what disposal options are available. Suggestions were made that the cities and County should work together to design and implement the program and that churches,

community organizations and trash haulers could be used to disseminate information on whatever program is adopted.

Summary

The findings from the focus groups reflect common concerns of participants surveyed during the 1988 HHW collection. Convenience was the primary concern expressed by both sets of respondents. Convenience equates to having a drop-off center for HHW that is located within easy driving distance from residents homes and providing a variety of operating hours for the facility. Public information to explain what HHW is, why it is a problem and how it should be properly disposed of was a second concern of both groups. While both the focus group and HHW participants expressed similar needs the non-participants level of motivatior was much lower. A lack of program awareness or the inconvenience of using an event collection appear to have prevented many residents from using a new alternative disposal method for HHW.

Chapter 6

Summary and Suggestions for Application

Lessons Learned

The objective of this report has been to provide background information about the increasing problem posed by household hazardous waste and to describe Hennepin County's efforts to evaluate its need for a permanent HHW collection site. Jurisdictions interested in establishing either a permanent or event HHW collection program can learn several lessons from Hennepin County's experience. Some of the issues involved in starting a collection program will be unique to each community, while other information can be generalized from one program to another. This chapter will draw together the survey and focus group data, as well as the experience of the County in conducting HHW collection events to provide a set of recommendations that can be used as a starting point for other jurisdictions examining HHW collections.

Program Justification

The primary issue to be addressed by a community interested in starting a HHW collection is whether the risk posed by HHW warrants the expense and effort of a special collection. Information from the focus groups clearly indicates that most residents dispose of potentially hazardous materials by throwing it in the trash, pouring it down the drain or storing it indefinitely. Common disposal methods for HHW have a **potential** to harm human health or the environment. While specific chemicals or materials contained in a consumer product can be proven to be harmful, reliable evidence linking specific products to environmental pollution when landfilled or incinerated to adverse affects on human health are scarce.

Previously conducted studies have determined that HHW makes up approximately one percent of the municipal waste stream. While small in quantity, the magnitude of risk posed by hazardous materials is a function of the nature and handling of the wastes (Conn, 1989). Local officials will have to assess local waste management priorities to determine if the potential risks warrant the need for a HHW collection.

Hennepin County has taken a pro active approach to addressing municipal solid waste disposal issues. Using this approach, the County is planning and implementing an integrated solid waste system. Household hazardous waste is being examined as one component of a solid waste system which will include waste-to-energy, recycling, composting and landfilling. The risk HHW poses to the County's system is being evaluated from the perspective of reducing total long-term liability. A separate system for household hazardous waste avoids the problems associated with landfilling or incinerating them. Selecting the lowest risk-disposal method for collected HHW further reduces the County's liability. Structuring a permanent HHW collection program to maximize residents' participation is the lowest-risk option for the safe operation of the County solid waste system.

Collection Costs

After assessing the need for HHW collection, the next question to be addressed is "what will a collection cost?" Information available from communities having held HHW collections must be viewed with caution. Standardized accounting methods have not been established and large discrepancies exist between programs as to the cost categories included as part of the total program cost. One cost category commonly overlooked is the salaries of public safety officers (police, fireman, bomb squad, sanitation workers). Ignoring the compensation paid to public employees assigned to assist in the safe operation of the collection can significantly under-report program costs.

Program design can dramatically affect the operating costs. Factors such as: whether "bulking" or recycling of collected materials is allowed; the use of volunteer workers; and the treatment/disposal options selected will alter the final program costs. One method used to lower operating costs is to combine

similar wastes in a single drum. This can be easily done with paints, pesticides and motor oils. Waste exchanges (recycling) can also reduce the amount of waste for disposal but may increase the program's liability. Collections using waste exchanges screen incoming materials and allow residents to take some products for reuse in their homes. The potential liability for giving residents misidentified or contaminated products discourages most collection organizers from using this option.

Using volunteer workers during HHW collections is a widely used practice. HHW collections are labor-intensive programs and require workers with a variety of skills. Volunteers can be used for jobs ranging from traffic coordinators and materials handler to waste sorters and packagers. Often collection organizers seek out volunteers with chemistry or environmental experience to assist with the sorting and identification of materials for packaging. If volunteers or public employees with technical backgrounds cannot be found, a waste management firm will have to be contracted to provide this service. As with any well-managed program, volunteers for a HHW collection must be selected for their work skills, properly trained and supervised, and recognized for a job well-done. Collections that use volunteers can anticipate significantly lower "out-of-pocket" labor costs.

The method selected for treatment/disposal of collected waste will affect the costs of the program. Disposal costs are directly related to a community's willingness to assume on-going liability for the waste; the longer time a program sponsor is willing to assume liability, the lower the disposal costs. Currently, landfilling collected wastes is the lowest cost disposal option. While costs are less, the community can be held responsible for future environmental problems that may develop. With full implementation of the 1984 Hazardous and Solid Waste Amendments, land disposal of untreated waste in Minnesota will no longer be allowed. Treatment or processing of various waste materials will be necessary. In contrast, incineration is the highest cost option but reduces the program sponsor's long-term liability for the waste.

Recognizing that the operating structure of a collection program will affect the total project costs, program planners can better compare and select options that fit their community's needs. While an average program cost is

approximately $100 per participant, HHW collection costs have ranged from $29 to $300 per participant. Program design factors explain the wide range of costs for collections and indicate how program operations must be adapted to a community's needs. As a relatively new waste management technique, estimating the costs of a HHW collection is difficult because of the lack of comparable information.

Program Design

Since bringing household hazardous waste to a special disposal site requires time and effort, a concern for establishing a permanent program is that of compliance. The core participants at the HHW collections were acting with a basic understanding of what household hazardous waste is, and the need for its proper disposal. Surveys conducted during the three annual collections indicate the core clientele has remained similar in demographics. Participants tend to have better educations, higher incomes and to be homeowners. Focus groups have shown that developing program participation beyond this core group hinges on two factors: building public awareness and designing a convenient collection system.

Program Awareness

Education and information dissemination are crucial to the success of any new program. Information provided to residents needs to be explained clearly and simply. The medium in which the message is presented should be one that can be retained for future reference by the homeowner. Newspaper inserts were often brought to the collection sites and used by participants as a reminder of the date, time and place that collections were being held. Educational brochures that have useful information, such as disposal site addresses, helpful hints or a "hotline" telephone number can be used to promote program awareness. Program publicity efforts should effectively accomplish four goals:

- Tell people **why** household hazardous materials need to be taken out of the waste stream.

- Tell them **what** products are hazardous, and in which forms.

- Explain **where** the items can be taken for proper disposal.

- Identify **when** the new disposal sites are available.

Promotional approaches used to inform local residents of the annual event collections have played a major role in participation and the results achieved by Hennepin County's collection events. Flyers to inform residents of the program were inconsistently distributed, while newspaper inserts reached a broad audience. Local information dissemination networks, such as block clubs, local grocery stores, neighborhood newspapers, and city newsletters, are cost effective mechanisms for "getting the word out". Personal contact by local environmental groups who have been trained to answer waste disposal questions and can distribute an informative brochure is another economic means for increasing participation. The more opportunities that a resident has to come in contact with HHW information, the more likely the individual will be to modify his or her behavior to comply with the new system.

Referral and Assistance

Residents must also be able to get accurate information about disposing of their hazardous products when they need it. Thirty-five percent of the respondents to the HHW participant survey stated that they had called a city, county or state agency for waste disposal information. Finding the correct government agency to answer disposal questions is often confusing for residents. One means to simplify hazardous waste referrals is to establish a solid waste information telephone service or "hotline". A central "hotline" could:

- answer residents questions;
- give instructions for storage or home disposal of some items;
- give information about items accepted at the collection sites;
- provide handling and disposal referral information.

The "hotline" and information center need to be well publicized to be effective. "Hotline" telephone numbers should be included in program brochures and advertising. This center should have information on the items accepted at the local collection centers and transfer stations, as well as their locations and days and hours of operation.

Program Convenience

Convenience is the major consideration when citizens consider using a specialized disposal system for HHW. Convenience in HHW disposal relates to two factors: collection location and availability. A network of local sites proximate to area residents may be more effective in getting hazardous household wastes out of the waste stream. Having one collection site in each district or municipality within an urban area should be examined as an alternative. Using the Zip Codes recorded on the HHW Participants Survey to estimate distances traveled to a collection, Hennepin County found that 80% of the participants came from within a three-mile radius of the site. Therefore, one or two permanent collection sites serving a large area are less likely to effectively reduce the amounts of HHW entering the regular waste stream. Costs and feasibility of operating local collection sites for hazardous household wastes should be given close consideration.

Another alternative to be explored would be a mobile collection program operated in conjunction with permanent collection centers. A specialized collection vehicle could be purchased which would act as a temporary collection and storage area during neighborhood or community collections. Collections could be scheduled with community cleanup events to take advantage of local publicity and volunteers to help operate the event. A mobile collection would also provide a means of promoting continued community awareness of the HHW problem.

The second factor defining convenience is the days and hours that a site is available to receive waste materials. Regardless of whether a community is providing a permanent or event collection, having the site(s) open at convenient times for the general public is critical. This point was strongly made by

participants in both the collection survey and the focus group study. Collection sites need to be open weekends and evening hours if they are to receive wide-ranging public support. In communities that have large seasonal variations in climate, local collection centers would not need to be open on a continuous year round basis. Peak collection periods tend to be in the spring and fall. During the slow periods a community could accept HHW using an appointment system or by scheduling periodic collection days.

Conclusion

As with any system, a household hazardous waste collection program is a set of components that fit together to make a whole and functioning project. Developing only one component of the system can create conflicts for residents and undermine the future of a complete program. This became apparent after county-wide advertising for the annual collections began to generate telephone calls from residents who were unable to attend the one-day event. Resident awareness of the problems posed by HHW had been raised and they wanted a means to dispose of their waste materials. A one-day or one-weekend event could not provide access to all of the county residents wanting to use the collections.

Building public awareness of HHW may unintentionally lead a community to providing an on-going collection service. It is, therefore, in the community's best interest to have established a set of priorities for solid waste disposal and to understand how a HHW project would fit within their system. Specific program goals and objectives which complement a community's needs should be developed. Research and planning can provide the initial information to establish goals and objectives.

Focus groups and surveys can only tell us what people may do when presented with a situation to which they have been asked to react. These techniques help us to understand consumer motivations and perceptions, but they do not guarantee that the public will respond as predicted when a new program is actually implemented. For that reason, it is critical that any new program be carefully implemented and that the results achieved by the program be measured against program objectives.

Jurisdictions should estimate the costs and effectiveness for various systems and select a reasonable alternative. Alternatives should be pilot-tested to evaluate the program's adequacy for reaching the local objectives. The results should be used to help determine what approach will be most successful in implementing a household hazardous waste collection effort.

Growing awareness of the problems posed by HHW has led to increasing participation in Hennepin County's event collections and a public demand for their continuation. The significance of removing these wastes from the waste stream entering the County's new incinerator has also been recognized. To meet the needs of the County, it has been decided that permanent HHW collection centers will be incorporated into three transfer stations now being constructed. Hennepin County has also made a commitment to continue using event collections as a method of building public awareness and gathering information to design on-going programs.

As part of the continuing effort to design and implement an effective household-hazardous-waste-collection system, the County has received a two-year grant from the United States Department of Energy and the Urban Consortium Energy Task Force to implement its on-going household hazardous waste program and examine the feasibility of locally processing a portion of the collected wastes. During its event collections, the County found that packing, transporting and disposing of the collected wastes at licensed hazardous waste facilities was a very significant cost component of the program. Options for local handling are being examined as part of the grant-funded program.

Although Hennepin county is still in the stages of designing and completing its household-hazardous-waste-collection system, the progress to date and the plans for the future show that commitment and innovation can help address one of the most difficult and pressing problems currently facing local governments - management of solid wastes.

APPENDIX 1
Pesticide Classes and Ingredients**

I. Insecticides

A. Organophasphates are poisons which interfere with the nervous system and can be toxic. They are biodegradable, but not much is know about the breakdown products.

Acephate
Azinphosmethyl
Chloropyrifos
Demeton*
Diazinon
Dichlorvos (Vapona DDVP)
Disulfotan
Malathion
Methyl-demeton
Mevinphos*
Naled
Phorate
Parathion*
Ronnel
Sterofos
Trichlorfon

B. Carbamates can interfere with human nervous system.

Aldicarb*
Carbaryl (Sevin)
Carbofuran
Maneb
Methomyl
Oxamyl
Propuxur (Baygon)
Sectran

C. Organohalogens are very slow to biodegrade and can accumulate in the food chain. When the chemical enters the body it can attach the nervous system and is suspected of causing cancer.

Aldrin*
Chlordane*
Dieldrin*
DDT*
Endrin*
Ethylene Dibromide*
Heptachlor*
Hexachloride*
Lindane* (Kwell)
Methyoxychor*
Mirex*
Toxaphene*

D. Organosulphurs will react with water, steam or acids to produce a toxic or corrsive material. When heated they can emit highly toxic fumes.

Ovex (murvesco)

E. Urea, Uracil, Triazine-based are low in toxicity, but will irritate skin, eyes and throat.

Altrazine
Ametryn
Bromacil
Diuron
Linvron*
Monvran*
Terbacil

F. Resmethrin, Pyrethrin are toxic when ingested or inhaled. They can cause diarrhea, convulsions and respiratory failure.

Appendix 1
continued:

II. **Herbicides**

A. Arsenicals are toxic which causes lung, kidney and liver damage; and death. They also irritate the skin, eyes and throat.

Arsenic Trioxide* Cacodylic Acid

B. Chlorophenoxy Acids are contaminated with dioxin, which is deadly and a mutogen. They will irritate the skin, eyes and throat.

2,4,D
2,4,5-TP (Silvex)*
MCPB
2,4,5-T
MCPA

C. Dipyridyl are toxic which causes lung, kidney and liver damage; and death. They also irritate the skin, eyes and throat.

Paraquat* Diquat

D. Nitrophenols are highly toxic and are easily absorbed into the skin causing interference with oxygen transfer in the cells which damages liver, kidney and nervous systems.

Binapacryl
Dinitroorthocresol
Dinitrophenol
Pentachlorophenol*

III. **Rodenticides**

Rodenticides are anticoagulants that may cause internal bleeding. May be lethal if taken over long periods of time.

Coumafuryl
Diphacinone
Princlone
Valone
Warfarin

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* These pesticides are restricted or banned and should not be used by households.

** This table was compiled from many sources, notably: Ridgley and Galvin, 1982; Sax, 1975, and Pioneer Valley Planning Commission and Western Massachusetts Coalition for Safe Waste Management.

Please answer the following set of questions about your household. This information will be used to compare people's answers. It will not be used to identify you in any way.

21. Are you male or female? 1. Male 2. Female

22. How many people live in your household? _____

23. How many members of your household are in each age category?

1 to 5 years old _____
6 to 12 years old _____
13 to 21 years old _____
22 to 55 years old _____
56 and older _____

24. What is your ZIP code _ _ _ _ _

25. Do you own or rent your home? 1. Own 2. Rent

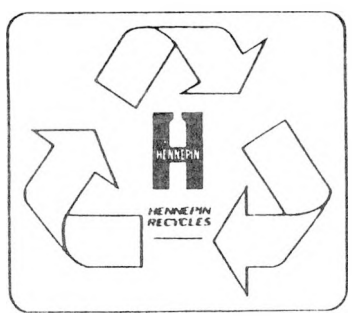
26. How long have you lived at your present address?
1. Less than 1 year
2. 1 to 3 years
3. 4 to 10 years
4. 11 to 20 years
5. More than 20 years

27. What year was your house built? _ _ _ _

28. What is your total household income?
1. Under $10,000
2. $10,000 to $19,999
3. $20,000 to $29,999
4. $30,000 to $39,999
5. $40,000 to $49,999
6. Over $50,000

29. What is the highest year of school completed by any member of your household? (Circle the number of years)

Grade school	High	College	Graduate Studies
1 2 3 4 5 6 7 8	9 10 11 12	13 14 15 16	17 or more



Household Hazardous Waste Survey
September 10, 1988

Please circle the number which corresponds to the answer that best reflects your situation.

1. How did you learn about this collection?
a. Television ad
b. TV news story
c. Newspaper ad
d. Newspaper story
e. Recieved a flyer
f. Radio ad
g. Heard from a friend
h. On cable TV
i. Local organization, please specify _____
j. Other, please specify _____

2. Before today, had you participated in household hazardous waste collections? (Circle only one answer)
1. Yes, last year
2. Yes, 2 years ago
3. Yes, both last year and 2 years ago
4. No, this is my first collection.

3. Approximately how long have you been storing most of the items you brought to the collection today? (Circle one answer)
1. 1 to 6 months
2. 7 months to 11 months
3. 1 to 5 years
4. 6 to 10 years
5. More than 10 years

4. Before bring an item to this collection, did you try to use the product completely?
1. Yes
2. No
3. Item was not usable

5. In addition to participating in this collection, I am actively recycling the following items: (Circle all items that apply)
a. paper
b. aluminum
c. plastic
d. glass
e. all of the above
f. none of the above (I am not recycling)
g. other, please specify _____

Thank you for helping Hennepin County to estimate the types and quantities of household chemical products being stored in area homes. To conduct this inventory you will need to examine the household products commonly found in your kitchen, bathroom, basement, garage and storage rooms.

In the first two columns, please estimate the quantity and type of products that you are currently keeping in your home. In the last column, estimate the amount of these materials you would consider as waste products that should be disposed of.

When you have completed the form place it in the postage paid envelope and mail it back to Hennepin County.

	Number	Amount you consider as waste materials.
AEROSOL CANS OF ALL TYPES		
OUTDATED PRESCRIPTION DRUGS		
	Battery Type and Number	
HOUSEHOLD BATTERIES		

AUTOMOTIVE SUPPLIES	Gallons/Quarts	Ounces	
Used Motor Oil			
Transmission Fluid			
Lubricating Oil			
Brake Fluid			
Other, specify			

FUELS			
Gasoline			
Kerosene			
Diesel Fuel			
Propane			

PAINTS			
Latex-base			
Oil-base			
Varnish			
Thinners			
Epoxy Enamel			
Paint Strippers			
Other, specify			

GARDEN SUPPLIES			
Insect Killers			
Weed Killers			
Poison (rat, mouse, cooner)			
Other, specify			

CLEANERS			
Rust or Aluminum Cleaners			
Swimming Pool Chemicals			
Oven Cleaners			
Drain Openers			
Rug Cleaners			
Floor Polish			
Metal Polish			
Spot Removers			
Tile Cleaners			
Toilet Bowl Cleaners			
Other, specify			

HOBBY SUPPLIES	Ounces	Amount you consider as waste materials.
Artist's Mediums and Thinners		
Artists Oils and Acrylics		
Rubber Cement Thinner		
Photographic Chemicals		
Ceramic Glazes		
Epoxy Glues (Muriatic)		
Gun Cleaning Solvents		
Other, specify		

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REPORT AND INFORMATION SOURCES

Additional copies of this report, "Energy Financing for Local Governments: Metropolitan Dade County's Energy Investment Fund", are available from:

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For additional information on the structure, operation and results of the Dade County Energy Investment Fund, or for information on the overall energy management program in Dade County, please contact:

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Office of Energy Management
44 W. Flagler Street -- Suite 2302
Miami, FL 33130
(Phone Number is optional)

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Chapter 1

Abstract

Introduction

Project Purpose

In 1985, Hennepin County entered into an agreement with Hennepin Energy Resource Co., Ltd. for the construction and operation of a 1000-ton-a-day waste-to-energy facility. Under the terms of this agreement, the County is obligated to ensure that only acceptable wastes are delivered to the facility. The contractual definition of "unacceptable waste" requires that the County remove materials that can contaminate ash emissions. In an effort to ensure that the new incinerator operates as safely as possible, Hennepin County is currently examining various methods of removing unacceptable materials from the waste stream; household hazardous wastes (HHW) are one stream being considered for diversion.

As with any new program, a number of policy and design issues must be addressed prior to implementing a permanent HHW collection system. In an effort to address these questions and share information from its experiences, Hennepin County applied for, and was awarded a grant from the Urban Consortium Energy Task Force. The grant research plan detailed a three-phase approach for developing and implementing a HHW collection. The Year IX grant from the Urban Consortium allowed the County to conduct the first phase of the work plan. In phase one, the County examined planning issues affecting program design and drafted a set of recommendations that included establishing a pilot collection program in phase 2. The pilot collection center would gather data to guide the development of a permanent county-wide

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collection program. Based on the results of the pilot program, an operating manual would be developed for integrating the permanent household hazardous waste program into the county waste management system. In the final phase of the project, the operating manual would be used to initiate development of permanent HHW collection centers and local waste processing options.

This report describes the results from the first phase of the project grant, moving from a broad examination of what HHW is, to detailed findings from surveys and focus groups addressing county residents' needs and opinions about a specialized HHW disposal system.

Report Organization

The term "household hazardous waste" has been coined within the last ten years to describe a broad category of materials commonly found in people's homes which may pose a threat to human health and the environment. While descriptive, household hazardous waste is unclear, and therefore often misunderstood. Chapter 1 discusses the federal government's technical but vague definition of household hazardous waste and then offers a working alternative. Using the alternative definition, the discussion examines specific categories of materials considered to be hazardous. Detailed descriptions of the materials and risks they pose provide a stepping- stone to understanding the issues.

HHW collections programs are explored as a means of reducing the potential risks associated with incineration of residential wastes. The chapter describes the results of the County's pilot collections which led to the realization that permanent collection programs would be necessary. To meet the needs of the County, it was decided that permanent HHW collection centers would be incorporated into three transfer stations now being constructed.

The event collection held during 1988 provided an opportunity to survey participants about their HHW disposal needs and behaviors as well as to gather data concerning the materials they continue to use and store around

(30 refs, 3 tabs)

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