BEFORE THE COUNCIL OF THE METROPOLITAN SERVICE DISTRICT

FOR THE PURPOSE OF AMENDING)	ORDINANCE NO. 92-456
THE REGIONAL SOLID WASTE	ý	
MANAGEMENT PLAN TO INCORPORATE)	
THE HOUSEHOLD HAZARDOUS WASTE)	Introduced by:
MANAGEMENT PLAN AND TO UPDATE)	Rena Cusma
PLAN POLICY 2.2)	Executive Officer

WHEREAS, By Ordinance No. 88-266B, Metro adopted the Regional Solid Waste Management Plan; and

WHEREAS, Chapter 2 of the Regional Solid Waste Management Plan, entitled "Hazardous and Medical Waste" contains policies for preventing the disposal of hazardous wastes, including household hazardous waste, at solid waste facilities; and

WHEREAS, The attached Exhibit "A", made part of this Ordinance by reference, expands and improves upon the original Plan policies and that portion of Chapter 2 related to the management of household hazardous waste; now, therefore,

THE COUNCIL OF THE METROPOLITAN SERVICE DISTRICT HEREBY ORDAINS:

<u>Section 1:</u> Policy 2.2 of the Regional Solid Waste Management Plan is hereby amended to read:

2.2 Metro-shall not knowingly accept for solid waste disposal or processing any hazardous waste materials at solid waste facilities. Metro shall manage hazardous waste in accordance with the EPA's management hierarchy of "reduce, reuse, recycle, treat, incinerate and finally land disposal". Section 2: The section of Chapter 2 of the Regional Solid Waste Management Plan entitled "Household Hazardous Waste Programs" is deleted in its entirety and replaced with Exhibit "A" of this Ordinance entitled Household Hazardous Waste Management System.

ADOPTED by the Council of the Metropolitan Service District this ______ 25th _____ day of ______, 1992.

Jim Gardner, Presiding Officer

ATTEST:

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Clerk of the Council

EXHIBIT "A"

CHAPTER 2 (HAZARDOUS AND MEDICAL WASTE) REGIONAL SOLID WASTE MANAGEMENT PLAN

Household Hazardous Waste Management System

DRAFT

May 20, 1992 Planning and Development Department

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PLAN POLICIES:

<u>Policy 2.0:</u> The region shall minimize the volume of hazardous and medical waste entering the mixed solid waste stream.

<u>Policy 2.1:</u> Solutions to proper management of household hazardous waste, conditionally exempt hazardous wastes, and medical wastes shall be developed as a component of the Regional Solid Waste Management Plan (RSWMP).

<u>Policy 2.2:</u> Metro shall manage hazardous waste in accordance with the EPA's management hierarchy of "reduce, reuse, recycle, treat, incinerate and finally land disposal.

* * * * *

PURPOSE AND OBJECTIVE:

The purpose of the Household Hazardous Waste (HHW) chapter is to develop a long-term strategy for the management of household hazardous wastes in the region.

The objective of the chapter is to reduce the amount of HHW disposed of within the mixed solid waste stream, increase the amount of collected HHW reused and recycled, and reduce the amount of HHW generated. The means to be employed for meeting the objective are to initiate promotion and education programs designed to promote proper collection of HHW for reuse, recycling and disposal, research projects to develop alternative funding sources for HHW management and HHW reduction, as well as the procurement of a collection system that provides service to households throughout the region. Metro's progress on achieving the management objective will also be monitored by measuring trends in volumes of HHW discovered in MSW entering facilities, volumes and composition of HHW collected at dedicated facilities, and sales figures for hazardous household products.

INTRODUCTION:

HHW is defined as any discarded, useless or unwanted chemical, materials, substances or products that are or may be hazardous or toxic to the public or the environment and are commonly used in or around households. HHW may include, but is not limited to, some cleaners, solvents, pesticides and automotive paint and other products (ORS 459). HHW exhibits characteristics similar to other regulated hazardous materials. Different components of the wastestream can be ignitable, corrosive, reactive with other substances or toxic. As a result, they can threaten human health and cause damage to the environment when disposed of with other non-hazardous mixed solid wastes.

HHW management is a recent occurrence. This chapter contains a regional strategy for managing the region's HHW that is based on what is known today. HHW management is a dynamic issue and, therefore, the programs and facility recommendations identified in the chapter will likely change over time as the region learns more about how to effectively manage HHW.

A regional strategy for managing HHW is necessary because the disposal of HHW in general purpose landfills or waste-water treatment facilities presents a potential hazard to the public health and the environment. These types of facilities are not designed to manage hazardous materials like HHW. HHW that is disposed of along with other mixed solid waste, can cause injury to solid waste haulers or transfer station workers when they come in contact with disposed materials. It can also cause adverse environmental impacts when it mixes with leachate that typically

forms in landfills. Leachate provides a vehicle for contaminating ground and surface waters with a range of substances that are present in the HHW waste stream. Improper disposal of HHW by pouring it directly into septic systems, or sanitary and storm sewer systems, also causes adverse environmental impacts to ground and surface waters, as well as disrupting sewage treatment facility operations.

A regional HHW management strategy is also necessary to avoid potential long-term liability costs that may result from disposing of HHW in a general purpose landfill. Federal regulations make the region liable for clean-up costs if HHW that is collected and disposed of, along with other mixed solid wastes in a general purpose landfill, resulted in a release of a hazardous substance from the landfill to ground or surface waters and, the source of the contamination was linked to the presence of HHW in the landfill. The potential costs to the region associated with cleaning up a spill could far exceed the costs to the region associated with implementing a regional HHW management program.

The HHW management strategy proposed in this chapter provides an efficient and cost-effective system for managing HHW within the region. The proposed strategy includes: efficient collection, where HHW is collected as a separate component of the solid waste stream; disposal and recycling options that are secure and will keep disposed HHW from being exposed to the air, earth or water; programs directed towards toxic use reduction, such as product labeling requirements or the promotion of alternative products; research tasks to develop new and innovative methods to fund the costs associated with HHW management and reduce the volume of HHW generated; and, education and promotion programs designed to encourage the general public to make use of a HHW collection and disposal system as well as reduce the volume of HHW they produce.

PLAN METHODOLOGY:

HHW management is a recent development within the region and nationwide. Consequently, the data base necessary for establishing trends and making accurate long-term projections is not available. The data and information included in the plan chapter provide guidelines for <u>initiating</u> the development of a regional HHW collection system and management programs. It is expected that management strategies will evolve rapidly as more information and experience is gathered through the implementation of the chapter. Further, this chapter is written to allow flexibility in management techniques employed within the system.

This plan chapter is based on a compilation of "Background Information" which outlines regulations which govern HHW management and outlines the program and facility components of HHW management programs operating elsewhere in the United States; and on a

preliminary "Facility Analysis" which illustrates the relative capital and operational cost differences between several potential HHW facility configurations for the region. The waste projections and facility cost information developed for the chapter were gathered from semi-annual collection events held within the region and other jurisdictions that operate HHW collection systems. It is the most accurate information available today. The HHW facility cost information is calculated over a ten-year planning period to illustrate the relative cost differences between HHW collection facility options as well as the overall cost of HHW management. The analyses conducted for this chapter also helped to identify the types of data that must be gathered in the future in order to make accurate long-term projections about HHW generation program effectiveness and facility costs. Both the Background Information (Appendix "A") and Facility Analysis (Appendix "B") documents are Appendices to the Regional Solid Waste Management Plan (RSWMP).

BACKGROUND:

Since 1986, Metro has been managing HHW as a separate component of the regional solid waste stream. Metro's initial step in HHW management consisted of a pilot collection event held at a single site in the region. Beginning in 1988, HHW collection became semiannual events held at four geographically diverse sites throughout the region. Participation at each event increased over time due largely to promotion and education programs initiated by private industry, waste haulers, local governments, DEQ and Metro. These programs included mail-outs to interested parties who have contacted Metro's Recycling Information Center (RIC), press releases, full page adds in local papers and brochures.

Though these collection events were successful, they were only able to attract about one-percent of the households in the region. To expand the region's capacity to collect and process HHW, the 1989 Oregon Legislature mandated that permanent HHW collection depots be developed at geographically diverse locations within the region. Metro is developing two fixed collection depots at the Metro South and Metro Central transfer stations. The facility at Metro South became operational in February, 1992. The Central is expected to open in late 1992. The facility at Metro 2. Together they will provide year-round collection service to a portion of the region. However, these two facilities are projected to generate only about a two-percent participation rate among households in the region. This projection is based on observed first-year participation rates for similar HHW collection facilities now operating in Seattle, Washington and San Francisco, California¹. This plan chapter was developed to identify strategies for increasing the regional participation rate and volumes of HHW collected within the region.

Appendix B; "Regional HHW Collection Projections", page 2.

The implementation strategies contained in the chapter include improving educational and promotional programs, as well as expanding the HHW collection system to provide increased service throughout the region.

POLICY DIRECTION FOR HHW MANAGEMENT:

Policies 2.0 through 2.2 of the RSWMP direct Metro to develop specific methods to minimize the amount of hazardous wastes, including HHW entering the mixed waste stream and solid waste facilities. They also direct Metro to develop methods for the proper management and disposal of HHW. The following discussions identify how the HHW chapter addresses these policies.

<u>Policy 2.0:</u> The region shall minimize the volume of hazardous and medical waste entering the mixed solid waste stream.

<u>Discussion:</u> Metro, in cooperation with local governments, DEQ, waste haulers and private industry, is working to reduce the volume of HHW entering the mixed waste stream. The fixed collection depot now in operation at the Metro South Transfer Station along with the depot scheduled to open at Metro Central in late 1992 is the region's first step in providing year-round HHW management service.

The facility and program recommendations in this chapter, are designed to further enhance the region's ability to collect HHW as a separate waste sub-stream so it may be managed properly. Promotional and educational programs will continue to be used to promote participation at existing and new facilities when they open. The chapter also identifies programs that are aimed at reducing the volume of HHW generated.

<u>Policy 2.1:</u> Solutions to proper management of household hazardous waste, conditionally exempt hazardous wastes, and medical wastes shall be developed as a component of the Regional Solid Waste Management Plan (RSWMP).

<u>Discussion:</u> Proper management of HHW within the region is dependent upon successfully segregating it from other mixed solid wastes so it may be reused or recycled by the generator or directed to the appropriate collection facility. Metro opened the first of two fixed HHW facilities at Metro South in February of 1992. A second facility is scheduled to open at Metro Central in late 1992. The recommended improvements to the fixed facility collection system identified in this chapter concentrate on improving the level of service throughout the region to encourage greater participation and collect more HHW for proper management. <u>Policy 2.2:</u> Metro shall manage hazardous waste in accordance with the EPA's management hierarchy of "reduce, reuse, recycle, treat, incinerate and finally land disposal."

Discussion: The need for comprehensive management of hazardous waste is generally recognized by state and federal agencies responsible for developing and administering hazardous waste management rules and regulations. Both the state Department of Environmental Quality (DEQ) and federal Environmental Protection Agency (EPA) have developed similar hazardous waste management strategies or hierarchies. The DEQ hierarchy is embodied in the "Purpose and Scope" of OAR 340, Division 100; "Hazardous Waste Management." The EPA hierarchy is contained in their Waste Minimization Assessment Manual². Both hierarchies place the greatest emphasis on source reduction as a management option, followed by reuse and recycling, treatment and incineration, and land disposal.

HHW is not defined as hazardous waste in most state and federal regulations. However, HHW does exhibit the same characteristics of hazardous waste (ignitable, corrosive, reactive with other substance or toxic), and when collected in large volumes can pose health risks and threaten the environment. Several components of the HHW waste stream can be recycled or reused, including latex paint and motor oil.

HHW exhibits similar characteristics to other hazardous wastes, and possesses similar opportunities for comprehensive management in addition to land disposal. Therefore, a HHW management strategy that is consistent with the EPA hazardous waste management hierarchy should be followed within the Metro region. The HHW chapter contains management options that support source reduction, reuse and recycling of HHW.

HHW SYSTEM STANDARDS AND GUIDELINES:

Both state and federal regulations provide standards and guidelines for the development of HHW collection facilities and programs within the Metro region. Several regulations provide specific direction to Metro for the development and operation of the HHW management system. Other regulations which govern the use, collection, management and disposal of classified hazardous wastes or hazardous materials, provide guidelines for designing a safe HHW collection system. The design and operation of the Metro South and Metro Central HHW collection facilities follow many of these standards and guidelines. The following is a summary of how each regulation impacts or guides facility design and operation, material handling and liability. A detailed discussion of each

²EPA Waste Minimization Manual; EPA/625/7-88/003. July, 1988.

regulation is also contained in the "Background Information" document, Appendix A to the chapter.

Facility Design and Operation:

The regulation which has the greatest impact on HHW facility design within the region is ORS 459, Solid Waste Control. As amended, the law requires Metro to build geographically diverse permanent collection facilities in the region. This requirement is the basis for the development of the collection facilities at the Metro South and Central transfer stations. Any expansion of the regional HHW collection system would further implement this state directive.

The federal Resource Conservation and Recovery Act (RCRA) establishes permitting procedures for hazardous waste treatment, storage and disposal facilities and formulates procedures to transfer regulation of these activities to the states. Although HHW is exempt from RCRA hazardous waste regulation, RCRA guidelines were used for designing the collection depots at Metro South and Central. As new and different types of facilities are added to the regional collection system, it will be prudent to follow these hazardous waste management regulations as guidelines on a sitespecific and facility-specific basis for HHW management. This strategy will help avoid future facility retro-fits should HHW become classified as hazardous waste.

Materials Handling:

The transport of hazardous materials is governed by the state Public Utility Commission (PUC) and under the federal Hazardous Materials Transportation Act (HMTA). Large volumes of HHW that require transport from collection facilities to a final disposal site or processing facility are considered hazardous materials by this act. Therefore, operational procedures at regional HHW collection depots must follow PUC and HMTA standards for transporting HHW to treatment facilities, recycling facilities or final disposal.

Liability:

Household hazardous waste is not "hazardous waste", as defined by RCRA. However, under the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or "Superfund") and the Superfund Amendment and Reauthorization Act (SARA), anyone who generates a particular hazardous substance that is disposed of at a landfill is potentially liable if that substance is released from the landfill into the environment. Generally, the costs of cleaning up a release or spill are proportioned among all responsible parties. In the worst case, this could result in the residents of the metropolitan area paying for the clean-up of

hazardous components of household waste that have been released from a regional landfill³.

The issue of liability is an extremely important one. The development and implementation of an effective regional HHW management program will help minimize the volume of HHW disposed of in general purpose landfills, thereby reducing the risk of landfill contamination and the liability costs associated with clean-up that could be borne by future generations. Additionally, HHW collection facility design and operation must meet high standards in order to reduce the risk of accidental spills or releases of collected volumes of HHW.

RESULTS OF PROGRAM AND FACILITIES ANALYSES:

In response to the policies contained in the RSWMP, Metro has developed and implemented a HHW collection and disposal system. The design and operation of the system is further shaped by the state and federal regulations. As a result, Metro's base HHW collection system consists of a fixed collection facility at the Metro South transfer station, with a second facility scheduled to open at Metro Central in late 1992, supported by a promotion campaign designed to encourage citizens to use the facilities for HHW disposal. For this Plan chapter, a preliminary program and a facilities analysis was conducted to identify how the regional strategy for managing HHW could be expanded or improved to serve the entire region. The program analysis consisted of an assessment of HHW programs in place across the nation. The analysis is based on data and assumptions gathered from within the region and other jurisdictions located outside of the region that operate HHW facilities.

The results of the program analysis identify programs that are expected to increase public participation in HHW collection, and therefore the volume of HHW collected⁴. The results of the facilities analysis report the relative cost differences between various HHW collection facility types and configurations that may be needed to collect the projected volumes of HHW⁵. The facilities analysis was conducted to provide answers about how costs varied between different HHW facility types, and configurations that would expand the region's HHW.collection capacity, if developed.

The results of the program and facilities analyses are based on the best available data, as described in Sections III and IV of

³Appendix A: Guiding Legislation; page 4.

⁴Appendix A; "HHW Program Analysis", page 16.

⁵Appendix B; "Results of Facility Cost Analysis", page 33.

Appendix A and Sections I and IV of Appendix B. However, the sources of data are varied and none correlate directly to the operation of a <u>permanent collection system within the region</u>. The sources of information include in-region collection events, collection events outside the region and the operation of regular collection service at fixed or mobile facilities in jurisdiction outside the region.

Information gathered from collection events provides data about participation rates, waste volumes and costs that resulted from a single day or weekend of operation, but are not reflective of what may occur if regular on-going collection service were provided. Information gathered from fixed depots or mobile facilities in other jurisdictions illustrate that there are difference in participation rates, waste volumes and costs between permanent systems and periodic collection events. However, the data gathered varied widely from jurisdiction to jurisdiction. This indicates that conditions unique to each jurisdiction examined, such as purchasing habits, traffic conditions and the general attitude of the population towards proper solid waste management influence the data gathered related to HHW management. Consequently, the data base necessary for establishing trends and making accurate longterm projections about participation rates, the volume of waste collected and costs for a permanent collection system within the region is not available.

The results of the analyses are appropriate for making short-term recommendations only. Additional data is necessary prior to making long-term programmatic and facility recommendations. The most efficient means of acquiring the needed data will likely be through monitoring the operation of the regional collection system over a period of time. The following are the results of these analyses.

Program Analysis:

The purpose of the program analysis was to identify HHW management programs that have been implemented in other communities and states that were found to be successful within the jurisdictions analyzed. The focus of the program analysis was to identify programs that, if implemented, could help to both increase participation rates at regional collection facilities and reduce the actual volume of HHW generated and disposed of within the region. The methodology used to conduct the analysis was to gather and review information about HHW programs in place nation-wide. Information gathering included literature reviews, interviews with management officials and site The HHW management programs examined for this analysis visits. were the municipality of Anchorage, Alaska; the state of Massachusetts; Clark and Skamania County, Washington, Seattle/King County, Washington and Santa Monica, San Francisco San Bernardino and Los Angeles, California. The detailed results of the Program Analysis are contained in Section IV of Appendix A. The major

findings of the analysis are contained in the "Conclusions" Section of this chapter.

Facilities Analysis:

The purpose of the facilities analysis is to assess the adequacy of the regional HHW collection system to manage the HHW waste stream over the ten year planning horizon. The analysis is based on a regional HHW projection which measures the volume of HHW available for collection within the region, estimates of the capacity of Metro South and Central to manage the volumes of HHW to be generated and an assessment of their ability to provide a uniform level of service for the entire region. Based on these results, the facilities analysis was conducted to develop a least-cost facility recommendation that would provide a uniform level of service throughout the region. The detailed results of the Facilities Analysis are contained in Sections I through IV of The major findings of the analysis are contained in Appendix B. the "Conclusions" Section of this chapter.

PROGRAM AND FACILITY CONCLUSIONS/IMPLEMENTATION GUIDELINES:

This section of the Plan chapter provides an explanation of the conclusions formulated from the established plan policy directives, information gathered from knowledge about HHW management in this region as well as other jurisdictions nationwide, and results of the HHW program and facility analyses contained in the Appendix to this chapter. These conclusions and implementation requirements are the basis for the tasks identified in the work program for implementing the regional HHW management plan.

Policy Directives:

The policy directives for this plan chapter come directly from Policies 2.0 through 2.2 of the RSWMP. The policies direct the region to manage HHW in accordance with a hierarchy of reduce, reuse, recycle, treat, incinerate and finally land dispose. Management of HHW in accordance with this hierarchy will reduce the volume of HHW in the region's mixed waste stream.

Policy 2.2 of the RSWMP recognizes that the hazardous waste management hierarchy is a key factor in managing HHW because it emphasizes programs aimed at reducing and reusing components of the HHW generated in the region. Programs that reduce the volume of HHW generated provide a greater benefit to the region than does land disposal at a hazardous waste landfill. Reuse of components of the HHW stream also has the effect of reducing the volumes of HHW that may require land disposal. This saves hazardous waste landfill space for other hazardous materials that require land disposal now and in the future, and provides additional environmental and public health benefits because fewer hazardous materials are produced and consumed by the public.

As a means of implementing the RSWMP policies related to keeping HHW out of the mixed waste stream, this plan chapter recommends the development of a collection system that is convenient for households throughout the region to use. It also recommends an educational and promotional program designed to make people aware of the need to separate HHW from their other household wastes and take them to the nearest collection facility for proper management. Operation of the collection facilities will include material recycling and reuse in order to further reduce the volume of HHW treated, incinerated or land disposed. Other programs identified in the chapter are aimed at reducing the volume of new HHW products that are developed for consumption. Based on information gathered from other jurisdictions operating HHW management systems, it is anticipated that the minimum participation rate at regional HHW collection facilities will grow to 15% by 2001.⁶

Facilities Discussion:

Metro has opened a fixed collection facility at the Metro South transfer station and is developing a second facility at Metro Central. These facilities are being built and operated in response to legislation passed by the state which requires Metro to construct collection depots in geographically diverse locations within the region. In order to determine the appropriate facility configuration that could provide a uniform level of service for HHW collection in the region, the concept of community service areas was developed. Community service areas are collections of neighborhoods that surround community centers. Transportation routes, business center activities, drive times and future development (land use) were factored into the identification of the HHW service areas⁸. The Community Service Area Map (figure 1) contains the community service area configuration for the region.

The two fixed facilities will provide HHW disposal opportunities to citizens located in areas 1 and 3 of the HHW Service Area map (figure 1). In order to increase participation in the HHW system, there is a need to add HHW collection opportunities in the region⁹. The facility analysis indicates that the least expensive option to provide this additional HHW collection service would be a mobile facility¹⁰.

⁶Appendix A, HHW Program Analysis, page 16.

⁷Appendix B, Level of Service Evaluation, page 6.

⁸Appendix B; Level of Service Evaluation, page 5.

⁹Appendix B, Adequacy of Metro South and Metro Central, page 5

¹⁰Appendix B; Results of Facility Cost Analysis, page 33.



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The facility analysis suggests that there is a need to provide additional HHW service through a mobile facility system for service areas 2, 4 and 5 on the map (figure 1) in order to attempt to attain at least a 15% participation rate region-wide. An analysis is required during the procurement process for the mobile facility to determine its frequency of operation within each service area as well as the associated cost of providing the service.

The facility analysis further suggested that available data from which to establish a long-term permanent HHW system is inadequate. There continues to be a great deal of uncertainty about how citizens will respond to both fixed and mobile facility options over time. Therefore, it is prudent to establish a good monitoring program to measure the participation rate at facilities, travel times for persons using the facilities, types and quantities of materials received, and facility operational costs. This data will allow the region to assess the adequacy of HHW collection service over time and make adjustments to the facility system as needed. HHW collection facilities, whether fixed or mobile, will require local approvals from host communities in order to operate. Consistent with policies 8.4 and 16.2 of the RSWMP, Metro will also need to work with the host jurisdictions to monitor facility operations in order to ensure that the facilities meet local siting standards and any adverse impacts caused by the presence of collection facilities are mitigated.

Program Discussion:

The programs identified for implementation in the region are based on what is known about the regional HHW system and research about other HHW management programs implemented in other jurisdictions nationwide. Programs recommended for implementation in the Metro region were chosen based on compatibility with the existing solid waste system as well as their potential and known effectiveness. Several of the programs identified will require additional research during plan implementation in order to determine how they can best be utilized within the region.

The programs to be implemented are as follows.

Promotion/Education

Promotion and Education is a cornerstone of every HHW program researched. The program serves three key functions:

- It makes people aware of the potential public health risks and environmental hazards associated with the improper management of HHW;
- It promotes the segregation of HHW from other household wastes along with the use of a collection facility for proper management; and,

• It helps to reduce the volume of HHW generated by encouraging people to buy only those products they need in volumes they will use, as well as provide information to consumers about alternative products that are not hazardous.

The regional HHW promotion/education program will be designed to include these three general functions. The development and implementation of specific tasks will require the coordinated efforts of Metro, DEQ, local governments, waste haulers and private industry.

There are numerous methods of disseminating promotional and educational information. They include informational brochures at solid waste facilities, informational hotlines, educational materials for the classroom and media campaigns. The determination of which methods will be most effective within the region should be decided prior to implementation.

<u>Funding</u>

The expense of HHW collection, treatment and disposal is significant. The results of the facilities analysis show that the cost per participant to procure and operate HHW collection facilities is approximately \$100.00¹¹. Therefore, it is necessary to develop diversified methods of funding HHW management in order to limit the impact to the regional tip-fee rate.

Historically, Metro has not charged participants to drop-off their collected volumes of HHW at semi-annual collection events or at the Metro South depot. These costs have been recovered through the Regional System User Fee component of the regional tip fee for mixed solid wastes¹². Additional funding for HHW management may be available from the Department of Environmental Quality through funds they accumulate through the state tipping fee.

The practice of recovering HHW collection costs through the solid waste tip-fee is consistent with funding methods for HHW collection programs operating in many jurisdictions throughout the United States. Given that the costs of managing HHW are high, the impact to the regional tip-fee may be great. Therefore, additional funding options should be investigated which would diversify the revenue sources for HHW management. At a minimum, the investigation will include determining the cost effectiveness of

¹¹Appendix B: Results of Facility Cost Analysis; page 38.

¹²<u>The Regional System User Fee</u> is collected on all wastes generated in the region intended for disposal. The fee pays the costs of solid waste programs that benefit all users of the system. These programs include solid waste system financial management, administration, engineering, planning, and implementation of waste reduction programs.

each funding option and whether each option is consistent with legislative intent for managing HHW in the state. The following are the funding options recommended for research and possible implementation.

Funding Options

<u>HHW user fees</u> are fees charged directly to participants at HHW collection events or facilities. The research conducted found that a HHW user fee could reduce participation at collection facilities, which would be contrary to the objective of this Plan¹³. However, it is not known if a user fee charged at facilities within the region would actually reduce participation. Therefore, additional research is warranted in order to determine how much of a fee participants may be willing to incur at collection facilities within the region, as well as how much of a deterrent, if any, a user fee would actually have on participation within the region. It should be noted that if a user fee were successfully implemented, it would likely only cover a small percentage of the overall costs of HHW management.

<u>Wastewater and stormwater service user-fees</u> are a common source of revenue for HHW management in many jurisdictions across the country. The basis for utilizing the wastewater and stormwater system as a funding option is that comprehensive HHW management programs not only reduce the volume of HHW entering the solid waste stream, but also reduce the volume of HHW entering the liquid waste stream¹⁴. Metro should work with local service purveyors to determine the potential benefit to these agencies that would result from expanding the region's HHW management program; and, to determine their interest and ability to assist in providing funding.

<u>Product fees</u> are fees charged on targeted products to help pay for their proper management and disposal. To date, product fees have largely been instituted on bulk materials at the wholesale level¹⁵. Before any product fees for hazardous household products could be implemented within the region, research would need to be conducted to determine which hazardous materials could be targeted for a special fee, what the fee should be, and how the fee could uniformly be collected.

<u>Retailer licensing fees</u> would require retail operations selling certain household hazardous materials, such as paint or insecticides, to pay a fee to help cover treatment and disposal

¹⁴Ibid

¹⁵Ibid

¹³Appendix A: Funding Mechanisms; pages 26 - 28.

costs for unused portions of their products¹⁶. Further research should be conducted to determine if such a program could be implemented in a cost-effective and consistent manner within the region.

<u>Private sponsorship and grants.</u> Grants to help pay for HHW management have been given to other cities in exchange for sponsorship and promotional rights at HHW collection events¹⁷. Within this region, there are a limited number of corporations or other private entities that would be interested or have the capital available for assisting in funding HHW collection programs. Therefore, private grants and contributions should not be relied upon as a major or consistent funding option.

Household_Hazardous Waste_Reduction:

There are two basic methods of reducing the amount of HHW generated:

- Reducing the number and volume of hazardous constituents in household products; and,
- Reducing the volume of hazardous household products purchased.

Reduction of the number and volume of hazardous constituents used in household products can best be accomplished at the national level. Many of the household products purchased in the region are manufactured in other parts of the country. Therefore, regional programs aimed at altering product formulas would probably not be feasible. The Office of Solid Waste for the federal E.P.A. is pursuing a national HHW reduction program aimed at identifying constituents of concern and developing regulations to reduce their volume in household products.

The region can be most effective in its HHW reduction efforts by helping to reduce the volume of household hazardous products purchased within the region. This can be accomplished through promoting the reuse of discarded household products, and educating consumers about the availability of alternative non-hazardous products for some hazardous household products. The programs proposed for implementation are as follows.

<u>Waste exchanges</u> are programs that allow individuals who deliver their HHW to a collection facility to exchange their waste materials for other HHW received that is of use to them. Individuals or organizations are also commonly allowed to pick up reusable HHW without having to first drop-off HHW. Typically, only

¹⁷Ibid

¹⁶Ibid

certain types of materials are eligible for exchange. They include only those that are in there original container with all labels readable. More hazardous materials, such as pesticides and strong acids, are also not eligible for exchange. A waste exchange program may be successful in diverting for reuse up to 5-percent of all materials coming into a facility. Metro will need to work with local governments as sites are chosen for mobile programs to develop a safe effective waste exchange program.

<u>Consumer Education</u> is a potentially effective method of teaching consumers to reduce the volume of HHW they produce is to provide useful information about HHW reduction at retail stores. This can be accomplished by working with retailers to promote the availability of alternative non-hazardous products that can be used as substitutes for certain hazardous household products.

<u>Legislation</u>

The legislative program includes monitoring and development components.

The purpose of the legislative monitoring component is to track potential changes to state and federal regulations that impact the management of HHW. Legislative monitoring allows Metro as well as local governments within the region to be responsive to potential changes in these regulations. Metro is performing this task and will continue it throughout the implementation of the plan chapter.

The purpose of the legislative development component is to develop legislation designed to help implement the regional HHW management plan. The development of new legislation must include input from Metro, DEQ, local governments, and affected groups in order to assure that the proposed legislation is equitable and serves to implement the goals and policies contained in this plan chapter. Potential pieces of new legislation to be researched and developed are listed below.

<u>A ban on the collection of HHW at the curb</u> could reduce the volume of HHW entering the mixed waste stream. Issues related to coordination between Metro local governments and waste haulers would have to be addressed before such a ban could be considered. Further, a detailed implementation and enforcement strategy would have to be developed.

<u>Manufacturer/Retailer take-back</u> legislation could also reduce the volume of HHW entering the mixed waste stream. The state currently has a similar law regulating lead acid batteries. Issues related to identifying HHW materials that could efficiently be collected through a take back need to be addressed prior to developing new legislation, as well as issues related to administration. <u>Product ban</u> legislation that would ban the sale of certain hazardous household products could help reduce the volume of HHW generated. There is precedent for such a product ban within the region and the state¹⁸. Issues related to product identification, economic impacts and administration need to be addressed prior to developing any legislation.

Monitoring

Monitoring refers to the gathering of data to determine the actual operational cost of regional collection facilities, the actual observed participation rates and volumes of waste received at facilities, and to measure the effects of promotional and educational programs on participation rates and regional HHW reduction.

The data gathering necessary to determine the operational cost of the collection system and determine the accuracy of assumptions related to the volume of waste collected and participation rates is relatively simple to obtain. These data can be obtained directly from the facilities and include:

- the actual observed participation rate at facilities;
- the actual volume of HHW collected segregated by waste type;
- the amounts and types of HHW reused, recycled, incinerated and landfilled and the costs associated with each management method; and,
- the capital and annual O&M cost for each collection facility in the regional collection system.
- the impact of repeat participants on the average volume of HHW disposed per household;
- the measured differences in the volume of HHW disposed of per single family household unit vs. multi-family household unit;

The purpose of this portion of the monitoring program will be to compare the data and assumptions used to develop this plan chapter with actual observed data at the collection facilities. Based on the results of this comparison, the facilities recommendations contained in the plan will be reassessed. The reassessment will include the feasibility of the 15% participation rate, the regional service area configuration, and the regional collection facilities configuration.

¹⁸Appendix A: Legislation; page 29.

The development and implementation of a monitoring procedure to measure the effectiveness of HHW programs designed to increase participation rates at collection facilities and promote HHW reduction within the region, is a more difficult undertaking. To show effectiveness, it must be possible to monitor changes in trends <u>and</u> quantify what caused any changes to occur. While it is possible to measure trends, such as increased disposal rates at collection facilities or decreasing sales rates for hazardous household products, it is extremely difficult to quantify what caused any changes in the trends to occur.

Changes may be a result of promotional and waste reduction programs, evolving economic conditions, seasonal variation, or a combination of factors. Consumer surveys and surveys at facilities are <u>not</u> recommended as a primary data source for obtaining this type of information because people tend to report what they should be doing, not what they are actually doing. However, surveys are useful for comparative purposes to other data, and have the added benefit of being an educational tool for the individuals surveyed¹⁹.

Based on these findings, the results of a program monitoring function within the region should only be expected to identify the presence and magnitude of any changes in trends related to the volume and composition of HHW found in the solid waste stream, delivered to collection depots, and in the volume and type of hazardous household products consumed. The actual cause of the change should not be expected to be quantified. Trend data alone are still useful in developing long-term program goals and justifying programs, because it can be reasonably inferred that the cause of any changes in these trends can at least partially be attributed to the implementation of HHW management programs and supporting collection system.

¹⁹Paul Kaldjian, U.S. EPA Office of Waste Management; Presentation made at EPA Hazardous Waste Conference. Seattle, Washington; December, 1991.

PLAN IMPLEMENTATION (REGIONAL WORK PROGRAM):

The following section outlines the roles and responsibilities for Metro, local governments, and DEQ in implementing the regional HHW management plan.

Metro Role:

<u>Facilities:</u>

- 1. Metro shall operate the fixed HHW collection facilities at the Metro South and Metro Central transfer stations.
- 2. Metro shall request financial assistance from DEQ to procure and assure operation of a mobile collection facility to serve the portions of the region not conveniently served by the fixed facilities. Initially, this service will be provided in east Multnomah County and Washington County (service areas 2, 4 and 5 in figure 1). Metro will work with DEQ to initiate procurement of the mobile facility before January of 1993.
- 3. Metro shall implement a monitoring project to monitor trends in consumer behavior and regional HHW disposal practices as well as through-put data and participation rate information at regional HHW collection facilities as they become operational. The types of data to be gathered shall include:
 - trend information, including disposal rates at collection depots and retail sales rates for hazardous household products;
 - the impact of repeat participants on the average volume of HHW disposed per household;
 - the measured differences in the volume of HHW disposed of per single family household unit vs. multi-family household unit;
 - the actual observed participation rate at facilities;
 - the actual volume of HHW collected segregated by waste type;
 - the amounts and types of HHW reused, recycled, treated, incinerated and landfilled and the costs associated with each management method; and,
 - the capital and annual O&M cost for each collection facility in the regional collection system.

- 4. Metro shall continue to check loads of mixed solid waste as they enter transfer facilities in to find and remove HHW that may be contained in the loads. Metro shall research the cost effectiveness of employing new technologies in the load checking program to more effectively detect HHW.
- 5. Metro shall work cooperatively with those local governments that act as host communities for HHW collection facilities to monitor facility operations in order to ensure that they meet agreed upon operational criteria and guidelines.

Programs:

- 1. Metro shall expand its educational efforts about proper disposal of HHW and HHW reduction as funding is available. Promotional and informational materials shall be made available to commercial haulers, self-haulers, schools, retailers and the RIC. The materials related to proper disposal will provide information about the location of HHW collection depots, their days and hours of operation and what types of waste they accept and do not accept. Materials related to HHW reduction will include information about waste exchanges and alternative products. The Public Affairs Department will be responsible for coordinating all promotion and education programs.
- 2. The Operations Division shall work to implement a waste exchange program at regional HHW collection depots.
- 3. Metro shall conduct research to determine the feasibility and effectiveness of alternative HHW system funding options. This task shall include:
 - Working cooperatively with the region's wastewater and stormwater facility operators to determine the feasibility of developing an alternative funding source for HHW management through the use of their rate base; and,
 - Exploring the feasibility of attracting private grants from corporations and other private interests.
 - Researching the feasibility of HHW user fees, product fees for hazardous household products and retailer licensing fees.

- 4. Metro shall conduct further research on the feasibility and effectiveness of collection bans, product bans and retailer/manufacturer take back programs as methods to reduce the amount of HHW generated and disposed of. Based on the results of this research, Metro shall develop or assist in the development of new legislation to implement these programs.
- 5. Metro shall continue to monitor and initiate as appropriate legislative activities related to HHW management at the state and federal level. As is necessary, Metro shall provide input to proposed legislative actions.
- 6. Projects proposed by the private sector for developing methods to recycle HHW shall be eligible for Metro's "1% for Recycling" annual grant program.

Local Government Role:

Facilities:

- 1. Local governments shall coordinate with Metro to help find appropriate sites for the mobile collection depot.
- 2. Host local governments shall work with Metro to monitor the operation of permanent and mobile collection depots in order to ensure that they meet agreed upon operational criteria and guidelines.

Programs:

- 1. Local governments shall be responsible for developing and disseminating promotional and educational materials about proper HHW management and waste reduction within their respective jurisdictions. Actual implementation of this task is dependent upon the availability of local funding.
- 2. Local governments shall work with Metro to develop mutually beneficial operational standards so HHW exchanges can be conducted at all HHW collection depots in the region.

3.

DEQ Role:

Facilities:

1. Metro shall coordinate with DEQ on the operation of the region's fixed facilities and mobile collection facility with the operation of the state-wide HHW collection program to avoid unnecessary duplications of service and cost within the Metro region.

Programs:

- 1. Metro and local governments shall coordinate the region's promotional and educational campaigns with DEQ to avoid duplication and help reduce costs for both the state and regional programs whenever feasible.
- 2. Metro shall coordinate with the DEQ in the development of funding options so that they may fit with the state-wide comprehensive HHW management funding plan being developed by DEQ.

GLOSSARY OF TERMS:

<u>Fixed Collection Depot (Facility)</u>: A receiving place for household hazardous waste located on a specific site and consisting of structures on permanent foundations.

<u>Hazardous Household Products</u>: Chemical materials and products, such as paint, pesticides and cleaning agents, that are or may be hazardous or toxic to the public or the environment and are commonly used in or around households.

<u>Household Hazardous Waste</u>: Any discarded, useless or unwanted chemical materials or products that are or may be hazardous or toxic to the public or the environment and are commonly used in or around households.

<u>Household Hazardous Waste Collection Event</u>: A specific day or portion of a week (usually a weekend) when a facility is temporarily set-up to receive household hazardous wastes. These events typically occur quarterly, annually, or less frequently.

<u>Mobile Collection Depot (Facility)</u>: A receiving place for household hazardous waste that is designed to be moved to various locations on a regular basis.

<u>Monitoring</u>: The gathering of data to determine the actual operational cost of regional facilities, the actual observed participation rates and volumes of waste received at regional facilities; and, to determine the effects of promotional and educational programs on regional waste generation.

<u>Permanent Collection System</u>: A configuration of household hazardous waste collection depots that receive discarded household hazardous wastes from the public at least once-a-week, year-round.

CHAPTER 2 (HAZARDOUS AND MEDICAL WASTE) REGIONAL SOLID WASTE MANAGEMENT PLAN

Household Hazardous Waste Management

APPENDIX A

BACKGROUND INFORMATION

DRAFT

April, 1992 Planning and Development Department

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INTRODUCTION:

The Background Appendix contains the detailed background information about guiding legislation that affects HHW management, current HHW management practices in place in other communities, Metro's past HHW collection events and an analysis of HHW programs implemented by other communities. The information contained in this appendix was used to frame the regulatory environment that affects the expansion of the regional HHW collection system. It also identifies programs that could potentially increase participation rates at collection facilities and decrease the amount of HHW generated, if implemented in the region.

Findings in this appendix are the basis for programmatic recommendations in Chapter 2, "Household Hazardous Waste Management System" of the Regional Solid Waste Management Plan (RSWMP). Several findings related to the potential impact on promotional and educational programs on participation rates at collection facilities were also used as inputs to the regional HHW tonnage projection contained in the Plan chapter and discussed in detail in the "Facility Analysis", Appendix B.

I. GUIDING LEGISLATION:

Recommendations contained in Chapter 2, "Household Hazardous Waste Management System", of the RSWMP are supported by state and federal legislation as well as Metro Code. These regulations also guide the design and operation of the regional household hazardous waste management system. This section summarizes these statutes.

A. Oregon Legislation:

Legislation enacted within the state of Oregon specifically directs Metro to develop and maintain a household hazardous waste (HHW) management system. It also directs the Department of Environmental Quality (DEQ) to develop and operate a HHW collection system statewide. The state also mandates that opportunities must be developed for certain materials to be recycled. One material, used motor oil, is hazardous and is commonly used by households. Therefore, the HHW collection system must be designed to recover or divert this material as it is received, rather than collect and dispose of it. The state has also enacted several regulations that restrict the sale of several hazardous materials, also commonly used by households. These regulations may be used as models in the future for developing similar legislation to limit the sale or require special labeling of certain household hazardous wastes. Additional research is needed about the benefits and potential economic impacts of such legislation before it could be developed and implemented.

The following identifies these laws and statutes.

ORS 459, Solid Waste Control

The state law which directly affects HHW management within the Metro region is Chapter 459, Solid Waste Control, of the Oregon Revised Statutes. Metro's initial HHW collection program was mandated by ORS 459. The state law directed Metro to operate at least semi annually a collection system or site receiving household hazardous waste. It also directed Metro to promote and advertise the events in order to increase participation. Metro operated these semi-annual collection events from 1987 through 1990.

House Bill 3515, known as the Toxics Use and Reduction Act of 1989, amended ORS 459. The Bill remanded Metro's requirement to hold semi-annual HHW collection events and replaced it with a requirement that Metro establish permanent depots to receive HHW from the general public on an ongoing basis. The Bill also specified that the facilities had to be located in geographically diverse locations throughout the Metro region. Additionally, Metro is to develop and implement a promotion program to encourage citizens to use the depots for household hazardous waste disposal (ORS 459.413). In response to this mandate, Metro is establishing two permanent HHW collection depots; one each at the Metro Central and Metro South transfer stations. Metro also implemented a promotion program to encourage the general public to use the facilities for their HHW disposal.

The 1989 amendments to ORS 459 also direct DEQ to become involved in HHW collection and management statewide. It requires DEQ to develop a statewide public education campaign to inform the public of alternatives to disposal of HHW at solid waste facilities, methods of reusing or recycling HHW and alternatives to the use of products that lead to the generation of HHW. DEQ is also directed to conduct statewide HHW collection events (ORS 459.417).

Recycling Opportunity Act (1983)

The Recycling Opportunity Act (ORS 459.165 through 459.200 and 459.250) requires that the "opportunity to recycle principle recyclables" be provided to all Oregon residents and is administered by the DEQ. In the Portland metropolitan area, at a minimum, monthly on-route collection service (curbside) must be provided to all garbage service customers within Metro's urban growth boundary. Recycling depots must also be provided at each solid waste disposal site (landfill, and transfer stations). Oregon Administrative Rules (OAR 340-60-010) identifies "principle recyclables for the region. Of interest to HHW collection programs is the listing of used motor oil, a common material encountered at HHW events, as a principal recyclable material. Amendments made to ORS 459.420 through 459.426 (1991) also bans the disposal of used oil at solid waste disposal sites. Therefore, HHW collection facilities in the region must make provisions to collect used motor oil and direct it to recycling markets rather than collecting and disposing of it at a hazardous waste landfill.

Lead Acid Battery Recycling Act (1989)

Lead acid batteries commonly used in automobiles, are made up of a lead core and sulfuric acid. Both these materials are extremely hazardous to human health and the environment if disposed of improperly. To mitigate potential health effects and environmental damage, the Lead Acid Battery Recycling Act (ORS 459.422 through 459.426) was authorized. This act bans the disposal of lead-acid batteries at solid waste facilities and requires retailers of new lead-acid batteries to accept used lead-acid batteries of the same type for trade-in. Once collected, the batteries are to be recycled at permitted battery manufacturing plants, secondary lead smelters or recycling facilities. In addition, it designates signage requirements for retailers and provides civil penalties for violations for improper disposal and failure to post the required notices.

Community Right to Know and Protection Act

State regulations administered by the State Fire Marshall require HHW facility operators to submit an inventory of the amounts and types of hazardous substances received and temporarily stored at a collection facility. The purpose of these regulations are to make information about hazardous substances available to the public; and, to make information available to emergency service personnel so they may be better able to respond to emergencies at a facility. (ORS 453.307 to 453.414).

ORS 767 Motor Carriers

This state law directly affects the transportation of loads of hazardous waste within the state of Oregon. The law gives the Public Utility Commission (PUC) the authority to set standards for safe transportation of hazardous waste, including HHW. The standards require hazardous waste transporters to register with the PUC and receive a Hazardous Waste Transport Permit. The law also requires transporters to notify the PUC of specific shipments of hazardous wastes. The PUC has also adopted the federal regulations for hazardous material transport by reference (OAR 860-66-055).

B. Federal Legislation:

Most federal regulations that govern hazardous waste management specifically exempt HHW from compliance. However, several regulations require compliance once HHW is collected in large volumes at collection facilities. At this point, large volumes of HHW are classified as a hazardous material.

Several federal regulations that govern hazardous waste management, but exempt HHW from compliance have been used to guide HHW management. These include: detailed facility specifications and operational procedures designed to ensure public safety and minimize the potential for adverse environmental impacts that may result from spills or other accidental releases. Even though HHW is a solid waste, it can exhibit the same characteristics as fully

regulated hazardous wastes. Bulk amounts of HHW at collection facilities can cause a threat to public health and the environment if accidentally spilled or mishandled. Though not required by law, the use of adopted federal regulations as guidelines for the design and operation of HHW collection facilities helps to ensure that the system will operate with a minimum risk to public health and the environment. Metro is using these more stringent federal regulations as design and operational guidelines for the design and operation of the fixed depots at Metro South and Metro Central. Consequently, they meet most of the specifications for facilities are added to the regional collection system, it will continue to be prudent to follow more stringent hazardous waste management regulations as guidelines on a site-specific and facility-specific basis for HHW management. This strategy will help to avoid future facility retro-fits should HHW become classified as hazardous waste.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) was adopted in 1976 and amended in 1984 by the Hazardous and Solid Waste Amendments (HSWA). Regulations interpreting this act are codified in the Code of Federal Regulations Volume 40, Sections 260 through 272. This act directs the EPA to identify and list hazardous waste to be regulated, establishes permitting procedures for hazardous waste treatment, storage and disposal facilities and formulates procedures to transfer regulation of these activities to the states. The 1984 amendments revise earlier regulations designating quantity limits that determine generator status.

Although HHW is exempt from RCRA hazardous waste regulations, RCRA provides detailed guidelines that can be used for designing HHW facilities. RCRA requirements can be used as a guidelines when: 1) developing collection facility specifications; 2) designing collection facility operations; 3) establishing collection facility personnel training requirements; 4) developing HHW waste categorization schemes used at collection facilities; and 5) developing HHW collection facility emergency preparedness and prevention plans.

Comprehensive Environmental Response, Compensation and Liability Act, Superfund Amendment and Reauthorization Act and the Hazardous Materials Transportation Act

Household hazardous waste is not "hazardous waste" under RCRA (see 40 CFR 261.4). However, the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or "Superfund") and the Superfund Amendment and Reauthorization Act (SARA) regulate "hazardous substances," some of which are components of household hazardous waste.

Under CERCLA, anyone who generates a particular hazardous substance that is disposed of at a landfill is potentially liable if that substance is released from the landfill into the environment. Generally, the costs of cleaning up a release or spill are proportioned among all responsible parties. In the worst case, this could result in the residents of the metropolitan area paying for the clean-up of hazardous components of household waste that have been released from a regional landfill.

HMTA is administered by the Department of Transportation (DOT). Regulations interpreting this act are codified in 49 CFR 172 and 173 and regulates interstate transport of hazardous materials including HHW. This act works in concert with RCRA in setting, listing, record keeping and tracking of hazardous materials. The HMTA sets broad hazardous material categories and labeling requirements for the transport of hazardous materials. HMTA references RCRA standards for managing hazardous wastes as means of establishing management requirements for hazardous materials, which include collected volumes of HHW being transported to processing facilities or final disposal. HMTA references RCRA in order to set the requirements for hazardous materials packaging, labeling and placarding which must be adhered to for transport by a hazardous waste collection, storage, treatment and disposal facility. HMTA (through RCRA) specifies that all hazardous waste transporters are hazardous waste generators which require an EPA identification number. It further specifies that transporters are responsible for the discharge of hazardous wastes or materials during transport. In case of an accidental spill, the EPA and DOT can hold a transporter responsible for site cleanup.

C. Regional Directives:

The Metro region has not developed laws specific to the management of HHW. However, through its legislative authority, the Metro region has established its ability to impact the sale and distribution of household toxics. If in the future, Metro determines that it would be beneficial and cost-effective to reduce the amount of HHW generated by banning or limiting the sale of certain household toxics, Metro will have the established regulatory authority to implement such a management option. This authority is established by the passage and implementation of the following ordinance.

Regional Phosphate Ban

In June 1990, the Metro Council passed Ordinance 90-336, which instituted a ban on the sale and distribution of household cleaning agents containing phosphate in response to the finding that phosphorous loading of surface waters within the Metro boundaries was negatively affecting water quality. The Ordinance was successfully implemented in February of 1991. The ordinance provides the basis for developing and implementing other types of product bans, labeling requirements or other restrictions on the sale of products within the region.

II. CURRENT MANAGEMENT PRACTICES FOR HHW DISPOSAL

Acceptable management practices for HHW include: 1) permanent and periodic collection events and facilities where the collected material is handled as a hazardous material, packaged and transported for appropriate ultimate disposal; and 2) waste minimization through source reduction and recycling. The recommendations contained in the Household Hazardous Waste Management system Chapter to the RSWMP are premised on these management practices.

In order to understand the manner in which HHW is managed, it is important to know how much waste is generated as well as how much is available for disposal. Typical generation values reported for HHW range from 25 to 115 lbs/household/year depending on the manner these values are calculated. Some communities equate HHW generation values with disposal at solid waste landfills while others count material collected at special events or facilities as the amount of HHW generated in that community. To complicate matters further, many municipalities include toxic materials commonly purchased by residents in their calculations because this material represents potential HHW if not used. For the Household Hazardous Waste Management System Chapter, HHW generation includes the amount of HHW properly disposed at collection events and facilities and poured into septic system and liquid waste facilities. Regional HHW projections calculated for the Plan chapter are for <u>HHW disposal expected at regional collection facilities only</u>. The projections include expected increases in participation rates at collection events and mobile facilities, which represent a net increase in the amount of HHW expected to be properly disposed of within the region.

Collection Programs and Disposal Options:

As of October 1991, eight hundred and twenty two (822) household hazardous waste collection events were held around the United States. Of those, fifty four (54) were permanent programs¹. They range from periodic collection events of single items such as paint to daily operation of permanent collection facilities which can accept a wide variety of HHW including pesticides, paints, automotive products and solvents.

The design of individual programs is as unique as the community planning agency or private sector in charge of the program. It is also dependent upon regional demographics. In most cases however, selection of a household hazardous waste collection program is restricted by budgetary constraints. The greatest single cost for any HHW collection program is material handling and disposal. As an example, in the Portland metropolitan area, semi-annual collection events have cost an average of \$114 per participant. Nearly 65% of these costs (approximately \$74/participant) is dedicated to HHW handling and disposal. It should be noted though, that periodic collection events have comparatively high economies of scale in relation to facilities that

¹Dana Duxbury and Associates. "The National Listing of Household Hazardous Waste Collection Programs 1990." This listing defines a permanent program as a program with at least monthly collections held at a fixed site or at a dedicated mobile facility.
provide regular service. This is because periodic collection events always have start-up costs. As an example the per-participant cost for the King County Mobile Collection Facility, which operates throughout the year, decreased by approximately 14-percent from 1989 through the first quarter of 1991.

Nearly every permanent collection program has been preceded by a series of community collection events. As participation in these programs increases, the need for alternative collection strategies becomes evident. Long waiting lines - up to one or two hours - become common place as does the accumulation of collected materials on sites processing 2,000 or more cars. To mitigate potential hazards such as accidental spills or traffic gridlock associated with collection events, many communities have moved toward establishing permanent facilities. Additional strategies for implementing permanent programs are through collection services such as: 1) collection of single waste types through curbside collection or 2) mobile collection facilities.

Permanent collection facilities vary in cost and type of service. Full service facilities such as the San Francisco facility, collect, store and package HHW on site. In addition, they provide lab service to test unidentified materials brought to the depot. The packaged material is collected by a licensed hazardous waste transporter and taken to a TSD facility for storage and ultimate disposal. Others provide moderate service, in which material collection, packaging and storage occur on site, with minimal testing capacity.

Many other programs collect only single waste types. These are often held in connection with curbside collection. Snohomish County, Washington and Corvallis Oregon, held paint "swap and drops" in 1991. Individuals bringing paint to a designated site were able to exchange it for other paint they might prefer. Other participants were allowed to claim paint even if they did not make an exchange.

A different method of implementing a permanent collection program is illustrated by the King County Washington Wastemobile. This is a mobile facility which collects HHW on a regular schedule at different locations around the County and performs the same functions as a fullservice facility including lab testing and material packaging.

Once waste is collected it must be classified and packaged appropriately for transport and disposal. Although, HHW is "technically" exempt from RCRA hazardous waste regulations, the EPA recommends that HHW than cannot be reused or recycled be managed as a regulated waste².

In 1988, the EPA established a HHW waste management hierarchy that parallels that adopted for regulated hazardous waste. This hierarchy is appropriately followed in sound HHW management and ultimate disposal decisions. The hierarchy is as follows:

²Susan Mooney. "EPA's Concerns Regarding Mercury in Paint." Environmental Protection Agency, Office of Solid Waste; Proceedings of the 5th National Conference on Household Hazardous Waste.

- reuse, recycle
- treat/stabilize
- landfill

The following is a discussion of the management and disposal options for HHW.

Reuse/Recycle

Recycling of hazardous waste refers to the reuse or reclamation of a material either as an ingredient (including it use as an intermediate) to make a product or employment of the material in a function as an effective substitute for a commercial product³.

Hazardous household materials that are commonly reused/recycled include latex paint and some paint-related products, antifreeze, used motor oil and some solvents. These materials are bulked and sent for reprocessing after which they are sold as new product.

HHW reuse has also been demonstrated through give-away programs. Snohomish County Washington recently sponsored a paint exchange program where sorted latex paint as well as some paint-related products were gathered as part of a mobile collection event. Material deemed appropriate for exchange was given away to interested parties. Another popular give away program sponsored by the San Francisco permanent collection facility includes other reusable materials such as unopened currently registered pesticides, cleansers and automotive products.

In the state of Oregon automotive battery recycling is mandatory under ORS 459.422 through 459.426. Retailers selling lead-acid batteries must post signage and accept used batteries of the same type. Both the lead and the acid are recovered, and used to generate new lead-acid batteries. The law provides the means for households to recycle their used lead-acid batteries, which reduces the number of batteries that enter the HHW collection system.

Used motor oil has been designated a principal recyclable material in the Portland metropolitan wasteshed. This affords residents the opportunity for curbside collection of this material. Non-contaminated used motor oil can be processed and sold for use as motor oil. Contaminated motor oil is usually blended as an alternative fuel and burned in a rotary kiln.

Unlike the waste management hierarchy for solid waste, incineration of fuels blended from hazardous liquids for heat or energy recovery is considered a reuse option. Hazardous wastes that are incinerated in facilities that recover energy include: solvent based paint, paint related materials, solvents and waste oil. In 1990, the King County Wastemobile sent 53% of its collected HHW to a rotary kiln for use as an alternate fuel. Similarly, the City of San Francisco's permanent facility sent 40% of the HHW collected at its permanent facility for incineration as fuel.

³40 CFR 261.1 (c)(7).

Treatment/Stabilization

Numerous physical, chemical and biological treatment technologies are currently being used to stabilize or reduce the toxicity of hazardous materials. An example of a stabilization technique is the solidification of bulked latex paint remaining after preliminary sorting for recycling with alum and hydrated lime. This process helps immobilize metals which might be subject to leaching from liquid paint. It is suggested that once solidified, this material can be disposed at a solid waste landfill.

Disposal at Hazardous Waste Landfill

A proportion of the HHW that is collected is routinely disposed at hazardous waste landfills. Some of these land disposed materials are recommended by RCRA while others are disposed in this manner because there are no viable recycling programs or processes available. HHW routinely disposed at hazardous waste landfills such as the one operated in Arlington, Oregon include: aerosol pesticides, other aerosols, dioxin containing materials and alkaline batteries.

Waste Minimization:

HHW minimization means a reduction in the amount and toxicity of material generated at a residential site and requiring treatment, storage or disposal. This can be accomplished through reduction of the amount of household toxics available for purchase, or through a reduction in the amount of household toxics purchased.

Reduction in the amount of household toxics available for purchase can occur through introduction of alternative non-toxic products into the market place or through bans on the production of certain household toxics, whether non-toxic alternatives exist or not. Reducing the amount of household toxics purchased, without the implementation of a ban, can be accomplished through labeling and education programs at the point of sale that identify products as toxic and may also identify non-toxic or less toxic alternative products. These programs can be mandatory or voluntary.

Several communities, including the city of Seattle, are researching the feasibility of product bans and product labeling programs in order to reduce the volume of HHW generated. Specific concerns related to which types of products, if any, should be banned; the necessary components and implementation strategy of an effective labeling program; and, the economic impacts to consumers, retailers and manufacturers that could result from the implementation of one or both of these programs require additional research and analysis.

III. METRO'S HHW COLLECTION EVENTS

Metro has held seven regional HHW collection events since 1986. The first event was a pilot project located at a single site. The pilot project resulted in the collection of one hundred and one (101) - fifty five (55) gallon drums from four hundred and fifty five (455) participants. Beginning in 1988, six subsequent semi-annual collection events have been held with increasingly popularity.

Participation:

Table 1 shows that participation at Metro's regional collection events has more than doubled over time. Participation is much greater during spring events than in the fall.

	NOV 86	MAY 88	OCT 88	APR 89	OCT 89	APR 90	NOV 90
PARTICIPANTS	455	1167	1170	2506	1783	3657	2098
DRUMS	101	498	480	1173	594	NA	512

 TABLE 1

 PARTICIPATION AT METRO'S COLLECTION EVENTS

Collection events held from 1988 through 1990 have been held at four geographically diverse sites throughout the region:

- Northern Site City of Portland, Multnomah County;
- Southern Site Oregon City, Clackamas County;
- Eastern Site City of Gresham, Multnomah County; and
- Western Site City of Aloha, Washington County.

Each site has been located close to a population center and three out of the four sites have been at fire stations with emergency response capabilities. Participation varied from site to site as illustrated in Table 2.

TABLE 2

PARTICIPATION IN	METRO	HHW	COLLECTION	EVENTS	BY SITE

	MAY 88	OCT 88	APR 89	OCT 89	APR 90	NOV 90
ALOHA	408	383	738	576	1,122	620
CLACKAMAS	233	208	427	305	537	376
GRESHAM	306	322	706	424	1,212	542
PORTLAND	220	257	635	478	786	560

HHW Characterization:

Many communities have generically categorized household hazardous wastes into the following categories: paint and paint-related products; automotive products; cleaning agents, arts and crafts materials; solvents and pesticides. However, more specific information on the type and quantity of HHW disposed in the region is critical to collection facility development. This data is important to the development of regional HHW disposal projections to estimate the amount of waste expected to be received at HHW collection depots. This information in turn is relied upon to determine size, queuing and storage space requirements for proposed facilities.

In the Portland region it was difficult to quantify and standardize the types and amounts of material collected at Metro events due to variation in contractor reporting methodologies. Some categorized collected materials by DOT classification schemes, while others used broad generic categories. In addition, most contractors reported the amount of material collected by packed drum or drum volume. A number of factors make these measurements subjective. First, the number of packed drums is dependent upon the manner in which the materials are packaged. For example, some contractors bulked solvent based paints, while others packed individual cans in drums filled with absorbent material. Bulked material resulted in fewer numbers of drums generated. Second, the reported drum volume for liquids may differ from the actual amount of material contained within a drum. Some of contractors reported liquids bulked in 55 gallons as full or 55 gallons, independent of whether the drum was 1/2 or 2/3 full of HHW. Third, solids reported in drum volumes do not accurately represent the amount of material disposed. A few of the contractors employed by Metro, reported solid materials in terms of the percentage of drum space occupied within a 55 gallon container. A half full container would be reported as 271/2 gallons of material. The weight of this estimated volume of solid material is extremely variable and cannot accurately be measured.

In an attempt to standardize the method in which HHW was accounted for in the region base-line HHW collection disposal data was generated from Metro's 1989 collection events (Table 3). This information was calculated based on actual weight of material as reported by contractors⁴ and was used as the foundation for HHW disposal projections necessary for the development of HHW collection facilities. The types of material collected at Metro events was similar to reported waste streams collected at permanent collection facilities around the country. As can be seen paint and paint related products comprised nearly 50% (by weight) of the materials collected:

•	paint related material (other than latex)	37-40%
•	Latex paint	13-15%

⁴The following assumptions for liquid materials were employed: all HHW sub-streams except paint related, bulked latex paint, antifreeze, and used oil are loose packed; each drum is considered 2/3 full; and the average density of disposed liquids equals 8.4 lbs per gallon.

Other materials collected in large quantities (greater than 7 - 10% by weight) were poisons and pesticides and solvents. An average of approximately 84 lbs/carload of HHW were collected at both events.

TABLE 3

SUMMARY METRO'S 1989 HHW COLLECTION EVENTS

APRIL	•	
MATERIAL	% BY WEIGHT	DRUMS
Acid	0.63%	15
Alkaline	0.74%	13
Auto Batteries	4.62%	18
Bulk Solvent	7.49%	39
Flammable (liquid)	3.07%	19
Flammable (solid)	14.45%	113
Compressed Gas (Aerosols)	3.04%	46
HazWaste	3.25%	48
Insecticide	1.07%	18
Nitric Acid	0.01%	3
Oil-Auto	3.24%	15
ORM*	0.39%	7
Oxidizer	0.24%	5
Paint-Latex	14.73%	180
Paint-Related	39.22%	559
Poison	<u>3.82%</u>	<u>75</u>
	100.00%	1,173
TOTAL		

ORM = Other Related Materials

OCTOBER					
MATERIAL (Liquid)	% BY WEIGHT	DRUMS	MATERIAL (Solid)	% BY WEIGHT	DRUMS
Paint-related	40.78%	252	Car Batteries	5.06%	17
Latex Bulked	14.31%	52	Asbestos	0.37%	6
Antifreeze	1.08%	4	Mercury	0.05%	3
Acid	0.52%	11	Oxidizers	0.33%	4
Base	0.29%	4	PoisonA	0.01%	1
Waste Gasoline	0.22%	1	PoisonB	7.94%	55
Oxidizers	0.01%	1	Alkaline Batteries	0.02%	1
PoisonB	3.56%	54	Ballasts	0.10%	2
Dioxin	0.24%	4	Aerosol Solvent	0.66%	5
Non-Chl Solvents*	3.09%	17	Cyanide	0.01%	1
Aerosol Solvents	0.93%	19	Dioxin	0.40%	4
Chl Solvents	0.37%	2	Flammable Pesticide	0.26%	4
ORM**	7.93%	23	Bases	0.72%	7
Carbon Tet	0.01%	1	Calcium Carbide	0.00%	1
Oil (Auto)	2.63%	9	Corrosive	0.04%	2
Flammable Pesticide	0.15%	2	PCB	0.02%	1
		-	ORM	7.71%	23
			Other	0.20%	1
TOTAL	76.11%	456			-
TOTAL	101211		TOTAL	23.89%	138

*Chl = Chlorinated

****ORM** = Other Related Materials

April 1990 Collection Event Survey:

Additional base information related to HHW collection facility and program development was collated from survey data collected at Metro's April 1990 event. This included information on participant travel behavior and demographic profile. These parameters were examined because the distance participants are willing to travel to bring HHW for collection as well as participant socio-economic status have been identified by many communities sponsoring events or facilities as significant factors encouraging participation.

Through self-reported user surveys at various collection facilities and events throughout the northwest, it has been demonstrated that the majority of HHW facility users or participants in collection events are willing to travel fifteen to twenty miles to dispose of their HHW. However, travel distance is not the only factor affecting participation. Others, such as operating hours and ease of location are additional inducements to participation.

Travel distance and demographic information was gathered from participants at Metro's 1990 HHW collection event in order to determine if participants within the region were sensitive to travel distance, and to develop a profile of the typical participant. The information was used in the Plan chapter to develop recommendations related to level of service within the regional

HHW collection system; and, to provide background information that will be utilized when targeting audiences for HHW education, publicity and marketing campaigns.

Tables 4 and 5 summarize the results of the survey.

	TRAVEL DISTANCE (Miles)	NUMBER PARTICIPANTS	% TOTAL
ALOHA	1-5 6-10 11-20 > 20 Unknown	132 233 362 7 <u>7</u> 741	17.8% 31.4% 48.9% 0.9% <u>0.9%</u> 100.0%
GRESHAM	1-5 6-10 11-20 > 20 Unknown	55 298 76 2 <u>0</u> 431	12.8% 69.1% 17.6% 0.5% <u>0.0%</u> 100.0%
PORTLAND	1-5 6-10 11-20 >20 Unknown	0 132 540 2 <u>0</u> 674	0.0% 19.6% 80.1% 0.3% <u>0.0%</u> 100.0%
CLACKAMAS	1-5 6-10 11-20 > 20 Unknown	7 127 221 2 0 357	2.0% 35.6% 61.9% 0.6% <u>0.0%</u> 100.0%
REGION	1-5 6-10 11-20 >20 Unknown	194 790 1199 13 <u>7</u> 2203	8.8% 35.9% 54.4% 0.6% <u>0.3%</u> 100.0%

TABLE 4 DISTANCE PARTICIPANTS TRAVELED TO APRIL 1990 METRO HHW COLLECTION EVENT

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TABLE 5
SUMMARY OF DEMOGRAPHIC DATA
METRO HHW COLLECTION EVENT - APRIL 1990

	AVERAGE SIZE OF HOUSEHOLD	AVERAGE AGE	AVERAGE INCOME	AVERAGE EDUCATION LEVEL
ALOHA	2.72	41-50	\$30,000 - \$40,000	Degree
CLACKAMAS	2.46	51-60	\$30,000 - \$40,000	Some College
GRESHAM	2.45	51-60	\$20,000 - \$30,000	Some College
PORTLAND	2.48	41-50	\$30,000 - \$40,000	Degree
REGION	2.53	51-60	\$30,000 - \$40,000	Degree

IV. HHW PROGRAM ANALYSIS

The purpose of the program analysis is to identify management programs implemented in other communities that could increase participation rates at HHW collection facilities or decrease the amount of HHW that is actually generated. The community programs analyzed have been in operation for only a few years. Many programs have also not been fully implemented. Therefore, accurate data which measures there effectiveness in terms of increased participation rates or decreases in volumes of HHW are not available.

The data reported in this section related to increased participation rates is preliminary. However, it is the best data currently available. Therefore, it was used as the basis for establishing a minimum participation rate for the region of 15-percent participation by 2001. The rate was used as an input to the HHW tonnage projection contained in the Plan chapter. This is the initial HHW tonnage projection developed for the region. As better data becomes available through the operation of permanent collection facilities and on-going promotion and education programs, the projection will be revised.

As the basis for establishing regional HHW management programs appropriate for the Portland metropolitan region, planning documents and recommendations from the Municipality of Anchorage, Alaska; the State of Massachusetts; Clark and Skamania Counties, Seattle-King County, and Los Angeles, California were reviewed. Prior work performed by Metro on HHW was also reviewed as part of this analysis. From this review, a number of potential HHW programs were identified and are listed in Table 6. Common elements from these programs were grouped into five basic HHW management system components:

- Education/Information
- Collection Service
- Funding Options
- Legislative
- Monitoring

These five system components were utilized in the Plan chapter for making specific programmatic recommendations that would likely increase participation at regional HHW collection facilities, if implemented. It is recognized that costs will be incurred for the development and implementation of HHW programs within the region. However, cost estimates for different program components have not been developed here because the methods of implementing these programs vary widely and can significantly influence costs. Therefore, it is most appropriate to consider cost during the development of actual program implementation strategies for the region.

SYSTEM COMPONENT	PROGRAM DESCRIPTION	POTENTIAL PROGRAM ELEMENTS
1. Education - Promotion		2
A. Public Promotion and Information Campaign	Program provides a continuous flow of information to educate and remind individuals about household hazardous waste minimization, disposal options, substitute products and total cost (including environmental costs) of hazardous product use and disposal.	 garbage bill insert newsletter/flyers media campaigns workshops/conferences promotional materials garbage can labeling
B. Education at Public Schools	Program targets elementary through high school-age children. Program makes use of existing education system to present programmed learning packets that emphasize potential environmental impacts of improper HHW and toxicity reduction.	 education packets school curricula
C. Education at Point of Sale	Education campaigns at retail stores are designed to influence consumer behavior. Development and distribution of information packets at the point of sale detail product safety and describe appropriate disposal methods.	 information packets coordination of local retailers pilot project
D. Education at Solid Waste Facilities	Education at solid waste disposal facilities alerts self-haulers to the need to separate their hazardous household materials and encourage them to bring their accumulated HHW to collection depots.	 flyers/brochures signage
E. Information Clearinghouse	Program identifies three major elements: 1) a hotline to provide information to the public on proper disposal methods and collection facility location and operating hours; 2) a resource directory to provide uniform information on proper disposal methods and options to local government agency staff, public interest groups, health professionals and product manufacturers or retailers; and 3) an information repository.	 hotline resource directory information repository
F. Research and Development	Consists of grants to encourage the testing and development of alternative products and innovative HHW recycling or reuse options.	• 1% for Recycling Grant Program

TABLE 6 SUMMARY OF HHW MANAGEMENT PROGRAMS IDENTIFIED

SYSTEM COMPONENT	PROGRAM DESCRIPTION	POTENTIAL PROGRAM ELEMENTS
2. Collection Services		
Services	Additional collection services to augment collection facilities may increase the volume of HHW collected.	 waste exchanges door-to-door pick-up curbside collection of selected wastes periodic collection events for targeted waste streams ongoing collection of targeted waste streams satellite events
3. Funding Options	Currently, household hazardous waste disposal is incorporated into Metro's solid waste tip fees. Additional funding mechanisms could be developed to offset these costs.	 wastewater/stormwater service user- fees private sponsorship and grants retailer licensing fees product fees user fees
4. Legislation		
A. Legislative Monitoring	Although hazardous household materials are <u>not</u> currently regulated under RCRA, they may be in the near future. Metro would continue to track proposed legislation and offer input as is necessary and inform local governments of potential changes to legislation.	 track state and federal legislation contingency plan
B. New Legislation	Metro would develop new legislation designated to implement the regional HHW management. Potential pieces of new legislation could include:	 develop state legislation development regional legislation
1. Manufacturer/Retailer Take Back	A model for manufacturer/retailer product take back in the State of Oregon can be seen in legislation regulating lead acid battery disposal. Retailers are required to accept old batteries when a customer is purchasing a new battery and can impose a new battery fee if an old battery is not brought in for exchange when purchasing a new battery. This program would involve targeting products amenable to both retail and manufacturers take back and working with the appropriate retail, environmental and government groups to fulfill its implementation.	 return of used/outdated product or empty containers provide credit for used/outdated product toward purchase of new product

SYSTEM COMPONENT	PROGRAM DESCRIPTION	POTENTIAL PROGRAM ELEMENTS
2. Collection Ban	Metro currently restricts disposal of hazardous materials brought to solid waste facilities such as oil and lead acid batteries. The program could be expanded to include collection bans pending further study.	 ban collection of specific products at MSW facilities use of new technologies for load checking
3. Product Ban	A phosphate ban has been successfully developed in the Portland metropolitan region. Similarly, a styrofoam ban is in effect throughout the City of Portland. Product bans could be instituted for particularly toxic items.	 ban sale or use of specific products within region
5. Monitoring	5	
A. Data Gathering	The regional HHW projections and facility recommendations included in the Plan Chapter are based on data gathered from other jurisdictions and in-region collection events. It is the best available data, but accurate for making short-term recommendations only. The monitoring program focuses on gathering actual observed data at collection facilities. The data will be used to reassess the data used to develop the regional HHW projection, facility service areas and the collection facility configuration. Trend data that measures changes in HHW disposal and collection rates, as well as the volumes of hazardous household products purchased will also be gathered. Trend information will be used to measure the effectiveness of HHW management programs designed to increase participation at collection.	 HHW sorts participation counts facility audits HHW volume data hazardous household product sales data participant surveys

A discussion of each system component and their potential program elements follows. The discussion focusses on identifying which system components should be implemented and which require additional research prior to recommending implementation.

Education-Promotion:

Education and promotion was found to be a common component in all of the HHW plan documents examined. It was considered by nearly every community as the cornerstone to

effective long-term toxic use reduction and HHW minimization. The planning documents reviewed reflected the feelings that public campaigns focussing on the toxicity of household products, can result in a change in consumer purchasing practices. It is anticipated that through public education on the hazards associated with the use of potentially toxic materials, consumers will seek out the least toxic product available. In response to consumer demand, manufacturers may change formulas or develop new non-toxic products that perform the same function as products that contain toxic or hazardous materials.

Also found within reports on HHW management, was the need to develop education campaigns for proper HHW disposal methods. These campaigns were run parallel to, or as part of toxic use reduction and HHW minimization campaigns. It was believed that interested citizens would participate in collection programs if they were aware of alternatives to disposing of toxic materials in their trash. As a result of this change in behavior, there would be a net decrease in the amount of HHW disposed at municipal solid and liquid waste facilities.

Of the communities analyzed, King County, Washington and San Francisco, California had most successfully implemented promotion and education campaigns in order to increase participation at their various collection facilities. Both San Francisco and King County reported participation rates as high as 15-percent in 1990 for some targeted neighborhoods. Overall, their community-wide participation rates were much lower (in the 1 to 3-percent range). The impact of these participation programs on participation rates cannot be accurately measured. However, there does appear to be a link to promotion and education programs and participation rates.

For the purpose of developing an initial HHW tonnage projection for the region, it is necessary to develop a predictor of how participation rates will change over time as the result promotion and education programs being implemented in conjunction with on-going collection service. Based on the information obtained from King County and San Francisco, it is assumed that a region-wide 15-percent participation rate is feasible within the ten-year planning period if promotion and education programs along with on-going collection service were implemented region-wide.

Within the region, promotion and education programs appear to have had positive impacts on other waste management programs. In 1990, Metro implemented a campaign aimed at a promoting waste paper recycling in the work place. Metro's Recycling Levels Report, completed in July of 1991, reported that waste paper recycling in the region jumped from 23% in 1989 to 49% in 1990. The report in part attributed the significant increase in the recycling rate to the promotion and education campaign. Related to HHW management, Metro has implemented promotional campaigns for the semi-annual collection events held through 1990. Between 1988 and 1990, participation has more than doubled from approximately 2300 in 1988 to 5600 in 1990 (Table 1, page 10).

Based on the research conducted and the documented success of other education and promotion campaigns implemented within the region, it is recommended that a comprehensive HHW promotion and education program be implemented region wide. The focus of the program should bee on promoting the use of collection depots and encouraging households to reduce the volume of HHW they produce.

A number of specific programs were identified that could be implemented in the Portland metropolitan area. They include: public information campaigns; publicity/promotion campaigns; and research and development. The actual configuration and scope of programs will be determined during implementation and should be based on their potential effectiveness and associated cost.

Public Promotion and Information Campaigns

Public promotion and information campaigns are designed to enhance the knowledge of general as well as targeted audiences. They are as varied as individual communities implementing them and the subjects they cover. Information campaigns cited in the literature included the following elements: media coverage of specific topics lasting a number of years, education campaigns targeted at school age children, consumer education, education at solid waste facilities and an information clearinghouse.

<u>Media Coverage.</u> Extensive long-term media campaigns have not generally been used as an education tool to disseminate information on HHW. However, this type of program has been demonstrated to be effective in bringing issues to light on many environmental topics and affecting attitudinal changes of the general populace. The literature examined, reflected the view that long-term media campaigns on HHW issues could similarly be effective in encouraging toxics use reduction and use of HHW collection facilities.

Media campaigns on environmental issues have appeared in both the electronic and print media since the mid-1960's. The form in which these campaigns appear ranges from television or radio documentaries to a series of newsprint or magazine articles. These information sources have proven important in generating interest in and presenting educational material on a variety of environmental topics to general audiences. Individual media types decide to pursue a story in response to a press release or perceived topic of general interest. Communities help set media agendas by putting forth numerous press releases on related topics or informing representatives of particular media on specific topics. An example of a community directed media campaign was evidenced in the City and County of Spokane Washington during the late 1980's. A long-term media campaign was launched by local officials to cover groundwater contamination of a sole-source aquifer. Continued communication with local television and newspaper representatives occurred over a 12 year period. This type of campaign can easily be adapted to address HHW issues.

Metro has been instrumental in encouraging media coverage of HHW issues through press releases prior to collection events and is already familiar with local media representatives. In addition, survey results from Metro's collection events, indicate that television and newspapers were the most common sources used to gather information on regional HHW activities. Because the mass media is already an important information source on HHW issues, Metro could easily extend these efforts into a long-term media campaign on HHW issues.

Education for School-Age Children. Education programs geared for school age children are popular around the country. A number of communities have recently implemented environmental education programs which include issues related to household toxics use and HHW disposal. Curricula have been developed for high school as well as elementary and middle school students describing the environmental and health risks associated with hazardous household materials. For example, San Bernardino County implements a county-wide program designed for kindergarten through sixth grade which addresses four key issues: What is household hazardous waste?; How can hazardous products harm us?; What can we (including kids) do to help?; and How can hazardous wastes harm the environment? Included is a 10 minute video called "The Haz-Kid Report." The State of Washington, Department of Ecology implements a statewide program through the distribution of curriculum material for kindergarten Included are information packets on waste reduction, recycling, through grade twelve. landfilling, incineration, litter control, hazardous waste management, household hazardous waste and waste and water management. Birmingham Michigan has developed a teacher sourcebook on household hazardous materials and labels. It is targeted at middle school age children and identifies household hazardous products and provides information on how to read product labels.

Metro has already developed a comprehensive waste reduction education program that services the 416 schools in the region. It includes presentation packages developed for grade school children from kindergarten to sixth grade, middle school and high school. The topics covered include consumer responsibility, pre-cycling, resources used in making recycled materials, energy savings from use of recycled materials and wildlife habitat. This program could easily be extended to include the topic of toxic household materials use and disposal and its relation to pollution prevention as part of Metro's waste reduction education program. Another way Metro could become involved in school education efforts is to work with state agencies - the DEQ as well as the State School Superintendent to incorporate learning packets/informational materials on HHW issues as part of state environmental education programs. In addition, Metro could work with or help coordinate existing local programs targeting school-age children that address problems associated with improper disposal of HHW. Examples of such programs are the River Ranger Program sponsored by the United Sewerage Agency and the City of Portland's Clean River Program.

<u>Consumer Education</u>. The current trend in consumer education/awareness campaigns designed to influence consumer purchasing practices of HHW (as well as products containing recycled content and other "environmentally friendly" products) is to distribute product information at the point of sale. Existing programs to date include product labeling of specific products and shelf labeling which identifies hazardous product categories.

In both the states of Washington and Oregon, a retail chain has instituted a chain-wide "green" products marketing campaign whereby certain products reviewed by an employee committee are

labeled as environmentally friendly. In addition, the company has an intermittent produce testing program which it uses to identify and label produce containing no detectable pesticide residues.

Additionally, two national product labeling programs have been developed by private ventures, Green Seal and Green Cross. Green Seal is in the process of performing life-cycle analyses on limited product categories. Pending test results, the company will sell its seal to manufacturers passing previously identified criteria for use in retail sale of the product. Another program, Green Cross identifies and labels products with a specified recycled content. The Green Cross label has already appeared on Portland area grocery bags. Green Cross is extending it's program to include commonly used toxic household products. Metro might chose to support these programs through staff review of product analyses or through financial assistance.

Existing programs requiring retail shelf labeling of selected hazardous product categories are limited in scope. The state of Iowa is currently the only state that has instituted a state-wide labeling program of this type. Programs of a similar nature however, have been implemented in the states of Oregon and Washington for lead acid batteries. Retailers of new lead acid batteries are required to post signs stating that recycling is the only disposal option for these materials and that non-compliance with this regulation will result in a civil penalty for each violation.

Another form of consumer education has been demonstrated though retailer distribution of literature on waste reduction efforts and appropriate disposal methods. For the past few years many local retailers have produced brochures encouraging consumer solid waste reduction and describing their own company wide waste reduction efforts as well. Encouraged by local and state governments, the paint manufacturers trade association in California voluntarily displays flyers at the point of sale on appropriate disposal methods for latex paint. In addition, numerous manufacturers display appropriate disposal options on the can. This type of program can be easily adopted to distribute literature on appropriate HHW disposal practices.

Education at Solid Waste Facilities. Education efforts at solid waste facilities are targeted at residents currently utilizing solid waste facilities to dispose of their municipal solid waste. These individuals are known as self-haulers. It is believed that educational efforts at solid waste facilities will encourage self-haulers to use HHW depots because: 1) self haulers are presumed to already be separating their recyclables from non-recyclable waste which affords them a discounted disposal fee, therefore further separation of HHW would be an extension of this practice and 2) since self-haulers already use solid waste facilities on a regular basis, HHW disposal will be relatively convenient - no additional travel will be required. Metro currently provides literature on appropriate disposal practices for HHW and product alternatives to residents using solid waste facilities. This program might be extended to provide more extensive literature on HHW minimization and toxics use reduction.

Information Clearinghouse. An information clearinghouse as described in the literature includes: 1) a regional directory developed for use by local governments who may share responsibility for some aspect of HHW management, or are responsible for environmental damage caused by improper HHW disposal; and 2) an information hot-line designed to answer questions on HHW minimization, product substitution and proper disposal methods. This program was deemed integral to a larger HHW education program because it encourages information sharing and dissemination. Many local agencies in the Portland metropolitan region receive inquiries from the general public on disposal of household hazardous waste. Currently, there is no single source describing product hazard classification, appropriate methods of disposal per hazard class, or product alternatives to replace some of the more toxic constituents of household products. Development of a resource document would provide a useful tool to local agencies requiring this type of information. As a means of providing technical assistance on HHW issues, Metro could take the lead in developing a regional document through a cooperative effort between local government agency staff, fire departments public interest groups, health professionals, manufacturers and retailers.

Metro has been operating a regional hot-line on recycling issues through its Recycling Information Center (RIC) for several years. The RIC routinely receives calls requesting information on all areas of recycling and additionally answers requests for information on household hazardous waste disposal. This program could be expanded to include information and sources of information on toxics use reduction and product alternatives.

An additional program element of an information clearinghouse as mentioned in the literature included a resource library on HHW issues. This information source is useful in documenting past HHW management practices as well as to tracking current developments in the field. In addition, this provides resource information to local planning agencies as well as the general public. Metro currently maintains two separate libraries on current solid waste practice. A small number of holdings are housed in the RIC. The other library is housed in the Solid Waste Department which stores technical literature on or related to current and past Metro solid waste projects. Both libraries currently maintain some information on household hazardous waste. Each could be expanded to include additional information on HHW issues.

Publicity/Promotion Campaigns:

Publicity/promotion campaigns were viewed separate from public information campaigns because they generally take place over short time spans, in association with a special event or program. Because of the time element involved in these campaigns, they do not usually impart detailed information on HHW minimization and toxics use reduction issues. Most HHW publicity/promotion campaigns that have been implemented in other jurisdictions are geared towards advertisement of a collection event or specifying facility address and operating hours. Within the Metro region, publicity and promotion campaigns have also been limited to the dissemination of specific information about a collection event or facility. These have been in conjunction with HHW collection events and have taken the form of press releases, flyer distributions and full-page ads in local newspapers. Metro will continue its publicity and promotional efforts on HHW disposal options as is required by state statute (ORS 459.413).

Research and Development:

Research and development focusses on the development of new information related to HHW management. Research and development programs instituted to date in other jurisdictions studied extend money to individuals or institutions to encourage household hazardous waste management research. Programs currently implemented have taken a number of forms such as grant programs that extend money to a university or private venture for research on HHW disposal alternatives and product substitutions. Metro has established grant programs, like the "1% Well Spent" recycling grant program which could be utilized for similar projects within the region.

Collection Service:

Additional collection services have been implemented elsewhere and could be implemented in the Metro region. The purpose of these services is to augment the collection service offered at collection depots in order to increase the volume of waste collected and decrease the volume of HHW that might ultimately require treatment, incineration or land disposal. Potential program elements include waste exchanges, curbside collection, collection events for targeted waste streams, and satellite events.

<u>Waste Exchanges</u> are programs that allow individuals who deliver their HHW to a collection facility to exchange their waste materials for other HHW received that is of use to them. Waste exchange programs generally have four operational components:

- Products must be in original sound containers with all labels readable;
- All products to be set aside for exchange are visually inspected;
- Only products with no unusual hazard are set aside for exchange. Typically, pesticides, strong acids and other similar products are not exchanagable; and
- No guarantees of product safety or effectiveness are claimed by the distributing agency.

A waste exchange serves two benefits. It promotes the reuse of HHW and it *reduces the cost* of management because those materials removed from the site and reused do not have to be recycled, treated, incinerated or land disposed. Waste exchange programs can divert for reuse

up to 5-percent of the HHW coming into a facility. In order to implement the waste exchange program region-wide, Metro should work with local governments as sites are chosen for mobile depots to develop a safe effective waste exchange program.

<u>Door to door pick-up</u> is designed to provide collection service to sectors of the population, such as the elderly, who may not be able to participate at collection depots. The program can also target multi-family developments where populations are concentrated and such a service may yield very high participation rates and high volumes of waste collected. There is little available data about the costs or benefits of such a program. Research must be conducted to determine if such a program should be implemented within the region.

<u>Curbside collection of selected wastes</u> is a program designed to collect large volumes of a particular component of the HHW stream. Materials to be targeted could be recyclable, where curbside collection is used to gather large volumes of the material for the market. Targeted materials could also be particularly hazardous materials that can be managed more economically if handled in bulk. If implemented, the program could be conducted periodically or on an on-going basis. Again, the costs and benefits associated with this program are largely unknown, Additional research would need to be conducted prior to implementing the program.

<u>Satellite events</u> are periodic collection events aimed at portions of the region not conveniently served by collection depots. Such areas can only be identified once the regional collection system becomes operational. Potentially, any areas of the region not conveniently served by the collection system could be served by adjusting site locations for the mobile facility. Areas outside of the region may also be served by the DEQ collection program, once it is implemented.

Funding Options:

Historically, Metro has not charged participants to drop-off their collected volumes of HHW at semi-annual collection events or at the permanent depots. These costs have been recovered through the Regional System User Fee component of the regional tip fee for mixed solid wastes⁵. Given that the costs of managing HHW are high, the impact to the regional tip-fee could be great. The results of the facilities analysis show that the cost to construct and operate HHW collection depots is approximately \$100.00 per participant over ten years⁶.

⁵The Regional System User Fee is collected on all wastes generated in the region intended for disposal. The fee pays the costs of solid waste programs that benefit all users of the system. These programs include solid waste system financial management, administration, engineering, planning, and implementation of waste reduction programs.

⁶Appendix B; Results of Facility Cost Analysis, page 33.

HHW management plans and programs adopted and implemented in other jurisdictions were studied in order to identify potential new funding options which could diversify the revenue source for HHW management within the region. Numerous plans and programs from across the United States were reviewed. Several were studied in greater detail because the funding methods implemented within these jurisdictions provided a diversified funding base for HHW management that appeared to be implementable within the region. The jurisdictions studied in detail include Anchorage Alaska, Seattle/King County and Clark/Skamania County in Washington, and Los Angeles California. Potential new funding options include HHW user fees, wastewater/stormwater service user fees, retailer licensing fees, product fees, and private sponsorship and grants.

<u>HHW user fees</u> are fees charged directly to participants at HHW collection events or facilities. The research conducted found that of the HHW collection programs, examined nationwide, no state or local jurisdiction is charging a fee directly to participants at collection events or collection facilities. The reasons stated for this practice were that a fee would reduce participation; and, that even if a fee were charged, it would be so small that it would not be a significant revenue source. Based on these findings alone, it appears that a HHW collection tip-fee charged directly to participants at collection facilities in the region does not appear to be a viable funding option. However, additional research may be warranted in order to determine how much of a fee participants may be willing to incur at collection facilities within the region, as well as how much of a deterrent, if any, a user fee would actually have on participation within the region would be contrary to the legislature's intent when it directed Metro to establish a permanent regional HHW collection system (ORS 459.413)⁷.

Wastewater and stormwater service user-tees. Anchorage, Seattle/King County, Clark/Skamania County, and Los Angeles, all utilized wastewater and stormwater user-fees for funding HHW management. The basis for utilizing the wastewater and stormwater system as a funding option is that comprehensive HHW management programs not only reduce the volume of HHW entering the solid waste stream, but also reduce the volume of HHW entering the liquid waste stream. The wastewater and stormwater facility operators within the jurisdictions analyzed assist in funding HHW management programs because they receive a direct benefit from the operation of collection facilities and dissemination of educational materials that serve to reduce the amount of HHW improperly disposed of.

User-fees on wastewater and stormwater service bills are a significant and dependable source of revenue. The revenues received by the jurisdictions studied are as follows:

TABLE 7REVENUE DERIVED FROM UTILITY USER-FEES

⁷Appendix A: Guiding Legislation; page 2.

JURISDICTION	PERCENTAGE OF FUNDING RECEIVED	TOTAL 1991 PROGRAM COSTS
Anchorage, Alaska	30%	\$1,000,000
Seattle/King County, Washington	25%	\$3,600,000
Clark/Skamania County, Washington	10%	\$100,000
Los Angeles, California	50%	\$2,600,000

Metro does not have any authority over wastewater or stormwater service within the region. However, Metro could work with local service purveyors to determine the potential benefit to these agencies that would result from expanding the region's HHW management program; and, to determine their interest and ability to assist in providing funding.

<u>Product fees.</u> The state of Washington currently institutes a special tax on certain hazardous materials, a portion of which is dedicated for local government assistance in developing and implementing HHW management plans (Model Toxics Control Act of 1987). The funding mechanism administered by the state derives revenues from hazardous materials sold in bulk at the <u>wholesale level</u> only. Before any product fees for hazardous household products could be implemented within the region, research would need to be conducted to determine which hazardous materials could be targeted for a special fee, what the fee should be, and how the fee could uniformly be collected. It may also be found that this type of a program could be implemented more efficiently and equitably on a statewide rather than a regional basis.

<u>Retailer licensing fees.</u> A retailer licensing fee program would require retail operations selling certain household hazardous materials, such as paint or insecticides, to pay a fee to help cover treatment and disposal costs for unused portions of their products. Implementation of such a program would likely require retailer licensing in order to identify the retail outlets for targeted products. To date, no jurisdiction has attempted to implement such a program, though many jurisdictions are currently investigating its feasibility. It is not clear how Metro could enforce such a program. However, further research needs to be conducted to determine if such a program could be implemented in a cost-effective and consistent manner within the region.

<u>Private sponsorship and grants.</u> The City of Los Angeles received a grant of \$900,000 from Unocal Corporation in 1990 for their HHW management program. The grant was given to the City in exchange for sponsorship and promotional rights at HHW collection events put on by the City. The grant money is being used to establish a HHW management trust fund that will provide a continuing source of revenue for the City's program. The trust fund was established to get maximum benefit from the grant because they do not expect to receive private grants on a regular basis. To date, Los Angeles appears to be the only community to have received a private grant for HHW management. Within this region, there are a limited number of corporations or other private entities that would be interested or have the capital available for assisting in funding HHW collection programs. Therefore, private grants and contributions should not be relied upon as a major or consistent funding option.

Legislation:

A legislative program includes both a legislative monitoring elements and a element designed to be proactive in developing new legislation for the region or the state.

Legislative monitoring includes the tracking and support of legislation regulating HHW. It was considered a major program component by the jurisdictions studied for the management of HHW. Tracking of pending legislation has important consequences for program and facility development as well as HHW disposal options. Tracking of legislation is important to HHW management in general, because although HHW is not currently regulated under RCRA, it may fall under RCRA jurisdiction in the near future. If HHW were to be managed as regulated hazardous waste, future program and facility planning activities might require complete reassessment. Within the region, Metro currently performs this legislative monitoring function on a variety of issues including HHW management. Metro will continue to perform this function as the HHW management plan is implemented.

<u>New legislation</u> could be initiated by Metro in order to support implementation of the regional HHW management plan. Potential pieces of legislation that could be proposed include support for new funding mechanisms on a statewide level, similar to those discussed previously, manufacturer/retailer take-backs, HHW product bans, and collection bans.

Legislation could be developed that would require retailers and manufacturers of certain hazardous household products to take back used products when new ones are purchased. The state currently has a similar law regulating lead acid batteries. In order to develop new legislation along these lines, HHW materials that could efficiently be collected through a take back program would have to first be identified. Research related to the cost of administration, the cost to retailers or manufacturers and the expected volume of material recovered would also have to be conducted prior to developing any legislation.

Legislation could also be developed to ban the sale of certain hazardous household products within the region or the state. The purpose of a product ban would be to reduce the volume of HHW generated. There is precedent for such a product ban within the region and the state. Metro has instituted a region-wide ban on the sale and distribution of household cleaning agents containing phosphates. In the State of Oregon, electronic batteries with a mercury content of greater than 0.025% by weight 25 milligrams or less for alkaline batteries (ORS 459.995 and ORS 469.992) have been banned as of January, 1992 and consumer batteries in non-removable housing will be banned by 1993. Significant research would have to be conducted to determine the feasibility of instituting a product ban for hazardous household products before any legislation could be drafted. Issues to research include identifying which products should be subject to a ban, the impact to consumers, and how a ban could be enforced.

Collection bans are another potential form of legislation that could reduce the volume of HHW entering the mixed waste stream. Metro currently does not allow hazardous materials, including

many hazardous household products to be delivered to transfer facilities. The program could be expanded to include collection bans for certain HHWs. A collection ban would help to make the generator responsible for properly disposing of their HHW. Implementation of such a ban would require coordination between waste haulers, the local governments that regulate them and Metro.

Monitoring:

The monitoring component for HHW management includes functions necessary to track disposal practices and facility use within the HHW collection system, as well as monitor the impact of educational/promotional campaigns and new legislation on HHW generation and disposal rates within the region. A monitoring program is necessary in order to provide background data necessary to make needed adjustments to the HHW Plan or implementation strategies and to support the continuation of successful implementation strategies. HHW monitoring functions should include the following.

Disposal Practices

HHW disposal practices are typically monitored at HHW collection events or facilities. Both the volume and characterization of HHW received are monitored. Changes in waste volume or /characterization may require changes to the operation of the collection system if volumes greatly exceed or are much less than what is predicted to occur. Further, this information can be used to evaluate educational and promotional campaigns. Depending on the focus of the campaign, a significant decrease or increase in total waste volume or the incidence of a particular component of the HHW stream being received at a facility can indicate the relative success or failure of a particular program or programs.

Facility Use

Demographic information about who disposes of HHW at collection facilities must also be maintained. This information is useful in evaluating the effectiveness of promotional campaigns on certain segments of the population and target population segments currently not participating the collection system for increased or redirected promotional and education campaigns. Data related to facility use can also be used to determine if geographic sub-areas are not being served by the collection system.

Trends Analysis

Trend data related to the volume and composition of solid waste disposed of in the mixed solid waste stream and collected at HHW depots, as well as the volume hazardous household material sold is useful information that should be monitored. Trend information can be useful in estimating the effectiveness of HHW programs designed to increase participation rates at collection facilities and promote HHW reduction.

CHAPTER 2 (HAZARDOUS AND MEDICAL WASTE) REGIONAL SOLID WASTE MANAGEMENT PLAN

Household Hazardous Waste Management

APPENDIX B

FACILITY ANALYSIS

DRAFT

April, 1992 Planning and Development Department

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INTRODUCTION:

The primary purpose of the "Facility Analysis" is to provide information about the relative cost differences between different types of HHW collection facilities. The Analysis was also conducted to illustrate the high cost of HHW management within the region in relation to the costs for managing other types of solid waste.

The Facility Analysis made use of a computer model that estimated the levelized cost of constructing, operating and maintaining different HHW collection facility configurations over the ten year planning period. The cost estimates were dependent upon a projected volume of HHW being delivered to facilities and approximate cost estimates for different types of facility configurations. The waste projection and facility costs reported for each facility type and configuration are reasonable approximations of their absolute costs per ton of HHW collected or participant served. However, they are a better approximation of relative percentage difference between facility types and configurations. The results should be interpreted accordingly.

This Appendix describes the data sources and assumptions for making the regional HHW tonnage projection and facility cost estimates. They are based on the best available data. However, the sources of information include in-region collection events, collection events outside the region and the operation of regular collection service at permanent collection depots or mobile facilities in jurisdiction outside the region. These data sources are varied and none correlate directly to the operation of a <u>permanent collection system within the region</u>. Consequently, the data base necessary for establishing trends and making accurate long-term projections about the volume of waste collected and costs for a permanent collection system within the region is not yet available. Therefore, the results of the analysis are appropriate for making short-term recommendations only. Additional data is necessary prior to making long-term programmatic and facility recommendations. The most efficient means of acquiring the needed data will likely be through monitoring the operation of the regional collection system over a period of time. As more accurate data becomes available, the model can be updated in order to provide reliable tonnage projections and facility cost estimates for long-term facility recommendations.

The Facility Analysis described in this Appendix consists of four separate sections. The first is the "Regional HHW Projection" which forecasts the amount of waste expected to be delivered to collection facilities in the region. The second section is the "Service Area Determination" which estimates the number of facilities that are necessary to provide service to all households in the region. Next is the "Facility Alternatives" section. This section describes the different types of HHW collection facilities and facility alternatives for which cost estimates were developed and projected through the use of the computer model. All facility configurations modelled included the operation of the fixed collection depots at the Metro South and Metro Central transfer stations. The final section is the "Facility Cost Analysis". which includes a description of the cost assumptions for each facility modelled and also reports the results of the analysis.

I. REGIONAL HHW COLLECTION PROJECTIONS

The regional HHW collection projection is a projection of the volume of HHW expected to be delivered to collection depots by residents. The projection is for ten years only (through 2001). Beyond ten years, there is uncertainty about how HHW management practices may be altered due to potential changes in technology and regulations governing the production of household chemicals or solid waste management. Therefore, it is not feasible to make accurate longer-term waste projections. This section contains the regional projection and describes the methodology used to develop it.

Methodology:

The regional HHW collection projection is based on actual data collected at past Metro HHW collection events and data gathered from other jurisdictions that operate permanent HHW collection systems. An assumption was also made that the level of service within the regional HHW collection service would become uniform over time. The basis for this assumption will be discussed in the next section of this appendix.

The HHW collection projection is dependent upon three variables:

- The participation rate in HHW collection among households;
- The volume of waste disposed per household; and,
- The number of households in the region.

The following is a summary of how values were estimated for these variables in order to produce a regional HHW collection projection.

The participation rate measures the percentage of households in the region that will dispose of their HHW at HHW collection facilities. The regional participation rate is estimated to be approximately 2-percent in 1992. This estimate is based on data obtained from semi-annual collection events which measures the total number of participants at those events. This data is compared with the estimated number of households in the region in order to derive the participation rate. The two-percent participation rate is further based on the observed first-year participation rates for similar HHW collection facilities now operating in Seattle, Washington and San Francisco, California. The major assumption in this calculation is that one participant is equal to one household. The participation rate is projected to grow from 2-percent to 15-percent in 2001. The basis for this projection comes from information obtained in the program analysis. Collection systems coupled with an on-going promotion campaign in King County and San Francisco have recorded participation rates as high as 15-percent within portions of their service territories. It is assumed

that a collection system coupled with an on-going promotion campaign within the region could yield at least a 15-participation rate region-wide within ten years.

The volume of waste collected measures the average volume of HHW delivered to facilities by an individual participant. Based on a review of data collected at regional semi-annual collection events held in 1989 and 1990, it was estimated that each household bringing waste to Metro collection facilities will deliver an average of 84 lbs. or 1/3 of a 55-gallon drum annually. There is no data available to estimate how this average may change over time. Therefore, it is assumed to remain constant through 2001.

The number of households in the region is an estimate of the total number of single family and multi-family units within the Metro region. For this analysis, one household is assumed to represent one potential participant. Metro's Data Resource Center (DRC) provided the projection of the number of households for the region. The number of households in the region is regularly updated with the use of building permit data obtained monthly and vacancy rate information obtained through monthly utility company and postal service surveys.

YEAR	TOTAL HHLD IN REGION	PARTICI- PATION RATE	# OF PARTICI- PATING HHLDS	TOTAL HHW IN REGION (TONS)	HHW AVAILABLE FOR COLLECTION (TONS)	HHW AVAILABLE FOR COLLECTION (DRUMS)
1992	475,764	2%	9,515	19,982	400	3,426
1993	483,406	4%	19,336	20,303	812	6,961
1994	491,048	6%	29,463	20,624	1,237	10,607
1995	498,690	8%	39,895	20,925	1,676	14,362
1996	506,332	10%	50,633	21,266	2,127	18,228
1997	513,974	11%	56,537	21,587	2,375	20,353
1998	521,616	12%	62,594	21,908	2,629	22,534
1999	529,258	13%	68,804	22,229	2,890	24,769
2000	536,900	14%	75,166	22,550	3,157	27,060
2001	544,542	15%	81,681	22,871	3,431	29,405

TABLE 1

ESTIMATED VOLUME OF HHW AVAILABLE FOR REGIONAL COLLECTION DEPOTS

The methodology used to develop the regional HHW projection is based on available data that is derived largely from semi-annual collection events held within the region from 1988 through 1990. The projection does not measure or take into account several important variables that are expected to be observable through the continuous operation of fixed and mobile collection facilities. These

include; the impact of repeat participants on the average volume of HHW disposed per household, differences in the volume of HHW disposed of per single family household unit vs. multi-family household unit and the actual observed participation rate at facilities. These types of data should be gathered at facilities in the region in order to developed a more detailed and accurate HHW projection suitable for making long-range programmatic and facility decisions.

II. SERVICE AREA DETERMINATION

Adequacy of Metro South and Metro Central:

There are three factors that determine the adequacy of the fixed collection facilities at the Metro Central and Metro South transfer stations to serve the needs of the region. They are the storage capacity of the two facilities, their queuing capacity and their ability to provide a uniform level of service to households throughout the region.

Storage capacity for collected HHW at the two facilities is dependent upon how often the collected waste is removed from the facilities for final disposal or recycling. If collected HHW is removed on a daily basis, the storage capacity at the facilities would likely be adequate to serve the region. This was determined by calculating the projected storage capacity for the two facilities (approximately 210 barrels or 26.5 tons) and comparing to the projected volume of HHW to be collected on an average day in 2000 (3,431 tons/ 156 days of operation = 22 tons or 175 barrels per day. However, the queuing capacity necessary to serve the projected number of participants in the entire Metro region is not adequate at these two locations. Reliance on these two facilities exclusively for regional HHW collection could lead to traffic congestion and long delays for participants, which would have a negative impact on participation rates. Further, the location of the two sites does not provide a uniform level of service for HHW collection throughout the region. Households in Washington County and east Multnomah County would not be adequately served because the facilities are not conveniently located for households in these parts of the region. This condition would also reduce participation rates because households would be less able or inclined to utilize the facilities.

For these reasons, the depots at Metro Central and Metro South are not adequate to mange the volumes of HHW estimated to be collected in the region through 2001.

Level of Service Evaluation:

Level of service for this evaluation focusses on identifying what HHW facility configuration would provide efficient service to all households in the region in order to help increase the regional participation rate to at least 15-percent. Efficient service is characterized by the geographic location of facilities, the days and hours of operation as well as the amount of time a participant would expect to spend at a collection site disposing of their HHW. The days and hours of operation necessary to provide efficient service were determined to be Friday through Sunday, eight to ten hours during the day. The basis for this determination was based on operational practices at other facilities in the City of Seattle, King County and San Francisco California. Operating the facilities over weekend was found to be efficient because the highest volumes of HHW were received on these days.

In order to determine the appropriate facility configuration that could provide a uniform level of service for HHW collection in the region, the concept of community service areas was developed.

The community service area concept is based on the assumption that most participants at HHW collection facilities will dispose of their accumulated wastes when performing other errands within their community. Therefore service area boundaries should reflect community boundaries that have been established by land development patterns and HHW collection should occur within these boundaries. The reason for this is that the HHW collection system should be designed to capitalize on established trip patterns in order to increase participation rates. The method of collection within community service areas could be via fixed or mobile collection facilities.

Service area boundaries for the region were developed by identifying major community service centers. Community service centers are the centers of commerce that provide basic goods and services to surrounding neighborhoods. The boundaries of the neighborhoods that utilize a particular community service area were set by reviewing various maps of the region that identified transportation corridors, neighborhood boundaries and natural features.

Based on the review, five service areas were identified. They include a central service area that has the Portland downtown area as its center (Service Area #1), a south service area anchored by Oregon City and Lake Oswego (Service Area #3), the Beaverton/Tigard community service area (Service Area #4), the Hillsboro/ Forest Grove service area (Service Area #5), and the east Portland/Gresham service area (Service Area #2). The Community Service Area Map (Figure 1) illustrates the boundaries of the community service areas. The fixed collection facilities at the Metro Central and Metro South transfer stations would continue to serve Service Areas 1 and 3. The service area boundaries developed for this analysis are preliminary. They were based on what expected trip patterns are within the region. It is likely that as information is gathered through the operation of fixed and mobile collection facilities, service area boundaries will be revised. Additionally, the service area boundaries are not intended to limit the type or amount of HHW collection service that could be made available within any given portion of the region.

Service Area Descriptions:

As described above, HHW service area boundaries reflect the trip choices that the majority of residents within a given service area make. Due to the element of choice, the decision made by residents at the service area fringes cannot accurately be predicted. Therefore, service area boundaries were developed as broadly sweeping lines rather than specific geographic demarcations, as illustrated in the Community Service Area Map.

Despite the lack of preciseness in service area boundaries, it was possible to project the number of households within each service area. Using the same methodology described in Section I, HHW projections were calculated for each service area.



 TABLE 2

 ESTIMATED TOTAL NUMBER OF HOUSEHOLDS IN EACH SERVICE AREA

YEAR	AREA 1	AREA 2	AREA 3	AREA 4	AREA 5
1992	173,336	69,695	113,973	91,334	31,299
1993	173,909	70,956	116,593	93,593	32,068
1994	174,482	72,217	119,213	95,852	32,837
1995	175,055	73,478	121,833	98,111	33,606
1996	175,628	74,739	124,453	100,370	34,375
1997	176,201	76,000	127,073	102,629	35,144
1998	176,774	77,261	129,693	104,888	35,913
1999	177,347	78,522	132,313	107,147	36,682
2000	177,920	79,783	134,933	109,406	37,451
2001	178,493	81,044	137,553	111,665	38,220

 TABLE 3

 ESTIMATED NUMBER OF PARTICIPATING HOUSEHOLDS IN EACH SERVICE AREA

YEAR	EXPECTED PARTICI- PATION	TOTAL HHLDS IN REGION	AREA 1	AREA 2	AREA 3	AREA 4	AREA 5
1992	2%	9,593	3,467	1,394	2,279	1,827	626
1993	4%	19,485	6,956	2,838	4,664	3,744	1,283
1994	6%	29,676	10,469	4,333	7,153	5,751	1,970
1995	8%	40,167	14,004	5,878	9,747	7,849	2,688
1996	10%	50,957	17,563	7,474	12,445	10,037	3,438
1997	11%	56,875	19,382	8,360	13,978	11,289	3,866
1998	12%	62,943	21,213	9,271	15,563	12,587	4,310
1999	13%	69,161	23,055	10,208	17,201	13,929	4,769
2000	14%	75,529	24,909	11,170	18,891	15,317	5,243
2001	15%	82,046	26,774	12,157	20,633	16,750	5,733

YEAR	PARTIC- IPATION RATE	AREA 1 TONNAGE	AREA 2 TONNAGE	AREA 3 TONNAGE	AREA 4 TONNAGE	AREA 5 TONNAGE
1992	2%	146	59	96	77	26
1993	4%	292	119	196	157	54 ,
1994	6%	440	182	300	242	83
1995	8%	588	247	409	330	113
1996	10%	738	314	523	422	144
1997	11%	814	351	587	474	162
1998	12%	891	389	654	529	181
1999	13%	968	429	722	585	200
2000	14%	1,046	469	793	643	220
2001	15%	1,125	511	868	703	241

TABLE 4 ESTIMATED HHW COLLECTION PROJECTION BY SERVICE AREA

Service Area 1:

Service Area 1 includes the north/central segment of the Portland metropolitan region. It is bounded by the Columbia River to the north, and the West Hills to the west. These limits were established based on the assumptions that Clark County residents will not use Metro facilities and that the West Hills is a major community boundary influencing east/west travel across the region.

The eastern boundary approximates the Interstate 205 freeway and was selected because it is believed to approximate the community boundaries of the City of Portland and the City of Gresham. The southern boundary was more difficult to establish, because no clear community boundaries were evident. It was estimated to be centered on the Interstate 5/State Route 217 freeway interchange. Approximately 33-percent of the total volume of HHW expected to be collected within the region over the ten year planning horizon is located within the service area boundaries.

Service Area 2:

Service Area 2 is the north-east service area encompassing the Gresham community. It is bounded to the north by the Columbia River and to the west by the Interstate 205 freeway. As in Service Area 1, it was assumed that no Clark County residents will use facilities located in this area. The southern boundary approximates the border between Multnomah and Clackamas Counties. Approximately 15-percent of the total volume of HHW expected to be collected within the region over the ten year planning horizon is located within the service area boundaries.

Service Area 3:

Service Area 3 is the southern-most service area in the region. Its northern boundary approximates the Clackamas/Multnomah county border. To the west this area is bounded by the Interstate 5 transportation corridor. No eastern boundary was established. Approximately 25-percent of the total volume of HHW expected to be collected within the region over the ten year planning horizon is located within the service area boundaries.

Service Area 4:

The eastern boundary of Service Area 4 is delineated by the West Hills and Interstate 5. The western-most boundary approximates N.W. Cornelius Road to the north and 185th Avenue to the south and was established based on population densities and predicted population growth in Washington County. No southern border was established for this service area. It is predicted that residents within this service area are more likely to use a facility in Washington County than travel to Metro Central. Approximately 20-percent of the total volume of HHW expected to be collected within the region over the ten year planning horizon is located within the service area boundaries.

Service Area 5:

The only boundary established for this service is its eastern boundary which corresponds to the western boundary of Service Area 4. Existing and future residents in this service area are expected to utilize facilities in the Forest Grove/Hillsboro area. Approximately 7-percent of the total volume of HHW expected to be collected within the region over the ten year planning horizon is located within the service area boundaries.
III. FACILITY ALTERNATIVES

This section contains a description of the HHW collection facility alternatives for the Metro region. These facility alternatives were developed as a means of identifying different types of collection facilities that could be developed to augment the existing fixed collection facilities at the Metro South and Central transfer stations as a means of improving the level of service within the region. Information about the design and operation of the collection facility alternatives was compiled through an investigation of existing facilities in operation in the Cities of San Francisco, Seattle and Santa Monica as well as King County, Snohomish County and the Hood Canal/Juan de Fuca region of Washington. The results of the investigation confirm that there are two basic collection facility options: fixed and mobile facilities. Fixed facilities are subdivided by: 1) site location and 2) building structure. Mobile facilities are of one general type consisting of a trailer unit and associated equipment that moves from site to site.

Non-Mobile Collection Facilities:

Non-mobile HHW collection facilities are collection stations that are developed at permanent sites. In general, they operate on a year-round basis and have evolved from traditional collection events or roundups in response to high contractor costs for material handling and disposal. Fixed facilities can be either fixed or pre-fabricated structures.

In addition, non-mobile facilities have been developed as a means of improving customer service and alleviating potential environmental and safety problems associated with collection events. Nonmobile facilities accomplish these tasks by providing predictable service on a year-round basis at a single location. This tends to reduce participant waiting time at collection facilities because there are not large volumes of traffic and facility over loading which commonly occur at periodic collection events. Management of non-mobile facilities to protect against environmental damage or injury to site personnel through accidental spills or releases is also easier at fixed facilities. Fixed facilities are typically designed to include spill containment areas, secure storage areas, emergency shower and first aid stations and other safety features.

The general operation of a non-mobile facility includes material sorting and packaging as well as the identification of unknown material. On-site staff are also responsible for the consolidation of materials such as latex paint and antifreeze as well as the packaging of materials requiring lab or loose packing¹. Material storage also occurs on site. Once materials are removed from the site, they are typically taken to a temporary storage depot (TSD) for additional sorting and consolidation, then transported to the TSD to final disposition.

¹Lab-packing refers to the packaging of smaller containers of HHW into approved hazardous waste disposal drum, along with an appropriate absorbent material. Each lab-pack drum must contain enough absorbent to fully absorb the liquid contents of the drum. Loose-packing refers to placing containers into a drum without absorbent, for short term transportation purposes.

Successful operation of non-mobile collection facilities has been demonstrated in numerous communities throughout the United States. They are primarily owned and operated by public agencies. Non-mobile facilities can vary in both their location and their structure.

Facility Location:

Non-mobile HHW collection facilities can be located at other solid waste facilities or as stand-alone facilities. Both types of facility locations have ben employed by different jurisdictions. However, the majority of the facilities in operation are located at other solid waste facilities. The primary reason for this is that it is easier to site a collection facility at an existing solid waste facility because the potential for concerns about land use and environmental impacts is less than if the facility were located on a site away from other similar uses.

Examples of non-mobile facilities currently operating at solid waste facilities include the City of Seattle's South Transfer Station depot, the City of San Francisco's Norcal-operated transfer station depot; the City of Santa Monica transfer station depot and the Municipality of Anchorage Alaska's transfer and land-fill depots. Stand alone facilities operating to date include the Kalamazoo County, Michigan's depot located on publicly owned fairgrounds, the Winona County, Minnesota's depot located on a city-owned lot and San Bernardino County's and the Municipality of Anchorage Alaska's satellite depots.

Facility Structure:

Non-mobile fixed facilities, or "fixed" facilities" as referred to in the plan chapter, are buildings that require original design and construction. They can be located in association with a solid waste transfer station or can be developed as stand alone facilities. They provide covered space to perform all functions of a collection depot including collection, material testing, packaging and storage. Both facilities at the Metro South and Metro Central transfer stations are examples of fixed facilities.

Non-mobile pre-fab facilities, or "pre-fab facilities", describe the majority of HHW collection centers operating elsewhere in the United States. These facilities consist of one or more modified hazardous waste storage trailers or pre-fabricated structures. These facilities typically perform the same functions as non-mobile facilities described above. A typical pre-fab facility has several structures or trailers dedicated to collecting, testing sorting packaging and storing HHW. additional structures are also provided for employee locker rooms and office space. Storage space at pre-fab facilities is usually limited, which requires material to be removed from the site and transferred to a TSD more frequently than at a non-mobile facility.

The City of Seattle operates a full service pre-fab facility. San Bernardino County and the Municipality of Anchorage Alaska operate satellite depots to a central packaging and storage facility.

Mobile Facility:

A mobile HHW collection facility consists of a modified trailer which includes a mini-lab for testing unknowns, an office and a dressing area. Additional equipment set up at the site includes material sorting tables, canopies, trucking and towing equipment, a forklift and temporary fencing for site security. Mobile facilities operate in public places for several days collecting HHW. The typical length of time at any one site is three days. The facilities then move to another location to begin operations. Mobile facilities usually operate in or near residential areas that are easily accessible to local residents. Typical locations include parking lots at schools or other public facilities, churches or shopping centers.

Mobile facilities perform only limited functions. In addition to collecting HHW, they are capable of doing only limited testing, sorting and packaging. No material storage occurs on site. At the end of each day of operation, collected HHW is removed and taken to a TSD for further testing, sorting and packaging prior to final disposition. Mobile facilities have one distinct advantage over fixed facilities. Mobile facilities can be located close to residential areas, which makes it more convenient for households to properly dispose of their HHW. Consequently, participation rates tend to be higher in communities that have mobile facilities within their HHW collection system. The capital investment necessary to implement a mobile collection facility is also small when compared to the capital cost of a fixed or pre-fab facility.

IV. FACILITY COST ANALYSIS

A detailed cost analysis which estimated the relative capital and operational cost differences between the facility alternatives discussed in Section III was conducted in order to illustrate the general cost differences between different facility types and different facility configurations intended to serve the five HHW facility service areas discussed in Section II. The cost data and assumptions developed for the facility cost analysis are derived largely from rough cost estimates for similar facilities operating in other jurisdictions and preliminary construction costs for the fixed collection depot at Metro South.

The results of the analysis are <u>not</u> intended for making long-term system development decisions or developing facility procurement or operating budgets. The analysis was conducted to:

- Illustrate the relative cost differences between different facility types and configurations;
- Illustrate the overall expense of HHW management; and
- Identify the type and amount of data acquisition that is necessary to refine the model inputs and outputs so results can be used to accurately make long-term decisions about future facility procurement and operation.

The cost analysis estimated preliminary capital and O&M costs over the ten year planning horizon (2000). The cost analysis is divided into four parts:

- Description of facility alternatives for each service area;
- Description of the model used to generate cost estimates for each facility option;
- Summary of cost assumptions used in the model; and
- Results of the cost analysis.

Facility Alternatives for Each Service Area:

Three facility alternatives were identified which could service each of the five Service Area described in Section III. The facility alternatives were identified by site visits to existing facilities or facilities under construction within the Region, Seattle and King County, Washington and San Francisco and San Bernardino California They are; non-mobile fixed (fixed), non-mobile pre-fab (pre-fab) and mobile. Table 5 summarizes facility options that were analyzed for each service area. Note that fixed facilities were the only facility alternatives analyzed for Service Areas 1 and 3. This is because the service area boundaries were configured so that fixed facilities at Metro Central and

Metro South would adequately serve the projected number of participants from within those two service areas over the ten year planning horizon.

SERVICE AREA	FACILITY ALTERNATIVES
1	• Fixed facility at Metro Central Transfer Station
2	 Fixed facility Pre-fab facility Mobile Collection Service
3	• Fixed facility at Metro South Transfer Station
4	 Fixed facility Pre-fab facility Mobile Collection Service
5	 Fixed facility Pre-fab facility Mobile Collection Service
Combined Service	 Mobile Collection Service for Area's 4 & 5 Mobile Collection Service for Area's 2,4 & 5

TABLE 5 FACILITY ALTERNATIVES FOR EACH SERVICE AREA

Fixed Facilities:

Fixed facility options were proposed for each service area. For areas 1 and 3, a fixed depot associated with a transfer station was the only option considered. For the analysis, it was assumed that the Metro South and Central depots will adequately serve these portions of the region over the ten-year planning horizon. For the purpose of analysis, the costs for land acquisition were not included in cost estimates for fixed facilities associated with the two existing transfer stations. It was assumed that since these facilities are located within the property boundaries of the existing transfer facilities, the costs for land acquisition are appropriately incorporated into the transfer station cost.

For Service Areas 2, 4 and 5, the stand alone option was the only fixed option considered. No transfer stations exist in areas 2 and 4 and it is not clear that the Forest Grove Transfer Station in area 5 could accommodate a HHW collection depot without the purchase of additional land. In developing cost estimates for these facility options, the cost of land acquisition was included.

Pre-fab Facilities:

Pre-fab facilities designed to serve areas 2,4 and 5 were modeled after the City of Seattle's pre-fab depots. These facilities operate with two hazardous waste storage sheds which allows for on-site storage of forty eight (48) - fifty five (55) gallon barrels of HHW. The pre-fab option used in the cost analysis includes a supplementary pre-fab structure for laboratory, locker, and office space. It was assumed that no additional storage space would be required, in addition to the two storage sheds, since waste would be removed off site on an as-needed basis as is the case for the Seattle facility.

Mobile Facilities:

Mobile facility options were established separately for Service Areas 2, 4 and 5 as well as in combination (Service Areas 4 and 5, and Service Areas 2, 4 and 5) for cost comparison. Each option was modeled after the King County and Snohomish County mobile collection programs. Each facility would be open three days per week, eight hours per day. The duration of each mobile option varies based on the annual number of participants expected in each service area. Tables 10 through 14 describe the length of operation for mobile facilities within each service area.

Description of Cost Model:

The cost model developed for this facility analysis is a computer-based spread sheet model that calculates nominal, real and discounted costs for the different facility alternatives, as presented in Section III. Nominal costs represent capital and O&M facility costs in present (1992) values. Real costs reflect the impact of inflation alone cu nominal costs. Discounted costs reflect the impact of inflation alone on nominal costs.

The time value of money, also referred as the "discount rate" (D.R.) is estimated to be 3% peryear. Real discount rates cannot be observed in the market; they have to be inferred by comparing market interest rates to inflation. For public projects, most economists use a real discount rate of 3%. The formula for calculating the discount rate is:

 $(1 + \text{Nominal D.R.}) = (1 + \text{Real D.R.}) * (1 + \text{rate of Inflation} (and expectations about inflation})).$

Assuming the nominal D.R. equals the primate rate of approximately 8.5% and inflation is about 5%, the formula calculates a real D.R. of approximately 3.3%.

As constructed, the model calculates all facility costs through 2001, adjusts for inflation and the time value of money, and divides by the tonnage base that these costs will be recovered from within the regional rate structure, the projected volume of HHW to be recovered over ten years and the expected number of participants respectively. The model results are summarized and presented as "levelized costs". A levelized cost is the technically correct measure to use when trying to compare

costs of different facility alternatives. It is a standardized and consistent measure commonly used in public utility evaluation and regulation. A levelized cost is a cost that, if charged against every ton of waste received or participant entering a facility would just recover the full costs of construction and operation of the HHW collection system.

While the levelized costs calculated in the model may look like rates, they are projected cost estimates. To make interpretation of the model's results simpler, reviewers should focus on the relative cost differences between facility alternatives instead of absolute amounts. Absolute costs may change over time due to changes in actual costs associated with facility procurement. If there are errors in the data or analysis, they are likely to have much less of an impact on relative costs.

Costs were calculated for all facility alternatives modeled. Spreadsheet data on capital and O & M costs as well as the model results for each facility alternative by service area are presented at the end of this appendix.

Cost Assumptions:

Capital and operation and maintenance (O&M) cost assumptions for HHW collection facility options were developed as inputs to the model described above. The cost assumptions are based data gathered from currently operating HHW collection facilities and Metro collection event data. Capital costs, as referred to in this analysis, include costs for site acquisition, construction, outfitting the facility with equipment, facility design and construction management. O&M costs include all costs incurred to operate the facility including labor, staff training, protective clothing, material testing, disposal drums, packing material, transport fees, disposal fees and liability insurance. Table 6 below summarizes the cost assumptions. The discussion that follows the summary table describes each capital and O&M cost assumption by cost category.

Again, the cost data and assumptions used for this analysis are based on the best available data. However, HHW management is a recent occurrence. Collection systems in the region and other communities have been operating for only a few years. Collection service has also often been on a periodic basis. Therefore, the available data is not adequate for establishing trends necessary for making long-term facility recommendations. The results of the model are illustrative and suitable for making short-term facility recommendations. Model results were calculated over the ten-year planning period only to more clearly illustrate relative cost differences between facility alternatives.

TABLE 6 HHW UNIFORM CAPITAL and O&M COST ASSUMPTIONS FOR THE REGIONAL HHW MANAGEMENT PLAN

· · · · · · ·	Fixed Depot	Mobile Depot	Pre-Fab Depot
CAPITAL COSTS			
Structural	\$150/sq.ft.	(\$2,200-\$4,700 lease/week, depending on the avg. # of weeks in service)	\$146,000-\$220,000, depending on facility size
Facility Outfitting	\$100,000	N/A	\$100,000
Queuing Space	\$1,050 per queuing & parking space	N/A	\$1,050 per queuing & parking space
Facility Design, Construction Mgmt.	15% of capital minus outfitting costs	N/A	15% of capital minus outfitting costs
Site Purchase	\$2.50/sq. ft.	N/A (shared)	\$2.50/sq. ft.
		,	
O&M COSTS			
Labor Chemist/Site Supervisor Hazardous Waste Tech.	1 FTE @ \$45,900 2 FTE (0-4000 ppy) + 1/2000 ppy @ \$30,700	1 FTE @ \$1,400/week 5 FTE @ \$4,700/week	1 FTE @ \$45,900 2 FTE (0-4000 ppy) + 1/2000 ppy @\$30,700
Staff Training	\$ 425/FTE	N/A	\$425/FTE
Protective Clothing	\$5000/FTE/year	\$96/FTE/week	\$5000/FTE/year
Material Testing	\$0.50/pound * 1% of annual through-put	\$0.50/pound * 1% of annual through-put	\$0.50/pound * 1% of annual through-put
Disposal Drums	\$20/drum	\$20/drum	\$20/drum
Packing Material	\$0.05/pound	\$0.05/pound	\$0.05/pound
Transport Fee (to TSD)	\$12.00/drum	\$12.00/drum	\$12.00/drum
Disposal Fee (including transport)	\$194/drum	\$194/drum	\$194/drum
Liability Insurance	\$12,500/year	\$240/week	\$12,500/year

Capital Costs:

For the analysis, capital costs for fixed and pre-fab depots did not require financing because it is assumed that they will be paid through cash reserves (this in fact is the case for both the Metro

South and Central depots). However, cash reserves have an investment value. For this analysis, the investment value was assumed to be 5% annually. The model estimated the recovery costs for the original capital outlay plus its investment value over the ten year planning horizon.

Since mobile facilities will be leased, all capital costs will be spent and collected in the same year. An investment value for these costs was not included when calculating capital costs for mobile facilities. Annual lease costs however, were subject to inflation.

The following is a description of each capital cost assumption used in the facility cost analysis.

1. Structural Costs

Structural costs include construction costs for a fixed building, purchase costs for a pre-fab building and lease costs for a mobile unit.

Fixed Depot

The structural costs for fixed depots were estimated at \$150 per square foot. Structural costs include all costs for site preparation, foundation work, construction of the building frame and all interior and exterior walls, roofing and flooring, utility hook-ups and installation of all lighting HVAC and plumbing. This value was based on partial design drawings and construction cost estimates from the Metro South HHW collection depot.

The Metro South Transfer Station depot is 4,400 square feet and can accommodate approximately 121 - 55 gallon drums of HHW. Based on operations at the San Francisco depot and on design considerations for the Metro Central transfer station depot, it was determined that 3000 square feet is considered the minimum size required for safe and effective HHW collection depot operation for annual processing of 12,000 to 27,000 cars per year (the number of cars predicted to use the Metro Central depot). Service Area 5 is predicted to service only approximately 6,000 cars annually. Therefore, this facility option was downsized to 2000 square feet. For the cost analysis that follows, capital costs for fixed facilities were based on the following actual and estimated facility sizes:

Service Area 1	4,400 sq. ft.
Service Area 2	3,000 sq ft.
Service Area 3	3,000 sq. ft.
Service Area 4	3,000 sq. ft.
Service Area 5	2,000 sq. ft.

TABLE 7FIXED FACILITY SIZES

Pre-Fab Depot

The structural costs for a pre-fab depot are based on the City of Seattle's HHW collection facilities located at their South and North transfer station sites. The facilities consist of two hazardous waste collection sheds and a separate structure that houses an office and locker room facilities. Each shed can store up to 24 drums or approximately three tons per day. According to cost data provided by the City of Seattle Solid Waste Utility for their recently completed facility at the Seattle South transfer station, each shed costs \$20,000. The structure to house laboratory, locker and office space also costs approximately \$20,000. Costs incurred by the Utility for site preparation, utilities and installation of the two storage sheds and one administrative building was \$160,000.

The capital and O&M costs for pre-fab facilities were calculated for Service Areas 2, 4 and 5 only, because the service areas were configured so that the fixed depots at Metro South and Metro Central would serve Service Areas 1 and 3.

Service areas 2 and 4 are expected to serve between 12,000 and 16,000 vehicles annually, which translates into an average daily tonnage through-put of between 3.5 and 4.3 tons per day (based on an average of 84 lbs delivered per vehicle and year round operation three days per week). Service area 5 is expected to serve only approximately 6,000 vehicles per year, which translates into a daily tonnage through-put of 1.6 tons per-day. Based on these calculations and the estimated storage capacity of the storage sheds, the estimated number of sheds and cost of pre-fab facilities for the three service areas modelled is as follows:

Service Area 2	2 storage sheds, 1 admin. bldg. + set-up	\$220,000
Service Area 4	2 storage sheds, 1 admin. bldg. + set-up	\$220,000
Service Area 5	1 storage shed, 1 admin. bldg. + set-up	\$146,000

TABLE 8 PRE-FAB FACILITY SIZES AND COSTS

Mobile Depot

The information used to determine the cost of a mobile facility is based on information from the King County Wastemobile and other mobile facilities operating throughout the state of Washington. The facilities used in these programs consist of a trailer and associated equipment that travels from site to site. This facility is designed to process up to 200 cars per day or approximately 8.4 tons of HHW per day. The facility has no on-site storage, therefore, collected materials must be removed daily.

The length of mobile service recommended for each service area fluctuates not only by service area, but from year to year. For example, during the first year of operation, in most service areas a mobile facility will be operating only three to six weeks. However, as participation rates increase over time, a mobile facility may operate year-round. Because of this variation over time, it was assumed that leasing a mobile facility for the period of operation would be more cost effective than purchasing a facility, operating it for a short period, then storing it for long periods of time. It was also assumed based on existing mobile facilities, that the facility would be operated by a private vendor.

Tables 10 through 14 describe the duration of a mobile program per year required to serve Service Areas 2, 4 and 5. The estimated duration of service is based on the number of participating households (one car = one household) expected over the ten year planning horizon. The number of expected participants was established based on increasing participation rates reaching at least 15% by the year 2000.

Service was designed to accommodate between 150 and 180 cars per day based on information obtained from currently operating mobile facilities in King County, Snohomish County and Hood Canal/Juan de Fuca region, Washington. Values in each table were calculated as follows:

• The expected number of participants per year was divided by 3 (days of operation per week) to yield the expected number of participants per week;

• To determine the annual duration of a mobile program to service the expected number of participants in a year, the expected number of participants per week was divided by the average number of cars expected to utilize a mobile depot in a day. The duration of the collection period was lengthened by one week when the number of participants requiring processing each day exceed the weekly capacity of the facility to collect HHW. Weekly capacity is estimated to be between 450 to 540 participants, based on the daily capacity of 150 to 180 participants.

Cost data supplied by the mobile facility vendor in King County, Washington shows that the lease cost for a mobile collection facility is \$4,700 per week for a mobile facility that operates for one-third of a year (approximately 17 weeks) or less. The lease cost includes the cost of the mobile trailer and equipment, transfer and set-up costs and administrative costs for staff training. As the length of operation increases, the weekly lease cost is assumed to decrease because costs can be recovered across a larger base of operations. The basis for this assumption is found in the quarterly cost reports for the King County mobile facility. According to the reports prepared by the vendor, per-participant costs have decreased by 14-percent from 1989 through the second quarter of 1991.

For this analysis, the lease cost for each mobile facility configuration modelled was calculated against the average number of weeks the facility was expected to operate over the ten-year planning period. For those configurations that averaged 17 weeks of operation or less, the weekly lease cost was \$4,700. For those configurations that averaged more than 17 weeks of operation annually, the lease cost was calculated by determining the percentage increase in average weeks of operation over 17 and applying it as a percentage decrease to the weekly lease cost. Table 9 summarizes the mobile facility costs by configuration modelled.

Configuration	Avg. # of Weeks Operating	Avg. Weekly Lease Cost
Svc. Area 2	14	\$4,700
Svc. Area 4	19	\$4,200
Svc. Area 5	7	\$4,700
Svc. Areas 4 & 5	26	\$3,100
Svc. Areas 2, 4 & 5	37	\$2,200

TABLE 9		
MOBILE FACILITY LEASE COSTS		

Year	Expected Participation (Households)	# Cars Processed/Day	Duration of Program (Weeks)
1992	1,398	155	3
1993	2,838	156	6
1994	4,333	179	8
1995	5,878	179	11
1996	7,474	179	14
1997	8,360	175	16
1998	9,271	172	18
1999	10,208	179	19
2000	11,170	178	21
2001	12,157	177	23

TABLE 10MOBILE FACILITY OPTION FOR SERVICE AREA 2

 TABLE 11

 MOBILE FACILITY OPTION FOR SERVICE AREA 4

Year	Expected Participation (Households)	# Cars Processed/Day	Duration of Program (Weeks)
1992	1,827	152	4
1993	3,744	178	7
1994	5,751	174	11
1995	7,849	174	15
1996	10,037	176	19
1997	11,289	179	21
1998	12,587	175	24
1999	13,929	179	26
2000	15,317	176	29
2001	16,750	174	32

Ycar	Expected Participation (Houscholds)	# Cars Processed/Day	Duration of Program (Weeks)
1992	626	208	1
۱ . 1993	1,283	143	2
1994	1,970	164	4
1995	2,688	149	6
1996	3,438	164	7
1997	3.866	. 161	8
1998	4,310	180	8
1999	4,769	177	9
2000	5,243	175	. 10
2001	5,733	174	11

TABLE 12MOBILE FACILITY OPTION FOR SERVICE AREA 5

TABLE 13MOBILE FACILITY OPTION FOR SERVICE AREAS 4 & 5

Ycar	Expected Participation (Households)	# Cars Processed/Day	Duration of Program (Weeks)
1992	2,453	169	5
1993	5,026	168	10
1994	7,721	172	15
1995	10,537	176	20
1996	13,475	173	26
1997	15,155	174	29
. 1998	16,896	171	33
1999	18,698	173	36
2000	20,560	176	39
2001	22,937	178	43

TABLE 14MOBILE FACILITY OPTION FOR SERVICE AREA'S 2,4 & 5

Ycar	Expected Participation (Households)	# Cars Processed/Day	Duration of Program (Weeks)
1992	3,847	160	8
1993	7,865	175	15
1994	12,054	175	23
1995	16,416	175	32
1996	20,948	175	40
1997	23,515	174	45
1998	26,167	174	50
1999	28,906	185*	52
2000	31,730	203*	52
2001	34,639	222*	52

* May require an additional day of service per week to receive and process the projected volume of waste to be delivered.

2. Facility Outfitting

Facility outfitting costs include capital equipment purchases such as forklifts, lab equipment and computing systems.

Fixed Depot

Outfitting costs are estimated at \$100,000 for fixed depots based on the budgeted amount for the Metro South and Metro Central transfer stations for fiscal year 1991. Outfitting costs include rolling stock, lab equipment and office equipment.

Pre-Fab Depot

Outfitting costs for pre-fab facilities are also assumed to be \$100,000. For the analysis, pre-fabs are expected to perform the same functions as fixed facilities. Therefore, they are assumed to require the same type and amount of equipment.

Mobile Depot

The facility outfitting costs for a mobile facility are included in the lease cost. This assumption was verified by the vendor for the King County mobile facility.

3. Facility Queuing Space

Facility queuing space includes the space required to queue vehicles without blocking traffic on adjacent roadways plus maneuvering room for ingress and egress. Space requirements are calculated based on the forecasted number of peak-hour vehicles that would utilize a facility in the planning year 2000.

Again, based on data gathered from past Metro-sponsored collection events, it is assumed that one car will bring an average of 84 lbs. of HHW to the facility.

Fixed Depot

Design drawings for the Metro South and Central fixed depots were used to calculate the number of queuing spaces and areas of ingress and egress for those two facilities. The number of queuing spaces required for fixed facilities in Service Areas 2, 4 and 5 are based on a calculation of what the traffic volume would be at fixed facilities on the peak hour of the peak day in 2000 (the planning period). This calculation was used because it is consistent with Metro practice for designing other types of solid waste facilities to meet projected demand. The calculation was not used to calculate the number of queuing spaces for the Metro Central and Metro South facilities (Service Areas 1 &

3) because both of those are retro-fits to an existing facility where existing paved queuing areas will provide additional queuing space for vehicles.

Development ordinances were used to estimate the vehicle queuing space and ingress/egress area requirements. Facility queuing space costs were calculated from expenditures associated with site preparation and paving for parking areas. The 1987 edition of the Means Construction Cost Manual was used to estimate the grading, paving and striping costs for queuing areas.

Based on these sources, the following estimates were developed:

- The size of each queuing space, including maneuvering room for ingress and egress is 300 square feet per vehicle;
- Site preparation and paving costs are \$3.50 per square foot or \$1,050 per space;
- The number of <u>additional</u> queuing spaces needed at the Metro South and Metro Central fixed depots is 30 each.
- Information on peak-hour demand was developed from Metro South and Metro Central transfer station design documents; To calculate the peak hour of the peak day's volume in the year 2000:

peak weekend	=	3.6 percent (annual throughput)
peak day volume	=	50 percent (peak weekend volume)
peak hour volume	==	20 percent (peak day volume);

The estimated number of queuing spaces and associated development costs are as follows:

QUEDING STACE COSIS			
Service Area 1	30	\$31,500	
Service Area 2	44	\$46,000	
Service Area 3	30	\$31,500	
Service Area 4	60	\$63,000	
Service Area 5	20	\$21,500	

TABLE 15QUEUING SPACE COSTS

Pre-fab Depot

Pre-fab depots are expected to function in the same manner as fixed depots. Therefore, the methodology and set of assumptions described above for fixed depots was used to determine queuing

space size requirements and cost estimates for pre-fab facilities. Pre-fab facilities were only modelled for Service Areas 2, 4 and 5 because it is assumed that the fixed depots at Metro South and Metro Central will serve Service Areas 1 and 3.

Mobile Depot

Queuing space costs are not applicable to mobile units because mobile facilities make temporary use of donated land.

4. Facility Design, Construction Management

Facility design and construction management costs include the expenditures incurred both during the design and construction phases of HHW collection depot.

Fixed Depot

Facility design and construction management costs were calculated at 15-percent of capital costs minus equipment costs (such as lab equipment and rolling stock) for the facility. This estimate was based on past construction cost estimates for other types of solid waste facilities in the Metro region. The cost estimate was obtained from cost statements for facility design and construction management services incurred during the construction of the Metro Central Transfer Station. The cost assumption was also verified by the facility designer for the fixed HHW collection depot at Metro South.

Pre-fab Depot

The assumptions described above for facility design and construction management costs were used to develop these costs for pre-fab depots. This assumption was also verified by the facility designer for the fixed collection depot at Metro South.

Mobile Depot

There are no site design or construction costs associated with mobile facilities. Program management costs are assumed to be passed through in the lease agreement.

5. <u>Site Purchase</u>

Site purchase costs describe the expense incurred to acquire land needed for HHW collection depots. These costs were <u>not</u> applied to the Metro South and Central transfer station depots in Service Areas 1 and 3. It was assumed that there were no land acquisition costs for retrofitting existing solid waste facilities with HHW depots. Land acquisition costs were however, included in the fixed facility cost estimates for Service Areas 2, 4 and 5. In Service Areas 2, 4 and 5 there are no public

facilities that could be retrofitted. Additional land area would likely be required for a HHW facility in these Service Areas. Based on input from real estate appraisers, the average price for undeveloped industrial land in the Portland metropolitan region where services such as sewer and water are available is \$2.50 per square foot or \$109,000 per acre. Sites considered appropriate for HHW facility development were flat, vacant industrial sites with utility and sewer hookup available on the site.

Fixed Depot

The amount of space required per facility was calculated based on the estimated square footage for the facility and queuing space plus an additional 5,000 square feet for landscaping setbacks. The estimated land area and associated land acquisition costs for Service Areas 2, 4 and 5 are in Table 16.

SERVICE AREA	FACILITY AREA	QUEUING AREA	SETBACK AREA	TOTAL AREA	ESTIMATED COST
Service Area 2	3,000 sq. ft.	13,000 sq. ft.	5,000 sq. ft.	21,000 sq. ft.	\$52,000
Service Area 4	3,000 sq. ft.	18,000 sq. ft.	5,000 sy. โt.	26,000 sq. ft.	\$65,000
Service Arca 5	2,000 sq. ft.	6,000 sq. ft.	5,000 sq. ft.	13,000 sq. ft.	\$33,000

TABLE 16	
LAND ACQUISITION	COSTS

Pre-fab Depot

Site acquisition costs for pre-fab stand alone depots were developed using the same assumptions and cost estimates described for fixed depots.

Mobile Depot

Site acquisition costs are not applicable to a mobile facility since these facilities temporarily share space with other existing users on donated land.

Operation and Maintenance Costs:

6. <u>Labor</u>

Labor costs are those costs incurred for staffing a HHW collection facility.

Fixed Depot

Labor costs for fixed facilities include the costs for a full-time chemist acting as a site supervisor and at least two full-time hazardous waste technicians. This is considered minimum staffing for a facility that processes up to 4,000 cars per year developed from information reported by existing fixed HHW collection facilities operating in the City of San Francisco, City of Santa Monica and San Bernardino County. Based on staffing practices at these facilities, an additional FTE was added for each additional 2,000 cars processed per year at a cost of \$30,700 per FTE. Annual labor costs are based on Metro 1991 salaries for HHW operations staff positions including benefits:

Chemist/Site Supervisor (1 FTE)	<u>Cost/Year</u> \$ 45,900
Hazardous Waste Technician (2 FTE @ \$30,700 per FTE)	\$ 61,400
TOTAL	\$107,300

Pre-fab Depot

The salaries and assumptions described above for fixed depots were utilized for pre-fab depots.

Mobile Depot

The number of employees needed to run a mobile facility is substantially higher than for a fixed depot because a mobile facility requires the removal of all hazardous materials from each site on a daily basis.

Mobile collection service options for each service area were designed to accommodate between 150 and 180 cars per day. Labor costs go up as more cars are processed.

The following are weekly labor costs for mobile depot staff required to operate a site open three days per week. These costs include labor for set-up and breakdown on a daily basis. The labor cost estimates were provided by the vendor for the King County mobile facility.

Chemist/Site Supervisor (1 FTE) (10 hrs @ \$46.50 @ 3 days)	<u>Cost/Week</u> \$1,400
Hazardous Waste Technicians (5 FTE) (9 hrs @ \$35/hr @ 3 days)	\$4,700
TOTAL	\$6,100

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7. <u>Staff Training</u>

Staff training expenditures cover the cost of a 40-hour training class for all new employees at fixed and pre-fab facilities. The training class teaches basic procedures to hazardous material operators as required by OSHA. The cost of the class is estimated to be \$425 per FTE. The cost estimate is based on class fees paid by Metro to a vendor to train Metro transfer station personnel about detecting and handling hazardous materials.

It should be noted that HHW facility personnel will receive additional on-the job training, but this will be accomplished in-house. The cost of such training is difficult to quantify and is not accounted for within the model.

The cost of staff training for personnel at mobile facilities is assumed to be the responsibility of the vendor. Costs associated with staff training are assumed to be an administrative cost recovered through the facility lease cost. This assumption was verified by the vendor for the King County mobile collection facility.

8. <u>Protective Clothing</u>

Protective clothing includes the annual costs for protective gloves, suits, boots, goggles, glasses and respirators.

Fixed Depot

It is assumed that most of the items included in this cost category will require replacement on a weekly basis. The annual cost for protective clothing replacement was estimated at approximately \$5,000 per full-time employee. This value is based on budget information for the Metro South and Metro Central transfer station depots.

Pre-fab Depot

The above assumptions were used to establish the cost of protective clothing for pre-fab depots.

Mobile Depot

Protective clothing costs for mobile depots were developed on a per week basis because mobile facilities will not be operating for a full year's time. The amount of protective equipment required was determined based on a partial year's operation. Costs for this equipment were estimated at \$96 per week based on the annual costs estimated for the Metro South and Central transfer station depots.

9. Material Testing

Based on information obtained from past Metro collection events, operational data for San Francisco's fixed collection facility and information provided by the vendor for the King County mobile facility, a small fraction of the HHW received at collection events and facilities (approximately 2 percent of the incoming material) is unknown material. Although each depot will be equipped with a standardized hazard identification kit, approximately one half of these materials (1 percent of the incoming material) will be unidentifiable and require further testing by an independent off-site laboratory. The cost for material testing at an off-site laboratory was estimated based on the following:

- Approximately 0.2 containers per vehicle require outside testing;
- The average cost to test an unknown is approximately \$200 per sample (based on cost estimates obtained from local laboratories); and,
- Assuming each car brings 84 lbs of HHW to a facility, the cost per pound of HHW received for the testing of unknowns sent to an off-site laboratory is approximately \$0.50 per pound.

The cost of material testing is assumed to be the same for fixed, pre-fab and mobile facilities.

10. Disposal Drums

This cost is associated with the purchase of Department of Transportation approved 55-gallon drums in which collected materials are packed for transfer to a TSD. It was assumed that each facility option requires the same number of drums. The number of 55-gallon drums required for disposal was calculated based on the number of cars expected at each depot times the number of drums disposed per car. The number of drums per car was estimated at 0.34 drums based on Metro's 1989 collection event data.

The cost of a 55-gallon drum was estimated at \$20 per drum based on previous Metro collection events. The cost assumption was also verified by the vendor for the King County mobile waste facility.

11. Packing Material

Packing material costs are purchase costs for absorbent material required to fill lab-packed 55-gallon drums. Based on information obtained from recent Metro collection events, on the average a lab-packed drum requires 150 lbs of absorbent material. For the model, the amount of packing material required was calculated as follows:

• total number of drums expected x 150 lbs per drum

The cost for packing material was calculated by multiplying the amount of material required as determined above by the per pound cost. Based on previous Metro area collection events, packing material costs \$7.50 per drum or \$0.05 per pound of the total incoming material.

12. Transport Fee (to Treatment Storage and Disposal Facility)

Once a material is packed at a collection facility it must be transported off-site to a TSD. The cost for transportation to local TSD's is \$12.00 per 55-gallon drum. This cost reflects the federal Interstate Commerce Commission tariff for transporting hazardous materials. The \$12.00 fee is the required tariff rate for transporting materials between 0 and 50 miles from the collection source. All licensed TSD's in the region are within this radius.

13. Disposal Fee

The disposal fee developed for the model is the average cost of reusing, recycling incinerating or landfilling HHW. The cost estimate is based on costs incurred by the King County mobile facility. These costs were used for the model because they include costs for other types of management in addition to landfilling and are representative of the costs associated with a HHW management program in the Metro region that focusses on recycling, reuse and incineration over landfilling. The following is a summary of HHW management information provided by King County and the average cost information per management option as provided by the facility vendor.

MANAGEMENT METHOD	PERCENTAGE MANAGED	AVG. COST PER BARREL
Beneficial Reuse	59%	\$125
Treatment/Hazardous Waste Landfill	26%	\$290
Metal Recovery (battery recycling)	5%	\$0
Hazardous Waste Landfill (Lab Pack)	7%	\$390
Destructive Incineration	3%	\$525

TABLE 17 HHW MANAGEMENT METHODS AND COSTS

For the model, the cost of disposal is the weighted average of these management methods and their associated average costs. The cost of disposal is \$194 and is assumed to be the same for all facility types and configurations modelled.

The model does not calculate changes in disposal costs due to market conditions beyond the impact of the inflation rate. Market conditions are volatile and cannot be accurately predicted. However, it is very likely that costs will increase faster than the rate of inflation. It should also be noted that actual disposal costs within the region will be dependent upon the characterization of the HHW received and management techniques employed. If for example, the waste characterization dictates that larger percentages of the HHW received are incinerated, landfilled or lab-packed than what is estimated for the model, disposal costs will be higher. Conversely, if higher percentages of material can be reused or recycled, disposal costs will be less.

14. Liability Insurance

The estimated cost of liability insurance for HHW facilities was obtained from Metro's insurance broker. The estimate includes policy rates for General Liability, Environmental Impairment and Automotive Coverage for facility rolling stock. The estimated annual insurance cost per facility is \$12,500. The insurance coverage provided includes \$5,000,000 in general liability insurance per facility, 1,000,000 of environmental impairment insurance per occurrence and a \$2,000,000 aggregate policy and \$5,000,000 in liability insurance for rolling stock.

Liability insurance costs were calculated on an annual basis for fixed and pre-fab facilities because each offer year-round service. Rates for mobile collection facilities were calculated on a per week of operation basis. The weekly liability insurance rate for a mobile facility was estimated to be \$240 or 1/52 of \$12,500.

Results of Facility Cost Analysis:

The results of the facility cost analysis estimate the relative cost differences between facility options as well as estimate the total system costs for different facility configurations over the ten year planning horizon. Relative cost differences are reported per participant, per ton of HHW received and per ton of mixed solid waste subject to the Regional System User Fee. Costs were calculated against this last tonnage base because this is the tonnage base that regional HHW collection costs are recovered from. The Regional System User Fee is collected on all wastes generated in the region intended for disposal. The fee pays the costs of solid waste programs that benefit all users of the system. These programs include solid waste system financial management, administration, engineering, planning, and implementation of waste reduction programs.

When reviewing the results of the analysis, it should be noted that like collection facility alternatives identified for different service areas vary in cost. For example, the relative cost difference between mobile facilities in Service Areas 2 and 4 is \$0.17 per ton of mixed solid waste subject to the Regional System User Fee. Likewise, the difference between fixed facilities in Service Areas 4 and 5 is \$0.48 per ton. The reason for these cost differences is because the number of households and volume of HHW projected to be collected within each service area varies. Therefore, capital and

operational costs of like facility alternatives vary commensurately with the size of the service area they are designed to serve.

In addition to modelling the capital and O&M costs for the two fixed collection depots located at Metro South and Metro Central, the following facility configurations were modelled:

- Combined mobile facility for Service Area's 2, 4 and 5;
- Separate mobile service for Service Area 2 plus combined mobile service for Service Areas 4 and 5;
- Separate mobile facilities for Service Areas 2, 4 and 5;
- Separate pre-fab facilities for Service Areas 2, 4 and 5; and
- Separate fixed facilities for Service Areas 2, 4 and 5.

The modelling of these facility configurations provided information about relative cost differences between individual facility alternatives as well as different facility configurations designed to serve all five potential HHW service areas.

Cost Effectiveness:

Following the practice of funding semi-annual HHW collection events, HHW collection facilities were assumed to be paid out of the Regional System User Fee component of Metro's tip fee. Levelized costs for each facility alternative were calculated against the total amount of waste that enters the regional solid waste system. Table 18 illustrates the relative cost of each facility alternative when recovered against projected tonnage volumes that will be subject to the Regional System User Fee over the ten year planning horizon.

- TABLE 18

RELATIVE COST	FOR Fixed, PRE-FAB AND	D MOBILE FACILITY OPTION	12
	COST/SYSTEM 7	TON	

AREA	FIXED	PRE-FAB	MOBILE
1	\$1.26	N/A	N/A
2	\$0.64	\$0.61	\$0.53
3	\$0.96	N/A	N/A
4	\$0.81	\$0.78	\$0.70
5	\$0.34	\$0.33	\$0.25

The results in the table indicate that on a per-ton basis, there is little relative cost difference between fixed, pre-fab and mobile facility alternatives. The largest reported difference is \$.09 per-ton between a fixed and mobile facility designed to serve Service Area 5. However, this \$.09 per-ton difference translates into a savings of approximately \$1,190,000 when calculated against all tonnage subject to the Regional System User Fee over the ten-year planning horizon. A relative cost difference of just \$.01 between facility alternatives constitutes a savings of over \$100,000. Given, these findings, the mobile facility alternative is clearly the least expensive facility alternative.

From the information developed in Table 18, levelized costs were calculated for the six system facility configurations described above. Table 19 illustrates the relative cost differences of each configuration modelled, the least expensive configuration being a single mobile facility to Service Areas 2, 4 and 5. The levelized cost for this system alternative is \$1.40 per system ton. The relative cost difference between this option and the most expensive configuration - three fixed facilities to serve Service Areas 2, 4 and 5 is \$.39 per ton or approximately \$6,500,000.

FACILITY CONFIGURATION	LEVELIZED COST/SYSTEM TON	RELATIVE COST DIFFERENCE (PER TON)
• Combined Mobile for Areas 2,4 & 5	\$1.40	\$0.00
• Separate Mobile for Area 2	\$1.46	\$0.06
• Combined Mobile for Areas 4 & 5 ²		
• Separate Mobiles for Areas 2,4 + 5	\$1.48	\$0.08
• Separate Pre-fabs for Areas 2,4+5	\$1.72	\$0.32
• Separate Fixed for Areas 2,4+5	\$1.79	\$0.39

TABLE 19					
RELATIVE COSTS	FOR	SERVICE	AREAS	2.4	& 5

Relative cost estimates were also calculated for the fixed collection depots located at the Metro Central and Metro South transfer stations, Service Areas 1 and 3 respectively. Their relative costs are as follows:

²The combined mobile option for service areas 4 & 5 was calculated because Washington County has demonstrated interest in a county-wide mobile HHW collection facility. Levelized costs for this option were calculated at \$.93 \$1.15/system ton.

FACILITY CONFIGURATION	LEVELIZED COST/SYSTEM TON
Fixed Facility (Service Area 1)	\$1.26
Fixed Facility (Service Area 3)	\$0.96
Combined Cost for Service Areas 1 & 3	\$2.22

TABLE 20RELATIVE COSTS FOR SERVICE AREAS 1 & 3

The values reported in Table 20 are not directly comparable to the values reported in Table 19. The large difference in facility costs between these facilities and the facility alternatives contained in Table 19 are attributed to the finding that fixed facilities are more expensive to build and operate as well as the finding that the facilities in Service Areas 1 and 3 are projected to serve larger population bases and therefore incur more costs for disposal.

Magnitude of Costs for HHW Management:

The following costs illustrate the total capital and O&M costs for each facility configuration over the ten-year planning horizon. In addition, costs illustrating the expense of HHW management based on the number of participants and tons of HHW brought to each facility are presented.

Total program costs reported in Table 14 are the "nominal costs" or projected actual costs in current 1992 dollars for developing HHW collection facility options within each service area. If no additional facilities are developed to supplement the Metro South and Central, the ten year facility costs to operate both these depots would be \$41 million. This cost would most likely be greater, because this value only accounts for participants expected within Service Areas 1 and 3. It is likely that residents from other service areas would utilize these depots if additional service were not available. However, if additional facilities are added to the system, even the least expensive option, a supplementary mobile facility for Service Areas 2, 4 & 5, would cost an additional \$28 million over the ten year planning horizon.

FACILITY CONFIGURATIONS	COST	COST DIFFERENCE
• Separate Fixed at Transfer Stations for Areas 1 & 3	\$41,192,115	NA
• Combined Mobile for Areas 2,4 & 5	\$26,622,211	\$0.00
• Separate Mobile for Area 2 w/ Combined Mobile for Areas 4 & 5	\$27,667,258	\$1,045.047
• Separate Mobiles for Arcas 2,4 & 5	\$27,908,783	\$1,286,572
• Separate Pre-fabs for Areas 2,4 & 5	\$31,965,633	\$5,343,422
• Separate Fixed for Areas 2,4 & 5	\$33,111,493	\$6,489,282

TABLE 21 TOTAL PROGRAM COSTS OVER TEN YEAR PLANNING PERIOD FOR SELECTED FACILITY CONFIGURATIONS

The large expense of HHW management becomes even more evident when levelized costs for each facility option are compared on a per participant and a per ton of HHW collected basis. Table 22 illustrates the levelized costs for HHW management based on the number of participants and amount of HHW expected to be collected within each service area. As can be seen, levelized facility costs for individual service areas range from \$103.16 to \$144.67 per participant based on the option selected. On a per ton of HHW received basis, levelized costs for facilities modeled, range from \$2,457 to \$3,446. As a comparison, the tip-fee for mixed solid waste in the region is only \$68 per-ton. Clearly, HHW management is the most expensive service provided within the regional solid waste system.

9	AREA 1	AREA 2	AREA 3	AREA 4	AREA 5	AREA 4 + 5	AREA 2,4+5
PER PARTICIPANT			(X.)			,	ž
Fixed	\$106.39	\$123.93	\$111.28	\$116.53	\$144.67	NA	NA
Pre-lab Mobile	NA NA	\$118.84 \$102.67	NA NA	\$100.48	\$103.16	NA \$99.80	NA \$97.17
PER TON	w. X						
Fixed	\$2,532.70	\$2950.149	\$2,649.64	\$2,773.96	\$3,446.81	NA	NA
Pre-fab Mobile	NA NA	\$2830.063 \$2,444.05	NA NA	\$2,685.11 \$2,391.88	\$3,273.13 \$2,457.84	NA \$2,376.14	NA \$2,313.45

TABLE 22 RELATIVE COSTS PER PARTICIPANT AND PER TON of hhw received

DATA TABLES:

- Levelized Cost Per System Ton
- Levelized Cost per Ton of HHW Received
- Levelized Cost per Participant
- Facility Cost Estimates

SOLID WASTE COMMITTEE REPORT

CONSIDERATION OF ORDINANCE NO. 92-456, FOR THE PURPOSE OF AMENDING THE REGIONAL SOLID WASTE MANAGEMENT PLAN TO INCORPORATE THE HOUSEHOLD HAZARDOUS WASTE MANAGEMENT PLAN AND TO UPDATE PLAN POLICY 2.2

Date: June 17, 1992 Presented by: Councilor Wyers

<u>Committee Recommendation:</u> At the June 16 meeting, the Committee voted 4-0 to recommend Council adoption of Resolution No. 92-456. Voting in favor: Councilors Buchanan, Hansen, Van Bergen and Wyers. Councilor Mc Farland was excused.

<u>Committee Issues/Discussion:</u> The purpose of this ordinance is to adopt a household hazardous waste (HHW) management plan for the region. Mark Buscher, Solid Waste Planning, began the staff report with a slide presentation outlining the operation of the household hazardous waste facility at the Metro South Station.

Larry Eisele, Washington County, who chaired the subcommittee that developed the proposed HHW management plan, noted that development of the plan spanned a two year period. The subcommittee included representatives of industry, the scientific community and local governments. Eisele explained that household hazardous waste is a relatively new field of solid waste management which can present significant problems.

Eisele noted that in developing the proposed plan, the subcommittee reviewed programs in other jurisdictions. There is not a high level of uniformity among such programs, particularly in areas such as funding, accounting, and overall cost management. Eisele believes that the proposed management plan takes the best of other management plans and will provide a state-of-the-art management system. The plan should be considered a flexible, working document capable of being amended to reflect the rapidly changing field of household hazardous waste management.

Buscher summarized the content of the plan. He began by discussing the two appendices. Appendix A is a program analysis that examined management, waste reduction and funding options for the plan. Appendix B is a cost analysis of collection system options. This analysis concluded that a system of two permanent stations (at Metro Central and Metro South) and a mobile capacity for Washington and East Multnomah Counties would be the most cost-effective. Initially this mobile capacity would focus on bulkier items such as paints and fertilizers.

Buscher explained that initially there would be four main implementation activities under the plan. These include: 1) seeking financial assistance from the DEQ (from fees collected by DEQ to develop a statewide HHW collection system) to implement a mobile collection capacity by January 1, 1993; 2) monitoring consumer behavior related to HHW management, collection and disposal; 3) development of educational and promotional programs, and 4) examination of various funding options such as a wastewater surcharge or user fees. Buscher noted that the local government role in implementing the plan would include: 1) developing and diseminating HHW educational and promotional materials, 2) assisting in obtaining sites for mobile HHW facilities and 3) monitoring permanent and mobile operations.

Councilor Hansen asked about the number of persons using the new collection facility at Metro South. Sam Chandler, Facilities Manager, responded that the weekly average has remained relatively constant at about 225 users. But he noted that the quantity of material per customer has declined. The average cost per customer has declined from about \$100 to \$75.

Councilor Van Bergen asked if the receipt of funding from the DEQ would obligate Metro to take HHW from other parts of the state at our mobile facilities. Buscher explained that DEQ would initially be asked to fund collection events similar to those sponsored by Metro in the past. These funds would be generated from within the region and therefore not require the acceptance of material from outside of the region. It is not anticipated that any equipment will be purchased for this purpose, although at some point the leasing of equipment might be considered if justified.

Van Bergen asked for a clarification that there will be no permanent facility in Washington County. Buscher indicated that that is correct. He noted that a mobile capacity is being provided in Washington and Eastern Multnomah Counties because such facilities will be 15-20% cheaper to operate.

Councilor Wyers expressed some concern that the educational and promotional programs associated with the plan include a strong focus on HHW reduction as well as management and disposal. Buscher indicated that these elements would be given equal weight.

Wyers asked about the development of a legislative agenda related to HHW. Buscher indicated that such an agenda would be developed as issues emerged using the normal process for developing Metro's legislative agenda.

Wyers asked why the regulation of conditionally exempt generators and medical wastes are not being addressed in this plan. Buscher noted that issues associated with the management of these types of waste are very different than HHW. During the coming fiscal year, work will begin on developing a management plan for these types of wastes.



2000 S.W. First Avenue Portland, OR 97201-5398 503/221-1646

METRO

Memorandum

To: Solid Waste Committee Members

From: John Houser, Council Analyst

Date: June 9, 1992

Re: Ordinance No. 92-456 For the Purpose of Amending the Regional Solid Waste Management Plan to Incorporate the Household Hazardous Waste Management Plan and to Update Plan Policy

2.2.

Ordinance No. 92-456 is scheduled for committee consideration at the June 16 meeting.

Background

This ordinance would amend the Regional Solid Waste Management Plan (RSWMP) to adopt a household hazardous waste (HHW) management and collection plan for the region. The ordinance also would amend Plan Policy 2.2 to reflect current state and federal regulation of hazardous wastes.

The HHW management plan was initially developed by a 16-member subcommittee of the Solid Waste Technical Committee which included representatives of state and local governments and the private sector. The plan has been approved by the Technical Committee and the Solid Waste Policy Advisory Committee.

The plan addresses the following areas: 1) expansion of the existing HHW collection system to cover the entire region, 2) development of HHW promotion and education and waste reduction programs, 3) exploring alternative funding sources for HHW management and collection, 4) examining the need to develop a legislative agenda related to HHW, and 5) monitoring of the management program.

Policy 2.2 in the RSWMP currently provides that "Metro shall not knowingly accept for solid waste disposal or processing any hazardous waste materials at solid waste facilities." The ordinance would replace this language with the following: "Metro shall manage hazardous waste in accordance with the EPA's management hierarchy of "reduce, reuse, recycle, treat, incinerate and finally land disposal.." This language recognizes both federal and state mandates to develop more comprehensive management programs for hazardous wastes.

Issues and Questions

In considering this ordinance, the committee may wish to address the following issues and questions:

1) The ordinance addresses only the management of HHW. It was envisioned that Chapter 2 of the RSWMP also would ultimately address other types of hazardous waste, specifically conditionally exempt generators (CEG) and medical wastes. Does the department have a timeline for the development of management plans to address these types of waste?

2) The plan addresses the need for education and promotion programs to encourage proper disposal of HHW and identifies some of the potential elements of such programs. Has the department developed a timeline and process for the development of these programs? Will these programs be reviewed/approved by the Council prior to implementation?

3) The plan indicates that Metro will attempt to develop a mobile HHW collection capacity to serve Washington County and east Multnomah County by the end of 1992. It appears that Metro will seek funding assistance from the DEQ in developing this capacity. What is the status of the development of this mobile collection system. What types of funding may be available from DEQ (eg. equipment purchase, operational funding, staffing, etc.)? What are the nature of Metro's financial responsibilities related to the mobile collection system (eg. will Metro be responsible for operating or staffing this mobile equipment)?

4) The plan provides for the development of a monitoring program for the HHW management system. What is the timing for the implementation of a monitoring program? Will the monitoring be done by existing Metro staff, by new staff, or by contract? What is the estimated cost of the monitoring program?

5) Could staff please describe how it intends to obtain the necessary local land use permits to operate mobile facilities throughout the region? Approximately how many mobile facility sites will be identified?

6) The plan notes that considerable research concerning regulatory options (eg. product regulation/bans) and funding options (eg. user fees) will occur prior to the 1993 Legislative Session to aid in the development of an HHW-related legislative agenda. What type of a process will be used to complete research (eg. a research committee, existing staff, a contractor)? What will the role of the Council be in the development of this legislative agenda?

7) The plan notes that one of the options for reducing HHW in the mixed waste stream would be a curbside disposal ban. Does Metro have the statutory authority to implement such a ban or would such authority be needed from the Legislative Assembly?

8) Has the staff developed a timeline for the establishement of an HHW waste exchange system as identified in the proposed management plan?

9) Is it the intent of the plan that the 1% For Recycling program could/should place an emphasis on HHW recycling projects during one of its annual funding cycles?

10) The plan notes that the disemination of HHW promotional, educational and reduction materials in a local jurisdiction will be the responsibility of that jurisdiction, subject to funding availability. In light of Ballot Measure 5, what assurances are there that such funding will be available?

11) The plan notes that the DEQ is developing a statewide HHW management funding plan? What is the status of this plan? Is it likely that Metro's plan will need to be adjusted when the DEQ plan is completed?

STAFF REPORT

CONSIDERATION OF ORDINANCE NO. 92-456 FOR THE PURPOSE OF AMENDING THE REGIONAL SOLID WASTE MANAGEMENT PLAN TO INCORPORATE THE HOUSEHOLD HAZARDOUS WASTE MANAGEMENT PLAN AND TO UPDATE PLAN POLICY 2.2.

DATE: May 20, 1992 Presented by: Mark Buscher

PROPOSED ACTION

Ordinance No. 92-456 amends the Regional Solid Waste Management Plan to incorporate the Household Hazardous Waste Management Plan and update Plan Policy 2.2. The Plan provides the direction necessary to expand the regional household hazardous waste (HHW) collection system to serve the entire region and also identifies methods for promoting HHW reduction.

FACTUAL BACKGROUND AND ANALYSIS:

Chapter 2 of the Regional Solid Waste Management Plan contains policies that guide the region's efforts in managing hazardous wastes, including household hazardous waste (HHW). The purpose of these policies and the chapter is to develop strategies for keeping hazardous materials from entering the mixed solid waste stream.

The proposed Household Hazardous Waste System Plan (Exhibit "A") was developed to implement the Plan policies. It is based on information gathered from HHW programs in operation across the nation. The programs and facility recommendations contained in the plan represent those that appear to be most feasible and costeffective. Specifically, the plan includes recommendations for:

- Expanding the regional system of HHW facilities;
- Promotion and education;
- HHW reduction programs;
- Expanding the options available for funding HHW management
- Developing a legislative agenda; and
- Monitoring the effectiveness of Metro's HHW reduction activities.

As a part of the plan development process, the existing Plan policies that guide Metro's management of hazardous wastes were also reviewed. It was found that the existing Plan Policy 2.2 is unclear and not consistent with state and federal regulations for managing hazardous wastes. Therefore, the policy was revised to be consistent with these standards. Further, the amended language makes the Policy consistent with Metro's policy of following the state hierarchy in developing solid waste management strategies.

PLANNING PROCESS:

The development of the Household Hazardous Waste System Plan was accomplished with the cooperation and input from a sixteen-member Hazardous Waste Subcommittee. The committee included experts in the field of hazardous waste management from local government, the Department of Environmental Quality, Portland State University and the private sector. The proposed plan represents two years of the committee's work.

Consistent with established procedures, the proposed plan has also been reviewed by Metro's Solid Waste Technical and Policy Advisory Committees. The Technical Committee unanimously endorsed the proposed plan at their meeting on April 23. The Policy Committee also unanimously endorsed the Plan on May 8.

RECOMMENDATION:

The Executive Officer recommends approval of Ordinance No. 92-456 for the purpose of amending the Regional Solid Waste Management Plan to incorporate the Household Hazardous Waste Management Plan and to update Plan Policy 2.2.
STAFF REPORT

CONSIDERATION OF ORDINANCE NO. 92-456 FOR THE PURPOSE OF AMENDING THE REGIONAL SOLID WASTE MANAGEMENT PLAN TO INCORPORATE THE HOUSEHOLD HAZARDOUS WASTE MANAGEMENT PLAN AND TO UPDATE PLAN POLICY 2.2.

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- HHW reduction programs;
- Expanding the options available for funding HHW management
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