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Solid Waste Management Plan

Inventory

Metropolitan Service District
Portland, Oregon

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ABSTRACT: Solid Waste Management Plan Inventory

The Solid Waste Management Plan Inventory is a comprehensive examination of the present solid waste system within the Metro region. The inventory is comprised of nine sections which appear as follows:

Section I, Solid Waste Laws, Statutes and Authorities, summarizes the extent of authority and responsibility that the State, Metro and local governments have in managing solid waste within the tri-county Metro area. This section includes discussion of statutory authorities as they relate to solid waste management planning, functional planning, waste flow control, waste reduction, rate setting, land use planning, franchising and hazardous waste. Further, it provides the legal framework from which we can make decisions for planning and managing solid waste.

Section II, Public Opinion on Solid Waste Issues, is a summary of findings from a telephone survey commissioned by Metro in August and September, 1985. The survey was designed to study public opinion about solid waste issues and recycling. Responses to the recycling questions were used in designing Metro's current public information campaign to promote recycling opportunities in the Portland area.

Section III, Current and Projected Population and Waste Generation, summarizes information from employment and population forecasts to project waste generation rates for the region. Individual, waste shed, residential, commercial and "other employment" waste generation rates are calculated. Center of waste locations are identified for the south, west, and east waste sheds for the years 1985 and 2005. This information is useful in determining types, locations, and capacities of necessary solid waste facilities.

Section IV, Existing Solid Waste System, gives an overview of the facilities used in managing solid waste generated within the tri-county area. It includes discussion of both in-region and out-of-region facilities. This section describes many facets of our existing facilities including: location, zoning, surrounding land uses, tonnages disposed, tonnages recycled and the kinds of waste accepted.

Section V, Waste Reduction Programs, describes the existing Waste Reduction Program which was adopted by the Metro Council in April 1986. This section discusses existing projects which have been implemented or are scheduled to be implemented under the program. The Waste Reduction Program was designed to reduce the region's dependence on landfills as the primary method of disposal. By using the state

hierarchy--reduce, reuse, recycle, recover, landfill--the waste reduction program charted the course for design and implementation of specific programs to divert the "maximum feasible" amount of waste from landfills. It is expected that full implementation of the waste reduction program will occur through the current solid waste management planning process.

Section VI, Hazardous Waste Programs, provides an overview of those hazardous waste issues which have been confronted by Metro, specifically household hazardous waste and conditionally exempt generators of hazardous waste. In addition, the Hazardous Waste Management Plan (1986) and the Household Hazardous Waste Collection Event (1986) are summarized.

Section VII, Rates, identifies the components of the disposal fee. Metro's rate setting is in accordance with ORS 268 which states Metro may collect user charges to pay for services and the planning, construction, and maintenance of facilities, equipment and improvements.

Section VIII, Case Studies of Facility Siting Processes, is an evaluation of past attempts by Metro to site solid waste facilities. It examines the siting process, land use impacts pertaining to siting and resulting litigation from siting decisions.

Section IX, Summary of the "Valuation of the Potential External Effects at Selected Types of Prototypical Solid Waste Facilities," was prepared by ECO Northwest. The purpose of this report is to identify, describe, and estimate the value of the potential environmental effects on land surrounding solid waste facilities.

INTRODUCTION

Solid waste management has been and continues to be one of the most formidable problems of the Metro region. Ever increasing quantities of waste, tightening environmental standards, and public opposition to the siting of any kind of solid waste facility are among the factors that legitimize the need for a comprehensive regional solid waste management plan.

Contained herein is an inventory of the present solid waste system, the first step in developing a regional comprehensive solid waste management plan. As a preliminary planning document, this report is designed to assist decision-makers in determining the best direction for the development of a solid waste system. This is a working document and thus will be updated as appropriate to reflect new information as it is brought forward in the planning process.

Section I

SOLID WASTE LAWS, STATUTES AND AUTHORITIES

OVERVIEW:

Metro is responsible for solid waste management in the region. In order for Metro to perform solid waste management, the State has granted Metro a number of authorities and responsibilities, primarily through ORS Chapter 459 and ORS Chapter 268. Through Executive Orders No. 77-25 and No. 78-16, the Oregon Governor designated Metro as the local government responsible for solid waste management in the region.

PURPOSE:

The Solid Waste Laws, Statutes and Authorities section of the Inventory sets out to describe the legal framework for solid waste management beginning at the federal level and ending at the local jurisdiction.

METHOD:

For organizational purposes the following section is divided into three parts. Part One summarizes Federal Laws (RCRA) and State Statutes (ORS 459 and ORS 268) which set the stage for solid waste management. Part Two describes Metro's authorities and responsibilities relating to solid waste management for the tri-county region. Part Three summarizes local jurisdiction roles and responsibilities.

DISCUSSION:

PART ONE, Federal Laws and State Statutes pertaining to Solid Waste Management.

Resource Conservation and Recovery Act:

Congress passed the Resource Conservation and Recovery Act (RCRA) in 1976 to address the problem of safely disposing of the huge volumes of municipal and industrial solid waste generated nationwide.

The purpose of the Act is to ensure that solid wastes are managed in an environmentally sound manner. The broad goals of the Act are to

- protect human health and the environment;
- reduce waste and conserve energy and natural resources; and
- reduce or eliminate the generation of hazardous waste as expeditiously as possible.

Under RCRA three distinct, yet interrelated programs, exist to carry out these goals.

- Subtitle C establishes a management system that regulates hazardous waste from the time it is generated until its ultimate disposal. The regulations which implement this program 1) identify solid wastes that are hazardous; and 2) establish administrative requirements for generators, transporters, and owners or operators of treatment, storage and disposal facilities.
- Subtitle D deals primarily with non-hazardous waste. It establishes minimum federal technical standards for solid waste management facilities, and a program under which participating states may develop and implement solid waste management plans. The technical standards for environmentally acceptable facilities are mandatory; the solid waste management plan is voluntary.

  The role of the federal government in solid waste management planning is limited, with the main responsibility for developing and implementing

plans occurring at the state level. However, states with EPA-approved plans are eligible for federal financial or technical assistance.

The main goals of the Subtitle D program are to encourage solid waste management practices that
1) promote environmentally sound disposal methods;
2) maximize the reuse of recoverable resources; and
3) foster resource conservation.

Subtitle I was established by the Hazardous and Solid Waste Amendments of 1984 to regulate petroleum products and hazardous substances stored in underground tanks.

EPA is currently considering changes in its regulations as a result of the Hazardous and Solid Waste Amendments of 1984. Some of these requirements will be incorporated into new EPA regulations regulating municipal solid waste disposal.

Oregon Revised Statutes (ORS) Chapter 459

ORS Chapter 459 establishes state policy on the development of statewide solid waste management programs. ORS Chapter 459 directs that in the interest of the public health and in order to conserve energy and natural resources it shall be the policy of the State of Oregon to establish a comprehensive statewide program for solid waste management. Specifically, ORS Chapter 459 provides the framework for the State's solid waste regulatory and enforcement program which will:

- Retain primary responsibility for management of adequate solid waste programs with local government units.
- Provide advisory and technical assistance to local government units in the planning, development and implementation of solid waste management programs.
- Develop in coordination with federal, state and local government units, long-range plans including regional approaches to solid waste management.
- Provide for the adoption and enforcement of minimum performance standards necessary for safe, economic and proper solid waste management.
- Encourage utilization of the capabilities and expertise of private industry in accomplishing solid waste management.

Oregon Revised Statute (ORS) 268:

Due to a proliferation of regional governments in the Portland metropolitan area leading to a duplication of public services, the 1977 Oregon Legislative Assembly extensively amended ORS Chapter 268, the Metropolitan Service District Act. ORS Chapter 268 was amended in order to provide a method of making available in the Portland metropolitan area public services not adequately available through previously authorized governmental agencies.

Subject to the limitations of state law, ORS 268 requires Metro to provide for solid waste management for the region. To perform solid waste management, Metro implements several authorities. These authorities are as follows:

- Solid Waste Management Authority
- Waste Reduction Management Authority
- Solid Waste Operational Authority
- Franchise Authority
- Rate Setting Authority
- Flow Control Authority
- Functional Planning Authority
- Hazardous Waste Responsibilities

PART TWO, Metro's Solid Waste Authorities and Responsibilities.

Solid Waste Management Authority:

ORS Chapter 459 grants primary responsibility for solid waste management to local government units. Metro has been assigned solid waste management responsibility for the entire tri-county region.

Solid waste management as defined by ORS 459.005 (20) means prevention or reduction of solid waste; management of the storage, collection, transportation, treatment, utilization, processing and final disposal of solid waste; or resource recovery from solid waste; and facilities necessary or convenient to such activities.

ORS 459.015 (2) established a hierarchy for methods of managing solid waste in order to conserve energy and natural resources. After consideration of technical and economic feasibility, Metro is to establish priority in methods of managing solid waste as follows:

- First, to reduce the amount of solid waste generated;
- Second, to reuse material for the purpose for which it was originally intended;
- Third, to recycle material that cannot be reused;
- Fourth, to recover energy from solid waste that cannot be reused or recycled, so long as the energy recovery facility preserves the quality of air, water, and land resources; and
- Fifth, to dispose of solid waste that cannot be reused, recycled or from which energy cannot be recovered by landfilling or other method approved by the department.

ORS 459.095 states that a local government cannot adopt an ordinance, order, regulation or contract which conflicts with Metro's Solid Waste Management Plan after it has been approved by DEQ.

There are two State programs which require a solid waste management plan in order for Metro to qualify for monies or assistance.

Landfill Siting Assistance: A solid waste management plan is required of Metro by the State through ORS 459.017, 459.035, 459.047 and 459.049 in order for Metro to obtain landfill siting assistance (e.g., assist in planning, location, acquisition, development and operation of the site). In reviewing applications for a permit for a solid waste landfill facility, DEQ can deny a completed application if the proposal is not part of or not compatible with the adopted solid waste management plan.

State Pollution Control Funds: ORS 468.220 (6) outlines the requirements for local governments to receive state pollution control funds. Before the state can make a loan or grant to a city, county or agency for solid waste disposal facilities, or the planning of such facilities, the applicant must demonstrate that they have an adopted solid waste management plan.

Waste Reduction Authority:

Specific waste reduction plan requirements for Metro are detailed in ORS 459.790 (8) (a). Under 459.790 (8) (a), a waste reduction program will provide for:

> "A commitment by the District to substantially reduce the volume of solid waste that would otherwise be disposed of in land disposal sites through techniques including, but not limited to, rate structures, source reduction, recycling, reuse and resource recovery."

Requirements for a waste reduction program are also stated in ORS 459.055. Specifically, a waste reduction program must be prepared before a landfill disposal site can be established as a conditional use in an area zoned for exclusive farm use. A waste reduction program written under this section specifically requires:

- a commitment to reduce the volume of waste that would otherwise be disposed of in a landfill through techniques such as source reduction, recycling, reuse and resource recovery.
- a timetable for implementing each portion of the waste reduction program.
- energy efficient, cost effective approaches for waste reduction.

- procedures commensurate with the type and volume of solid waste generated in the area.

- a waste reduction plan that is legally, technically and economically feasible.

Oregon Law, Chapter 876 (HB 2619 of 1987) requires Metro to report to the Environmental Quality Commission on the implementation of its solid waste reduction program by July 1, 1988 and every two years thereafter. Within this report Metro is to summarize the percent of solid waste currently reused, recycled or disposed of and compare those amounts and percentages to the District's existing and projected goals. The Commission will review the report submitted by Metro and determine if the District's activities comply with Metro's solid waste reduction program. No later than September 1, 1988, the Department of Environmental Quality shall make a preliminary report to the President of the Senate and the Speaker of the House of Representatives and to the appropriate legislative interim committee. The Department will submit a full report to the Legislative Assembly on or before January 1, 1989 and every two years thereafter.

Solid Waste Operational Authority:

ORS 268.317 outlines activities the District may undertake for the purpose of solid waste disposal. These activities apply only to areas within the District boundaries. These activities include the ability to:

- build, construct, acquire, lease, improve, operate and maintain landfills, transfer facilities, resource recovery facilities and other improvements necessary for the solid waste disposal system

- sell, enter into short or long term contracts, solicit bids, enter into direct negotiations, deal with brokers or use other methods of sale or disposal for the products or by-products of the District's facilities

- require any person or class of persons who generates solid waste to make use of the disposal, transfer or resource recovery sites or facilities of the District or disposal, transfer or resource recovery sites or facilities designated by the District

- require any person or class of persons who pick up, collect or transport solid wastes to make use of the disposal, transfer or resource recovery sites or facilities of the District or disposal, transfer or resource recovery sites or facilities designated by the District

- regulate, license, franchise and certify disposal, transfer and resource recovery sites or facilities; establish, maintain and amend rates charged by facilities

- prescribe a procedure for the issuance, administration, renewal or denial of contracts, licenses or franchises

- regulate the service or services provided by contract, license or franchise

- receive, accept, process, recycle, reuse and transport solid wastes

Franchise Authority:

Franchise authority over solid waste disposal facilities is granted to Metro through ORS 268.317 (5) and ORS 459.065 (1) (a). Metro maintains a franchise program through which it authorizes private businesses to operate solid waste disposal sites, processing facilities, transfer stations, and resource recovery facilities.

Metro Code 5.01.020 establishes a franchise system for the disposal of solid waste in the District to:

- provide a coordinated regional disposal program and solid waste plan

- provide standards for the location, geographical zones and total number of disposal sites, processing facilities, transfer stations and resource recovery facilities to best serve citizens of the District

- ensure that rates are just, fair, reasonable and adequate to provide necessary public service

- prohibit rate preferences and other discriminatory practices

- ensure sufficient flow of solid waste to the District's resource recovery facilities

- maximize the efficiency of the District's solid waste management program
- provide for cooperation between the District and cities or counties
- reduce the volume of waste that would otherwise be disposed of in a landfill through source reduction, recycling, reuse and resource recovery

Metro franchise authority is further defined in Metro Code 5.01.030 (c) which states that it is unlawful for any person to take, transport, or dispose of solid waste at any place other than a disposal site, processing facility, transfer station or resource recovery facility operated by a franchisee or exempted by Section 5.01.040 of Metro Code.

Metro currently has non-exclusive franchise agreements with six operators; four of these have obtained variances from rate regulation. The six franchised facilities include a limited purpose landfill, a transfer station, a small composting facility, and three material recovery centers. These facilities are described in Section IV, the "Existing Solid Waste System."

Metro may issue exclusive franchises for the sole right to operate in a specified geographic area or in a specified manner; however, to date, no exclusive franchises have been granted.

Rate Setting Authority:

The Metropolitan Service District establishes disposal rates at solid waste facilities which it operates and at those facilities which it franchises.

The authority to collect fees is stated in ORS 268.317 (5) which allows Metro to "establish, maintain and amend rates charged by disposal, transfer and resource recovery sites or facilities." ORS 268.515 (1) also provides that "a district may impose and collect service or user charges in payment for its services or for the purposes of financing the planning, design, engineering, construction, operation, maintenance, repair and expansion of facilities, equipment, systems or improvements."

Procedures for reviewing the rates of private franchised facilities were adopted through Metro Executive Order No. 25. Resolutions No. 82-366, No. 84-483 and Metro Code 5.01.180 establish the policies for determining rates.

Metro has a rate structure which includes four different fees in accordance with Metro Code, Sections 5.02 and 5.03. The four discrete disposal rate elements are the base disposal rate, regional transfer charge, convenience charge and user fee.

Metro has granted variances from rate regulation at a number of the franchised facilities which it regulates when it is found to be inappropriate, extremely burdensome, highly impractical or would force curtailment or closing down of a business (Metro Code 5.01.110). Generally, this has been when revenues at the private facilities are heavily dependent on potentially volatile secondary materials markets.

Metro is not restricted from using funds collected in one year to pay for expenditures in another year. This provides Metro the authority to develop multi-year rate strategies and stabilize rates over a number of years based on projected costs. ORS 459.335 mandates that fees collected for solid waste disposal be used only for solid waste and related planning, administrative and overhead costs of the district.

Flow Control Authority:

Metro has the authority to impose flow control, both on individuals and on commercial haulers per ORS 268.317 (3) (4). Flow control is the ability to require any person or class of persons to make use of particular landfills, transfer stations, resource recovery facilities or any other solid waste disposal facility designated by Metro. Flow control authority is considered vital for effective and efficient solid waste management practices because it allows Metro to enter into long-term contracts to supply specific amounts and types of waste to specific facilities. To date, the Metro Council has not implemented flow control.

Several methods for implementing flow control are available: price differentials, geographic limitations or quotas for commercial and individual haulers. Franchises issued by local jurisdictions to commercial collection companies could contain provisions stipulating where specific waste materials are accepted for disposal, transfer or recycling. Alternatively, solid waste facility permits from both DEQ and Metro could contain provisions stipulating the types of materials accepted at a particular disposal, transfer or recycling facility. These permits could also stipulate that commercial haulers and the general public from a certain geographic area must dispose, transfer or recycle waste at certain solid waste facilities.

Functional Planning Authority:

Under ORS 268.390, the Metro Council has the authority to prepare and adopt functional plans for areas and activities having significant impact on the orderly and responsible development of the metropolitan area. Functional plans have been developed by the region for transportation planning (Regional Transportation Plan); for water quality planning (208 Waste Water Plan); and for air quality planning (Control Strategy for Portland-Vancouver Interstate Air Quality Maintenance Area State Implementation Plan Revision).

Following adoption of a functional plan, the Council can recommend or require cities and counties to make changes in any city or county comprehensive plan to assure that the local plan and any actions taken under it conform to the District's functional plans.

In September 1986, the Metro Council adopted Ordinance No. 86-207, establishing a planning procedure for identifying and designating those activities and areas in need of functional planning. In March 1987, the Metro Council adopted Resolution No. 87-740 for the purpose of specifically designating solid waste as an area and activity appropriate for the development of a functional plan.

The relationship between regional functional plans and local comprehensive plans was recently spoken to in a case before the Land Use Board of Appeals (LUBA): Citizens for Better Transit and Douglas R. Allen vs. Metropolitan Service District (LUBA No. 86-022). Citizens for Better Transit challenged Metro Resolution No. 86-632 which amended the Transportation Improvement Program (TIP) and alleged that the TIP amendment violated Portland's Comprehensive Plan. LUBA ruled that Metro's authority to amend the TIP does not require compliance with local comprehensive plans and that Metro's actions are not controlled by local plans. Rather, Metro may require cities and counties to change their plans to conform to Metro's functional plan.

Hazardous Waste Management Responsibility:

The Oregon Department of Environmental Quality is the agency responsible for regulation of hazardous wastes. To date, Metro's role has been limited to the coordination of a household hazardous waste collection day. Any wastes generated by households are not recognized as hazardous under State or Federal laws.

ORS 459.305(5) requires Metro to operate or cause to be operated a collection system or site for receiving household hazardous waste at least twice a year. An educational program is also required to increase participation in the program. This requirement is effective July 1, 1988 if Metro sends solid waste generated within the District to a regional disposal site.

The responsibility for managing hazardous waste generated by conditionally exempt generators is unclear. Conditionally exempt generators are those that produce less than 220 pounds per month of hazardous waste or less than two pounds per month of acutely hazardous waste. The generators of this waste are exempt from regulation under state law and are not required to manifest their waste or to use a licensed hazardous waste disposal facility. The wastes they generate are legally defined as hazardous wastes by state law but are allowed in sanitary landfills with the permission of the site operator under DEQ's Administrative Rule.

Metro Resolution No. 86-618 states that Metro will not knowingly accept any quantity of hazardous wastes at Metro-owned facilities. Metro can undertake programs to prevent disposal of improper materials, such as hazardous waste, at its sites, but establishing permanent alternative disposal locations or extensive management methods for hazardous wastes is beyond Metro's current authority.

PART THREE, Local Government Roles and Responsibilities.

Opportunity to Recycle:

In 1983, the Oregon Legislature passed Senate Bill (SB) 405 which sought to increase recycling through a combination of voluntary and mandatory approaches. This legislation has been incorporated into ORS 459.165-200. It requires that local governments provide the opportunity to recycle to those citizens who want to participate. Cities with populations over 4,000 must provide curbside collection at least once a month for certain recyclable materials designated by the EQC. Presently, these include newspaper, cardboard, glass, small quantities of scrap metal, tin cans, and motor oil. A proposal currently under consideration may require yard debris to be accepted as well. Cities or unincorporated areas with populations under 4,000 must provide recycling facilities at disposal sites. The law also specifies that recycling promotion and advertising must occur.

To provide the on-route recycling pickup service, a city or county has been given authority to displace competition with a system of regulated collection service by issuing exclusive franchises. If this "opportunity to recycle" is not fully utilized, the State (EQC) may require one or more classes of solid waste generators to source separate specific recyclable materials and make this material available for collection.

Collection Responsibility:

Cities and Counties have responsibility for regulating solid waste collection service which is provided by private companies. ORS 459.085 provides the authority for Counties to license or franchise solid waste collection service. Cities derive their authority from their home rule powers as well as ORS 459.200. Section IV of the Inventory describes in more detail county and city collection services in the tri-county region.

State Land Use Requirements:

Oregon state land use planning goals (ORS 197) require that solid waste disposal sites be provided for in each city's or county's comprehensive plan. Goal 11 (Public Facilities and Services) requires local jurisdictions to "plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development." In addition, Goal 11 specifically states:

"To meet current and long range needs, a provision for solid waste disposal sites, including sites for inert waste, shall be included in each plan." In order to have their comprehensive plans acknowledged by the Land Conservation and Development Commission (LCDC), local governments within the region were required to recognize Metro as the agency responsible for all aspects of solid waste management.

Section II

PUBLIC OPINION ON SOLID WASTE ISSUES

In August and September 1985, Metro commissioned a random sample telephone survey to study public opinion about solid waste issues and recycling. Columbia Research Center conducted the telephone survey, contacting 605 respondents equally representative of the three metro-area counties. Questions covered general solid waste concerns and, in more detail, recycling participation and values. Responses to the recycling questions were used in designing a public information campaign to promote recycling opportunities in the Portland area. This campaign is described in the Waste Reduction Programs section.

Major findings of the survey include:

- Eighty-six percent of area residents recycled newspaper, glass, cans, and/or yard debris at least once during the six months prior to the survey. Seventy-eight percent had recycled newspaper, while the percentage of people recycling glass, cans and yard debris six months prior to the survey was 34%, 29%, and 38%, respectively. On a monthly basis, 50% of residents recycle newspaper, 15% recycle glass, 13% recycle cans, and 24% recycle yard debris.

- Metro citizens are motivated to recycle by the desire to preserve natural resources. Lack of space for storing recyclables is regarded as the main drawback to recycling.

- The most effective theme for promoting recycling among the population in general would appeal to Oregonians' reputation for environmental concern.

- When asked their preferred choice among four options for disposing of solid waste, 52% of respondents selected a facility to process waste into fuel. Twenty-seven percent preferred a waste incinerator, 13% preferred converting waste to compost, and 8% preferred a new landfill.

- Asked to comment on the merits of each alternative, as opposed to choosing just one, 90% responded that building a fuel-processing center would be a very good or good alternative. Good/very good rankings for the other options were: composting, 79%; waste incinerator, 78%; landfilling, 25%.

- Forty-six percent of respondents believe a fuel-processing center would have the most positive effect on the environment. Thirty percent believe composting would be most environmentally sound, 19% identified waste incineration, and 5% chose landfills.

- A fuel-processing center was identified by 45% of respondents as likely to receive most public support. Twenty-four percent listed landfills as most popular, 20% identified waste incinerators, and 12% mentioned composting.

- Eighty-six percent of residents are willing to pay increased garbage collection fees for an efficient, environmentally safe waste disposal system. Sixty-three percent would be willing to pay between $1 and $5 more per month.

- Twenty percent of residents could name Metro as the agency responsible for solid waste management. Twenty-five percent reported they were familiar with solid waste issues, and 34% said they were familiar with Metro. Forty percent stated they are confident Metro can successfully deal with the challenge of solid waste disposal.

Section III

CURRENT AND PROJECTED POPULATION AND WASTE GENERATION

CENTER OF WASTE LOCATIONS

This section describes the arterial road intersections that approximate the locations of the centers of waste for the years 1985 and 2005. The centers of waste were calculated for the three waste sheds and the entire region.

South Waste Shed	- 1985,	Rothe Road and McLoughlin Boulevard
	2005,	McLoughlin Boulevard between Rothe Road and Jennings Road (Clackamas County)
West Waste Shed	- 1985,	Allen Boulevard between Murray Road and Cedar Hills Boulevard
	2005,	Allen Boulevard and Murray Road (Beaverton)
East Waste Shed	- 1985,	East Burnside Street and 47th Avenue
	2005,	East Burnside Street and 55th Avenue (Portland)
Regional Waste Shed	- 1985,	Barbur Boulevard, just south of the Ross Island Bridge (Portland)
	2005,	Terwilliger Boulevard, just north of Capital Highway (Portland)

The 2005 locations are depicted on the Regional Waste Shed Map, Appendix A.

Section IV

EXISTING SOLID WASTE SYSTEM

The solid waste system is composed of both private and public facilities and private collection companies. Most solid waste facilities are within the tri-county area. However, several facilities used to dispose of tri-county generated waste are outside the three-county boundary. A map, depicting the location of these facilities, a chart summarizing the amount of waste disposed of at landfills and waste-to-energy facilities, a chart detailing the amount of waste recycled at major facilities and a listing of the land use zones of existing solid waste facilities can be found in Appendices B, C, D and E.

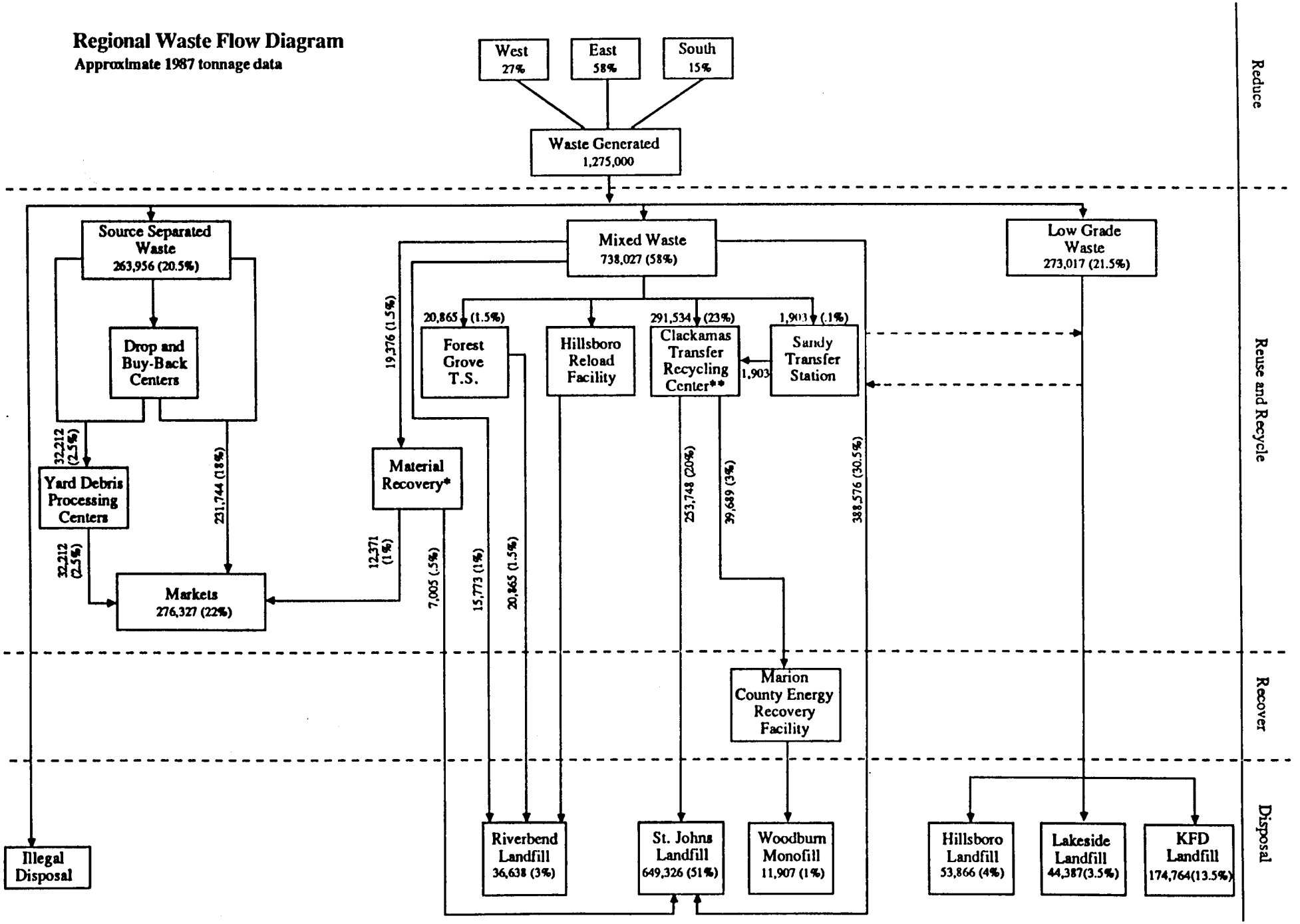
Prior to the construction and operation of a solid waste facility, an applicant must receive two permits and, in some cases, a disposal or processing franchise. The applicant must obtain a land use permit from the jurisdiction in which the facility is to be located. (In some cases a preliminary approval is issued by DEQ prior to issuance of a land use permit.) In most cases an applicant must obtain a franchise from Metro. Recycling drop centers and yard debris processing centers are currently exempt from Metro franchising policies. The Metro franchise determines if the applicant is qualified, whether the proposal complies with the Solid Waste Management Plan, whether the facility is needed, and whether regulatory requirements have been met. After receiving a Metro franchise, the applicant must receive a DEQ disposal permit. This permit evaluates operational and design aspects of the facility, compliance with appropriate state and federal standards, and mitigation methods to meet these standards.

WASTE FLOW DIAGRAM

The purpose of this diagram (following page) is to illustrate how solid waste flows through a system of facilities. The total waste generated is divided vertically into three distinctly different waste streams: source separated, mixed, and low-grade. The entire system is divided horizontally according to the state hierarchy: reduce, reuse, recycle, recover, disposal. The approximate 1987 waste flow tonnage amounts and percentage of total waste generated is shown for each individual flow line.

Regional Waste Flow Diagram

Approximate 1987 tonnage data



* Includes OPRC, EC, MDB, CTRC

** Source separated materials received at CTRC is accounted for within the Drop and Buy Back Center category.

FACILITIES

TRANSFER STATIONS

Within the tri-county area, there are currently three transfer stations. Additionally, a small reload facility is expected to be operational by June, 1988. Cumulatively, these stations handle about one third of the waste disposed of from the area (historically). All other wastes must be hauled directly to landfills or waste processing facilities. Each transfer station is a unique operation as described below.

- Clackamas Transfer and Recycling Center (CTRC) (Section 29, T2S, R 2E, tax lot 904, Clackamas County)--This facility is located at 2001 Washington Street in Oregon City. Adjacent neighbors of the facility include: a freeway exit ramp to the north, a log yard and paper mill to the south, an old landfill to the east, and a rail line and I-205 to the west. The facility is owned by Metro and operated under a management contract. Metro establishes rates at the facility. The transfer station was built for $4.5 million and opened in April of 1983. An average of 800 tons of waste per day are transferred at the facility and transported mainly to the St. Johns Landfill, although some wastes are taken to Marion County Energy Recovery Facility and the Yamhill County Riverbend Landfill. Wastes delivered by both commercial haulers and private disposers are dumped into an enclosed storage pit where they are compacted by a bulldozer and pushed into the tops of transfer trailers with a 20-23 ton capacity per trailer. In 1986, 291,000 tons of waste were transferred through the facility. About 88 percent of this amount was delivered by commercial haulers.

  Forty cubic yard drop boxes for cardboard, newsprint, scrap metal/tin cans and glass are located around the perimeter of the building. Drop areas are located inside the building for appliances and tires; both these items are recycled. Customers are asked to take clean loads of yard debris to a nearby processor for recycling.

Persons disposing of their waste are asked to put their recyclables alongside their vehicle. A customer who brings in a minimum of one half cubic yard of recyclables receives a reduction in their disposal fee. Spotters place the materials in the appropriate drop boxes. This ensures that the drop boxes contain clean loads of recyclable materials. CTRC now has material recovery capability with the addition of a compactor near the tipping floor. Incoming high-grade loads are dumped on the tipping floor, cleaned of any non-recyclable material, and then pushed into the compactor. The compacted recyclable material is then transported to OPRC for further processing.

- Forest Grove Transfer Station (NE 1/4 Sections 1 and 6, T1S, R 4W and 3W, tax lot 9501, Washington County)--This facility is located at 1525 "B" Street in Forest Grove. The adjacent neighbors of the facility include: to the north, a light industrial building, a commercial building, and homes; to the south, vacant land; to the east, homes; and to the west, commercial buildings. The facility is privately owned and operated under a Metro franchise to Ambrose Calcagno, Jr. Rates at the facility are regulated by Metro. The facility has been operational since the fall of 1985 and transfers about 60 tons per day to the Riverbend Landfill in Yamhill County. Only commercial haulers owned by Calcagno may use the transfer station (although a recycling drop center service is also offered on site for the public). All operations occur inside a building. Wastes from compacting garbage trucks (packers) are dumped directly into the tops of walking floor trailers. Each trailer has a capacity of about 20 tons. Annual flows through the facility are approximately 20,000 tons, although the facility is capable of handling as much as 45,000 tons per year.

- Sandy Transfer Station (Section 20, T2S, R 5E, tax lot 800, Clackamas County)--The transfer station is located at 19600 S.E. Cannon Valley Road at the east end of Sandy. Adjacent land uses of the facility include: heavy vegetation to the north, east and south, and to the west a thin strip of heavy vegetation in front of two residential lots. This facility is privately owned and operated and

is regulated by Clackamas County. Commercial and private disposers dump their wastes directly into 40 cubic yard drop boxes. An average of two drop boxes (10 tons) per day are transported to Metro's Clackamas Transfer and Recycling Center. Full service recycling is offered. Drop boxes are available for newspaper, glass, cardboard, tin, aluminum, scrap metal, motor oil, radiators, and appliances.

- Hillsboro Reload Facility (Section 18, T1S, R 2W, tax lot 1700, Washington County)-- Hillsboro Garbage Disposal Inc. has received authorization from Metro (Council Order No. 87-15) to utilize a reload facility for transporting wastes to the Riverbend Landfill. Only wastes collected by the company's packer trucks will be reloaded to drop boxes at the uncovered facility. About 10,000 tons per year or about 40 tons per day will be transferred at the site. The facility is expected to be operational by June, 1988.

Transfer stations outside the planning area: Several transfer stations located outside the region are worth mentioning because they have or are capable of transferring wastes for transport to or from the region:

- The Newberg Transfer Station (Section 20, T3S, R 2W, tax lot 3228-1700, Yamhill County), located at 2904 South Wynooski, is privately owned and is regulated by Yamhill County. Wastes are transferred from a tipping floor, where some recycling occurs, to 40 cubic yard drop boxes for transport to the Riverbend Landfill.

- The His Transfer Station (Section 8, T4N, R 1W, tax lot 410811300, Columbia County), located in St. Helen's, at 2285 Gable Road, services several communities in Columbia County. The facility is regulated by Columbia County. Wastes are currently taken to Riverbend.

- Two transfer stations in Clark County, R & R Transfer and Recycling (Section 34, T3N, R 2E, tax lot 97, Clark County), located at 11034 N.E. 117 Ave, and English Pit Transfer Station (Section 30, T2N, R 3E, tax lot 16, Clark

County), located at 912 N.E. 192, have, in the past, transferred some wastes to landfills in the Metro region, although the majority of these wastes currently go to landfills in Clark County.

LIMITED PURPOSE LANDFILLS

Currently, there are three limited purpose landfills located within the tri-county area. These facilities accept all but food wastes and hazardous wastes. They principally accept demolition, drop box, yard debris and other dry types of wastes. Currently, about one quarter of the wastes landfilled from the Metro region are disposed of at these limited purpose landfills.

- Riedel Waste Disposal Inc. (Killingsworth Landfill)(Section 17, T1N, R 2E, tax lots 30, 38, Multnomah County)--The Riedel limited purpose landfill, also referred to as Killingsworth Fast Disposal, is located at 5700 N.E. 75th Avenue and Killingsworth in Portland. The site, which is operated by Riedel Waste Disposal Inc., began accepting waste from commercial haulers in early 1981 and from public disposers in late 1982. The site, which accepts only non-food and non-hazardous wastes, is a former gravel pit which is equipped with a synthetic side liner, a clay bottom and a leachate collection system. In 1986, the site received an estimated 157,000 tons of material (430 tons per day). About 85 percent of this was delivered by commercial disposers (mainly drop boxes). The landfill operates under a Metro franchise which includes provisions for rate regulation. At current fill rates, it is expected that the site will reach its permitted capacity in the fall of 1988.

- Hillsboro Landfill (Section 7, T1S, R 2E, tax lot 1200, Washington County)--The Hillsboro limited use landfill, located at 8205 S.E. Minter Bridge Road in Hillsboro, is owned by Gary Clapshaw. Adjacent land uses include: open agricultural space to the north, homes and greenhouses to the south, greenhouses to the east, and to the west, homes and greenhouses. This site, like the Killingsworth site, accepts dry wastes from

both commercial and public disposers. About 70 percent of the estimated 47,000 tons disposed in 1987 (or about 130 tons per day) was delivered by commercial (drop box) customers. Under the current permitted site capacity and waste flows, the landfill will close in the summer of 1988. However, the operator is in the process of requesting an extension of the permitted capacity which could allow the site to remain active until 1993 or 1995 assuming current flows. The facility lies outside the Metro boundary. It does not operate under a Metro franchise, but under a special Metro agreement to accept waste from within the region.

- Lakeside Reclamation Landfill (Section 7, T2S, R 1W, tax lots 100 and 700, Washington County)--The Lakeside Reclamation Landfill, also known as the Grabhorn Landfill, is owned and operated by Howard Grabhorn and is located near the intersection of Scholls Ferry Road and Vandermost Road in Washington County. Adjacent land uses include: a sewage lagoon and orchards to the north; and to the south, east and west, open agricultural land. The site accepts drop box and demolition wastes from commercial disposers. In 1986, an estimated 42,000 tons of waste were disposed of at the site. Since the site is located outside the Metro boundary, Washington County regulates the site and no Metro franchise is needed. It is expected that the site can remain open under current flows through 1995, or later.

- Circle C Landfill (Section 9, T4N, R 1E, tax lots 24, 33, 61, 62, Clark County)--The Circle C Landfill is located in Clark County, Washington, approximately 16 miles north of the Oregon border and just off Interstate 5. The site is privately operated and is regulated by Clark County and the State of Washington. The site receives approximately 20,000 tons per year of dry non-food wastes from commercial and public disposers and expects to remain open for 80 years at this flow rate. No waste from the Metro region is currently going to this site.

GENERAL PURPOSE LANDFILLS

Currently there is only one general purpose landfill located within the tri-county area. There are two general purpose landfills located nearby, but outside the tri-county area. One of these landfills located outside the three-county area is strictly for disposal of ash residue from the Marion County Energy Recovery Facility. On March 24, 1988 Metro entered into a 20-year contractual agreement with Oregon Waste Systems, Inc. for the Arlington Landfill. The landfill will replace St. Johns and provide final disposal service for the entire Metro region.

- St. Johns Landfill (Sections 31 and 36, T2N, R 1E and 1W, tax lots 2, 6 and 30, Multnomah County)--The St. Johns Landfill, located at 9363 North Columbia Boulevard, is the only general purpose landfill within the three-county area. Neighbors of the landfill include: the Columbia Slough and Smith and Bybee Lakes to the north, a non-operating incinerator to the south, a tavern and auto wrecking operations to the east, and auto wrecking operations and a house to the west. St. Johns Landfill has been operating since 1932. The landfill is owned by the City of Portland and contracted out by Metro. Metro establishes rates at this facility. Waste is accepted from both commercial haulers and private disposers. Hazardous wastes are not accepted for disposal. Approximately 1,900 tons are received daily. The scheduled closure is February, 1991.

  At the entrance to St. Johns Landfill, recycling drop boxes are present for newsprint, cardboard, aluminum, steel, glass and tin cans. Appliances like refrigerators and washers are stripped at the public haul transfer site and recycled. A drop box specifically for clean loads of yard debris is also provided for public use.

  The public is encouraged to recycle and all loads are examined for materials that may be extracted for recycling. A customer who brings in a minimum of one half cubic yard of recyclables receives a reduction in their disposal fee.

- Riverbend (Sections 1 and 12, T5S, R 5W, tax lots 5501-200A1 and 5501-200A2, Yamhill County)--Riverbend Landfill, an out-of-region general purpose landfill, located on Highway 99W in McMinnville, is privately owned and operated. Yamhill County establishes rates at this facility. Only commercially hauled waste from the tri-county area is disposed of at this facility. Approximately 80,000-90,000 tons of waste are disposed of annually. About half this amount is from the tri-county area. Of the 4,000 tons per month received from the tri-county area, 50 percent is direct haul and 50 percent is received through the Forest Grove Transfer Station.

- Woodburn Landfill (Section 31, T4S, R1 W, Marion County)--Woodburn Landfill, located in Woodburn, is owned by Marion County and is operated under contract with Valley Landfills. The landfill is presently used for disposal of ash residue from the Marion County Energy Facility. The landfill is expected to continue operating for seven years. The landfill is ten miles outside the Metro boundary.

- Leichner/Vancouver (NW 1/4 Section 4, T2N, R 2E, tax lots 9, 13, 14, 25, 26, 27, 28, 29, 34, 35, 38, Clark County)--Leichner Landfill, located in Clark County, Washington, is the only Clark County site authorized as a sanitary landfill. The facility is privately owned. Anticipated closure date is 1989. An extension may be requested. Disposal rates are not regulated. No waste from the Metro region is currently disposed of at this landfill. Clark County, Washington is currently pursuing development of a general purpose landfill at the Carlson site.

- Arlington Landfill (Sections 20, 29, 39, N ½ N ½ 31, N ½ 32, T2N, R 21E, Gilliam County)--Arlington Landfill, located in Gilliam County near Arlington, Oregon, is privately owned by Oregon Waste Systems, Incorporated. The facility with a total capacity of 60 million tons is committed to provide Metro with landfill space for 20 years beginning in January, 1990.

MATERIALS RECOVERY AND RECYCLING CENTERS FOR MIXED WASTE

Materials recovery encompasses methods and procedures for extracting useful materials from the mixed waste stream (waste which is composed of a number of discrete materials).

- Oregon Processing and Recovery Center (Section 10, T1N, R 11E, tax lot R-816-10-0100, Multnomah County)--Oregon Processing and Recovery Center is located at 701 N. Hunt Street in Portland. Adjacent land uses include: Columbia Slough to the north, a tire processing facility to the south and east,and a truck yard to the west. The facility is privately owned and operated by Wastech. A buy-back center is also located at this facility. Mechanical devices (trommels and screens) and people are used to separate recyclables for resale. The facility accepts loads of mixed waste composed of at least 50 percent recyclable materials. Salvaging of materials is allowed. The facility is being expanded to receive and process up to 100,000 tons per year. Residual waste (estimated 40 percent of volume received) is disposed of at St. Johns Landfill or Killingsworth Fast Disposal. Currently, Oregon Processing and Recovery Center has a Metro franchise but rates are not regulated by Metro.

- East County Recycling (Section 26, T1N, R 2E, tax lot 31, Multnomah County)--East County Recycling is located at 12409 N.E. San Rafael in the Parkrose district of Portland. Adjacent land uses include a dense stand of trees to the north, a school to the east, a shopping center to the south, and homes and a professional building to the west. Mixed waste is accepted for processing at the site for loads with at least 30 percent recyclable material. The owners/operators hand-sort the loads in preparation for sale of the materials to the secondary market. Between October 1986, when they began reporting their volumes to Metro, and June 1987, they processed about 4,250 tons, with about 70 percent of that recycled. Currently, East County Recycling has a Metro franchise but rates are not regulated by Metro.

- Marine Drop Box--Marine Drop Box, located at 6849 N.E. 47, collects dunnage and debris from ships and sorts out useful wood, rope, cable, turn buckles, metal clips and wire for resale or for salvage. Adjacent land uses include: an auto wrecking area to the north, a light industrial development to the south, homes to the east, and light industrial development to the west. Ninety percent of the material received is reused or recycled. Approximately 10,000 cubic yards of waste are processed yearly. Currently Marine Drop Box has a Metro franchise but rates are not regulated by Metro.

- Sunflower Recycling (Section 11, T1S, R 1E, tax lot 101, Multnomah County)--Sunflower Recycling, located at 2345 S.E. Gladstone, has a composting operation for limited amounts of source separated food scraps, grass clippings, weeds, sawdust, and sod. Adjacent land uses include: an office/warehouse area to the north, a manufacturing plant and houses to the south, a foundry to the east, and a truck yard, cement plant and rail yard to the west. Less than two tons per month of waste is composted in two 6 cubic yard cement mixers. Food and garden wastes are collected from Sunflower customers only and resold to the business's customers. Currently Sunflower Recycling has a Metro franchise but rates are not regulated by Metro.

- K. B. Recycling (Section 5DA, T2S, R 2E, tax lots 1700 and 1790, Clackamas County)--K. B. Recycling is located at 8277 S.E. Deer Creek Lane near the intersection of 82nd Avenue and Highway 224. Adjacent land uses include: a stand of trees to the north, a commercial building to the south, I-205 to the east, and a commercial building to the west. The facility is a privately owned and operated source separated drop center for recyclable materials.

WASTE-TO-ENERGY FACILITIES

- Marion County Energy Recovery Facility (Sections 17 and 18, T6S, R 2W, tax lots 554, 557, 558, 560, 576, 581, 586, 620, 621, 622, 624, 625, Marion County). The Marion County

Energy Recovery Facility, located at 4050 Brooklake Road in Brooks, Oregon, is a garbage incinerator equipped with state-of-the-art technology to control air pollution. The facility accepts up to 40,000 tons of solid waste per year from the Metro region. The facility is permitted to handle as much as 200,000 tons a year. Waste is hauled from the Clackamas Transfer and Recycling Center to the Energy Recovery Facility.

YARD DEBRIS PROCESSING CENTERS

Five yard debris facilities receive source separated yard debris and process the material into a salable product. The material is delivered to the facilities by private individuals, commercial landscapers, and commercial waste collection firms. The material is generally processed into compost for sale as a soil amendment or ground cover. These firms received and processed over 200,000 cubic yards (approximately 20,000 tons) of material in 1986, and over 300,000 cubic yards (approximately 30,000 tons).

- Grimm's (Section 21, T2S, R 1W, tax lot 1800, Washington County)--Grimm's is located at 18850 S.W. Cipole Road in Sherwood. Adjacent land uses include: vacant agricultural land to the north, an industrial park to the south, a farm to the east, and an R.V. center to the west.

- McFarlane's Bark Inc. (Section 5AD, T2S, R 2E, tax lot 402, Clackamas County)--McFarlane's is located at 13345 S.E. Johnson Road in Clackamas County. Adjacent land uses include: a rail line and trees to the north, an R.V. storage area to the south, a commercial building to the east, and a light industrial area to the west.

- East County Recycling--East County Recycling is located at 12409 N.E. San Rafael in Portland. This facility grinds yard debris but does not compost the material. East County Recycling has been working on innovative yard debris products to broaden the marketability of yard debris.

- Washington County Unified Sewerage Agency (Section 6BC, T2S, R 1W, tax lots 2400, 2500 and 2800, Washington County)--Unified Sewerage Agency is operating a small composting facility at its Hillsboro sewage treatment facility located on First Street in Hillsboro. Adjacent land uses include: a light industrial area to the north, vacant land to the south and east, and an industrial area and homes to the west. Yard debris is accepted from homeowners on Saturdays and Sundays only. Small businesses can use the facility seven days a week. No dirt or sod is accepted. The compost is mixed with sludge for application to farm land. Since opening in May 1987, an average of 10-12 cubic yards are received each weekend.

- City of West Linn Yard Debris Center (Section 36, T2S, R 1E, tax lot 1700, Clackamas County)--West Linn operates a small yard debris collection center for city residents located at 4001 Willamette Falls Drive. The yard debris is processed and composted on site and later sold to the general public. Adjacent land uses include: heavy vegetation to the north and south, heavy vegetation and a waste water treatment facility to the east, and Willamette Falls Drive and a bluff to the west.

RECYCLING DROP-OFF CENTERS

There are approximately one hundred fifty recycling drop-off centers. These centers are depicted on three maps titled "Recycling Drop-Off Centers in Appendices F, G and H. The services offered include:

- multi-material drop centers (operated daily--54 locations)

- multi-material drop centers (operated monthly --8 locations)

- newspaper only depots (34 locations)

- buy-back centers (35 locations)

- motor oil drop centers (27 locations)

- pickup services (45 companies)

Fifty-four centers are multi-material drop centers that operate daily. These centers do not buy materials. Eight centers are multi-material drop centers that only operate monthly. Churches and other non-profit groups collect materials monthly as fund-raising events. Thirty-four centers are newspaper only drop centers. These types of centers are operated by both non-profit and profit businesses. Thirty-five centers are buy-back centers that pay a market rate for purchase of recyclables. Twenty-seven centers are motor oil drop centers. Typically, these are gas stations and auto dealers.

In addition to the drop-off centers, 45 companies operate pickup services for specific items. Items that are collected by pickup services include office paper, scrap metal, appliances and yard debris.

DESIGN OF FACILITIES FOR PUBLIC USE

Presently the general public is not required to utilize a commercial garbage collection service for disposal of waste. During 1986, a total of 150,426 public trips were made to St. Johns and Clackamas Transfer and Recycling Center. Weekends are the peak days the public uses Metro facilities.

To accommodate the general public at Metro facilities, additional features have been designed and built at both St. Johns Landfill and the Clackamas Transfer and Recycling Center. At St. Johns Landfill, a separate public transfer area has been built. The general public no longer needs to dispose of waste at the working face of the landfill. Recycling drop boxes are also available. At Clackamas Transfer and Recycling Center, commercial garbage trucks and public vehicles are separated and use different sides of the pit to dispose of waste. A second gatehouse is used to process transactions during periods of high public use. Ten bays, on one side of the pit, are used almost exclusively by the general public. Recycling drop boxes/bins for newspaper, tin, aluminum, ferrous metals, glass, non-ferrous metals and cardboard are provided for source separated recyclables brought to the facility by the general public. Oil, batteries and tires are also accepted for recycling.

DIVERSION

Diversion is the process by which waste is redirected from one facility to another. Metro has used this as a tool to prolong the life of landfills and to recover recyclable materials from the waste stream. For the most part, Metro implements diversion of waste through the use of rate incentives. Statutory flow control authority has not been implemented to divert waste from one facility to another to date. Outlined below are some examples of diversion.

Diversion from St. Johns Landfill

Metro has attempted over the past few years to divert waste from the St. Johns Landfill. Metro has done this by first requesting the users of the facility to utilize alternative facilities such as materials recovery centers or limited purpose landfills where appropriate. Metro makes these alternative facilities economically attractive through techniques such as waiving certain fees collected at the site. Rate setting is the main technique Metro uses to accomplish diversion.

Encouraging the diversion of loads to alternative sites is limited by the type of alternative facilities available and the willingness of haulers to use them. Currently, the alternative facilities available can only take non-food waste or loads with a high percentage of recyclables. While use of the facilities has increased, economic incentives have been insufficient to divert all the waste which could be handled by these alternative facilities. Metro has considered the use of a ban on loads brought to the St. Johns Landfill which could be taken to alternate facilities.

In addition, Metro has prohibited waste from outside the Metro boundaries from entering its facilities, specifically from Clark County. The prohibition was based on Metro's authority to manage solid waste facilities in the best interest of its constituents.

Out-of-Region Diversion

Metro has permitted and encouraged haulers to utilize disposal facilities outside the Metro boundaries and has intergovernmental agreements with those facilities which allow this diversion. Individual haulers are currently permitted to use the Forest Grove Transfer Station which then hauls the waste to the Riverbend Landfill in Yamhill County. Metro also hauls waste to this landfill from its Clackamas Transfer and Recycling Center. The agreement with Yamhill

County allows the diversion of over 40,000 tons per year from regional disposal sites.

COUNTY AND CITY COLLECTION SERVICES

One of the general public's primary uses of the solid waste system is interaction with a local hauler and the solid waste collection system. Collection services are offered by private companies licensed or franchised by a city or county government. A map and accompanying legend show the location and boundary of each franchised hauler. The city of Portland and unincorporated areas of Multnomah County are not franchised and haulers have no distinct service areas. A chart entitled "City and County Franchise Information," Appendix K, provides details about the terms and expiration dates of franchises, the boundary of the franchise and the process for changing a franchise. The section below describes the collection system in the counties and cities of the metropolitan region.

Multnomah County

City of Portland: There are 115 private hauling companies in the city of Portland ranging from one-person operations to large corporations. The haulers are permitted through the city's Bureau of Environmental Services. To apply for a permit, one must have a valid business license and Public Utility Commission permit. The hauling permit is renewable yearly with a $60.00 application fee. The application fee covers the administration and enforcement of permitting procedures. The haulers also pay a $.73 fee for each ton of waste to cover the costs of promotion and administration of the Bureau's recycling program.

All rates are set by individual haulers on a competitive basis. There is a provision in the permit that stipulates that a hauler may not charge a person who participates in recycling more than a customer who does not participate in recycling.

In June 1987, the city began full implementation of its curbside recycling program. With commencement of this program, haulers are required to provide curbside recycling service once a month either themselves or through contract.

Preliminary analysis by the Bureau of Environmental Services showed that recyclables were collected from 16.5 percent of Portland haulers' residential and commercial customers during the program's first month. This exceeded the projected participation rates for the first year.

Unincorporated Areas of Multnomah County: The unincorporated areas of Multnomah County are permitted through the city of Portland's Bureau of Environmental Services. Curbside recycling is also provided.

Clackamas County

Clackamas County has 26 franchised haulers. The franchises are issued for a period of ten years. Unless just cause exists for termination of the franchise, they are automatically renewed each decade. The county sets standards of service, including standards for recycling, and sets rates. The collectors pay two percent of their gross as a franchise fee. The cities of Happy Valley and Johnson City are under the county umbrella of franchises. Most of the other cities in Clackamas County franchise their own haulers. Their agreements are very similar to those issued by the county.

Washington County

In the unincorporated areas of Washington County the haulers are franchised by the county. There are 27 existing franchises that presently have no set time limit. The county sets the rates and standards of service. The franchise fee is set at three percent of the gross. Cities in the county administer their own franchises.

Section V

WASTE REDUCTION PROGRAMS

In 1986 Metro adopted a solid waste reduction program. The program was designed to reduce the region's dependence on sanitary landfills as the primary method of disposal. By using the state hierarchy--reduce, reuse, recycle, recover, landfill--the solid waste reduction program charted the course for design and implementation of specific programs to divert the "maximum feasible" amount of waste from landfills. The elements of the waste reduction program are described below.

PROMOTION, EDUCATION AND PUBLIC INVOLVEMENT

Promotion, education and public involvement are ongoing activities of the Waste Reduction Program. The objective of these programs is to reach the general public and special interest groups with recycling information and opportunities to increase their participation in waste reduction activities. Promotional and educational activities include:

- a multi-year advertising campaign
- newspaper and magazine advertisements
- billboards and transit advertising
- radio ads and public service announcements
- television public service announcements
- monthly calendar of eight weeks of recycling events
- a speakers' bureau availability list
- "Operation Phone Book" Lions' Club yearly event
- Christmas Tree Recycling yearly campaign
- displays at community events, county fairs and local trade and business shows
- biannual yard debris program design and implementation
- coordination of recycling awareness days, recycling day at the zoo and teacher in-services

- cross-training of staff from Clackamas Transfer and Recycling Center and St. Johns in the Recycling Information Center

- operation of the Recycling Information Center

Recycling Information Center

The Recycling Information Center was established in 1979 to provide the tri-county region with a centralized resource for recycling and waste reduction information. The Center assists with the promotional and educational activities described above.

In addition, the Center

- manages Metro's office paper recycling program

- maintains a library on recycling

- distributes supplementary recycling curriculum materials to schools

- provides cross-training of solid waste gatehouse staff

- assists with household hazardous waste collection days

In 1987, the Center implemented a "hotline connection" with the city of Portland. The Center continues to receive recycling information calls from city residents. Those calls that deal with city policy on curbside recycling or consumer complaints are transferred directly to the city recycling office. About ten percent of the calls from city residents are transferred by means of an off-premises extension each month. This system facilitated the immediate requirement for the city to have a recycling hotline while eliminating duplication of efforts.

New programming of computer equipment added in July 1987 has enhanced the speed and capability of the Center's operations. Accurate data is collected on all calls received. The Center can now report to each waste shed the number of calls received from their area, what materials residents were calling about and what type of service they were interested in.

Recycle/Market - Yard Debris

These programs are designed to achieve "maximum feasible" reduction of yard debris currently being landfilled through the use of regional processing facilities.

In November 1986, a market survey and marketing plan was completed for yard debris compost. The plan includes market research activities, technical analysis, public information plans, quality control and enhancement mechanisms, and supply management analysis, as well as a monthly schedule of activities.

The goal of the yard debris marketing program is to promote commercial sales of at least 75 percent of the yard debris that is presently being landfilled--about 77,500 tons (775,000 loose cubic yards) of debris.

The market survey showed that, at present, compost is the most viable potential market for yard debris. Several activities were undertaken to boost sales of yard debris material:

- promotional and technical literature
- laboratory testing of compost
- determination of performance characteristics and technical use specifications for compost in landscape applications

This short-term program was very successful. Compost sales in May 1986 were 100 percent higher than in May 1985. Eighteen thousand seven hundred cubic yards (1,870 tons) of compost were sold in 1986. Outflow of finished compost is nearly equal to inflow of raw debris at the processors and sales represent about 26 percent of the Metro goal for 1991.

The plan is a marketing support tool for enhancing the private processors' sales and marketing programs. The emphasis of the tasks to be carried out by the Metro marketing plan are directly related to the development and distribution of technical information about the compost product. Quarterly testing of yard debris compost looks for herbicide residuals, toxicities, weed seeds and chemical/nutrient content.

Most of Metro's distribution of information is directed to the yard debris processors and end users who, in turn, use it to promote direct sales to their customers. In addition to this role, Metro promotes the concept of buying recycled yard debris in coordination with the established media campaign

through the news media and at product trade shows. Metro's yard debris marketing plan does not involve direct sales of compost or any of its products to the end user.

In order to promote home composting and source separation of yard debris, compost workshops were held in Spring and Fall 1986; a booth displaying various yard debris products was exhibited at the ASLA conference in November 1986, the Far West Ag Show in August 1986, the Home and Garden Show in April 1987 and the Arbor Fest at the Forestry Center in March 1987.

Yard debris recycling was the featured promotion in Spring and Fall 1987. Metro continues to print and distribute The Art of Composting handbook that guides homeowners through the process of backyard composting.

Two cities, West Linn and Oregon City, offer weekly curbside collection of yard debris. Oregon City estimates that 25 percent of the available material is recovered. West Linn also operates a yard debris collection site. This site is described in Section IV, Existing Solid Waste System.

Processing capacity in the region is limited. Grimm's and McFarlane's provide the majority of processing capacity in the region along with mobile chipping services. McFarlane's location and the size of the existing yard debris pile have raised concerns with county and private economic development groups. The concerns raised are odors from the collected yard debris, the appearance of the operation, traffic congestion, and a location in a prime industrial/commercial area.

Rate Incentives

Rate incentives are one method used by Metro to achieve the maximum feasible reduction of waste. By simply deleting certain charges, it is possible to divert loads from St. Johns Landfill to processing centers. For example, Oregon Processing and Recovery Center, which achieves a substantial amount of material recovery, deletes both the user fee and the regional transfer charge. This acts as an incentive for haulers of high-grade loads to dispose of their material at Oregon Processing and Recovery Center rather than at St. Johns Landfill.

Resource Recovery

The purpose of the resource recovery component of the 1986 waste reduction program is to reduce the volume of landfilled solid waste and to recover energy and materials.

During the summer of 1985, Metro conducted a nationally advertised symposium on resource recovery. During Fall 1986, Metro issued RFPs to process up to 48 percent of the waste stream for volume reduction and energy and materials recovery. Of the thirteen proposals received in January 1987, consideration was narrowed to three waste-to-energy and one mass composting option. Proposals responding to the RFPs addressed established economic, technical, environmental and public acceptability criteria. In January 1987, Council asked that additional information about potential landfill sites and overall "system cost" of each resource recovery proposal be provided before selecting any vendor for further negotiation. Metro Council desires that chosen resource recovery options result in overall "system cost" not exceeding 20 percent of landfill-based system cost.

On a yearly basis, Metro intends to allocate up to 350,000 tons of solid waste to a waste-to-energy facility and 160,000 tons to a mass composting facility.

Vendor proposals call for five to ten percent recovery of materials by volume and sharing of costs and revenues with Metro for materials sales.

In August 1987, Metro conducted preliminary negotiations with proposers. In September 1987, Council selected one composting and one refuse-derived fuel proposal with whom to enter into formal contract negotiations.

As of early 1988, no site for the mass incineration project has been permitted. Continued public opposition to the facility and various proposed sites have effectively put the project on hold until a site can be secured. Formal contract negotiations for the composting facility are continuing.

WASTE CHARACTERIZATION STUDY

Background

This Waste Characterization Study (WCS) is one part of the "System Measurement" portion of Metro's 1986 Solid Waste Reduction Program (SWRP). The waste reduction program is being undertaken by Metro to "substantially reduce the volume of solid waste that would otherwise be disposed of in land disposal sites." The purpose of the WCS was to establish a system, based on analyses of waste composition, for determining which programs and projects will obtain maximum economically and technically feasible waste reduction through each level of the hierarchy. The State Legislature established the hierarchy in ORS 459.015 as reduce, reuse, recycle, energy recovery and land disposal, in descending order of importance. The state hierarchy and the Metro SWRP specifies that waste which is technically and economically feasible to manage by a higher method on the list, shall not be managed by a lower-ranked method.

Purpose

The purpose of this study is to provide estimates of the composition of waste generated within the Metro region. The analysis of the waste will serve as a basis for determining the economic and technical feasibility of the various waste reduction methods. It also provides a baseline for measuring the effectiveness of the programs to be implemented.

Approach

The WCS project encompasses two waste substream analyses. The first analysis, Task 1, examined the composition of the waste stream disposed of by landfilling. This analysis includes both general purpose landfills (putrescibles), and limited purpose landfills (no putrescibles). The second analysis, Task 2, examined only the commercial waste stream, with emphasis on high-grade waste components. The High-Grade Waste Analysis also included an estimate of composition,, but was substantially less comprehensive than the Full Waste Stream Analysis.

Based on background information and existing conditions in the Metro area, the waste stream analysis was planned and executed by the following characteristics:

- Sampling sites included St. Johns Landfill, Clackamas Transfer and Recycling Center (CTRC), and Killingsworth Fast Disposal Limited Purpose Landfill (KFD).

- Full year seasonal samplings included fall, winter, spring, and summer sampling periods.

- Waste was characterized by hand-sorting samples into 27 categories. The 27 categories make up 17 major categories or components.

- A confidence interval of 95 percent, with a precision level exceeding ±5 percent, was provided for the combined data from St. Johns Landfill and CTRC (Municipal Solid Waste), as well as the entire waste stream (St. Johns, CTRC, and KFD).

- When actual waste weights were not available at a site, a weighing program was employed to estimate quantities received.

- Vehicle types included rear-, front-, and side-packers, loose and compacted drop boxes, and self-haul vehicles. All vehicle types were sampled based on the quantity of waste received in these vehicles at the waste disposal facilities in the Metro region.

- Each seasonal sampling effort consisted of one week at each of the three sites. An average of 11.8 samples per day were sorted at each site during the four sampling efforts.

The waste stream analyses were planned and executed in accordance with the "Solid Waste Assessment Guidebook" authored by SCS Engineering.

The energy content of the combined commercial and residential wastes was estimated by obtaining grab samples during the fall program.

Calculation Methodology

Information presented in the tables in this report has been calculated to provide an accurate representation of the Portland Metro regional waste composition.

The data from each sample form was entered directly into the data base. The average sample weight was 283.44 pounds; however, the individual samples ranged from 140 to 600 pounds. In order to equalize the samples, each sample was converted from weight data to a percentage. In other words,

each category in an individual sample is divided by the total sample weight to convert the sample to percentage data. Therefore, the sum of all the categories within a sample equals 100 percent, or 1.0. All summary data is then calculated by summing individual sample percentages and dividing by the number of samples selected.

If percentage had been calculated by summing the weights and dividing by the number of samples, then heavier samples would have been of greater significance than lighter samples. For example, a sample weighing 600 pounds would have four times the significance of a sample weighing 150 pounds.

Site Summary Report-Percentage. In the Site Summary Report-Percentage, the Municipal Solid Waste (MSW) component of the waste stream is identified in the column called "Combination." It is a weighted average of CTRC and St. Johns percent composition category. The assumption has been made that the waste disposed of at CTRC and St. Johns Landfill is representative of the municipal solid waste disposed of in the Metro region. The weighting is based on the tonnage of waste disposed of at each site. The following formula was used to calculate the "Combination" column:

(Category % at CTRC X 0.4556)
+ (Category % at St. Johns X 0.5446)
= Category % of Municipal Solid Waste

Therefore, CTRC represents 45.56 percent and St. Johns 54.56 percent of all MSW disposed of in the Metro region.

The "Total" column in the Site Summary Report-Percentage represents the total waste disposed of in the Metro region. It is a weighted average of CTRC, St. Johns, and KFD percent composition by category. We have made the assumption that CTRC and the St. Johns Landfill are representative of all the general purpose landfills in the Metro region, and KFD is representative of all the limited purpose landfills in the Metro region. The following formula was used to calculate the "Total" column:

(Category % at CTRC X 0.3225)
+ (Category % at St. Johns X 0.4211)
+ (Category % at KFD X 0.2564)
= Category % of Municipal Solid Waste

Therefore, of all the waste disposed of in the Metro region, CTRC represents 32.25 percent, St. Johns represents 42.11 percent and KFD represents 25.64 percent. The difference between the MSW and all waste disposed of in the Metro region is that the total includes limited purpose landfills as well as general purpose landfills.

Statistical Report. The Statistical Report uses the percentage data for each sample to calculate the means percentage and precision at a 95 percent confidence level. Therefore, all samples are considered equal for the specified selection criteria. For example, for the total waste stream where all samples are selected, both the Statistical Report and the Site Summary Report utilize all 705 samples to calculate the total; however, the Statistical Report treats all samples equally, while the Site Summary report uses weighting factors as described above.

General

This section discusses the composition data summaries from the perspective of season and site. In addition, the waste composition of drop boxes is also discussed due to recent considerations regarding the management of this waste. The full year mean values contained in these exhibits are weighted in proportion to the waste quantities received at each site and during each season.

In examining the data, it is essential to recall that it is presented in percentages. To determine the estimated quantities of categories or subcategories, the waste quantities for each site and season need to be considered with the percentages.

When comparing various waste stream composition studies, it is vital to realize that none replicate exactly the method and category definitions employed for the Metro studies. Thus, comparisons on a component-by-component basis are not exact. When estimates from various studies are compared, an understanding of the various studies is important to avoid the development of misleading conclusions or comparisons. In addition, the comparisons are not based on statistical analyses, but on a percentage-to-percentage basis. A more useful basis of comparison for the same components from various studies may be on a pound-per-capita basis.

Paper. Paper comprises approximately 29 percent of the waste landfilled and is the largest category of the waste stream. The Paper category consists of four subcategories: Corrugated Cardboard (OCC)/Kraft Paper; Newspaper; Office Paper; and; Other Paper.

Waste deposited at CTRC and St. Johns consisted of 35 percent paper, while waste deposited at KFD has a significantly lower paper content of 13 percent. This relation of lower content at KFD than at CTRC and St. Johns is consistent for all the paper subcategories. OCC and Office Paper percentages were

lower at CTRC than at St. Johns, possibly reflecting greater disposal of office-generated at St. Johns. Newspaper and Other Paper were slightly higher at CTRC than at St. Johns, possibly reflecting a higher percentage of residential waste disposal at CTRC.

The seasonal paper content of the waste stream are substantially the same during the fall and winter, which are the highest seasons of the year. Part of the winter high could be the result of lower yard waste percentages, resulting in slight percentage increases in all categories for the winter sampling period. The high paper content during the fall probably reflects increased OCC/Kraft and bulk mailings (Other Paper) as people prepare for the holiday season. It should be noted that the fall sampling period was conducted in an unusually mild-weathered November. In a more typical November less yard debris would be expected, resulting in an even higher percentage of paper. The summer has the lowest paper content of all four seasons, while spring's percentage of paper is representative of the annual average.

All paper subcategories have their lowest percentages during the summer. The highest percentage of OCC occurs during the winter while the highest percentages for Newspaper, Office Paper, and Other Paper occur in the fall. The effects of newspaper recycling drives during the school year and residential burning of paper in the cold months is unclear from the data.

Although paper is the highest percentage category, only 56 percent of the paper is considered to have potential for recycling from Metro's waste stream. The remaining portion will require another option for its management. The percentage of paper in Metro's land-disposed waste is substantially lower than the U.S. EPA nationwide estimate of 38 percent.

The percentage of newsprint was approximately 3.4 percent of Metro's waste stream. Since the newsprint percentage is low relative to other waste streams, careful consideration should be given to the cost effectiveness of efforts to further reduce this percentage. The lower percentage may also reflect the definition of newsprint used in this study. Other studies may not have separated the glossy unrecyclable paper, commonly used in advertising, from recyclable newsprint. This could result in a noticeable difference in the percentage visible in the waste stream.

However, the percentage of OCC in Metro's waste was higher than for Michigan's waste but lower than for New Jersey's, Santa Clara's and U.S. DOE's as well. OCC was approximately

nine percent of the total waste stream and has traditionally been a recycled material. OCC is at a relatively high percent as compared to other waste streams; therefore, serious consideration regarding increased levels of recycling of this component seems appropriate.

Similar observations are appropriate for Office Paper. It would appear that consideration of increased recycling of this component is warranted. None of the Michigan sites were located in areas with office paper recycling programs, although their Office Paper content was lower than that for Metro.

Plastics. Plastics (including Container Plastics, Durable Plastics, and Other Plastics) comprise approximately seven percent of the waste landfilled. The Other Plastics subcategory has the highest percentage of all the plastic subcategories. Other Plastics, at five percent, comprise a higher percentage of the waste stream than the combination of Milk Jugs, Containers, and Durables, which comprise only two percent of the total waste stream.

Waste deposited at CTRC and St. Johns consists of eight percent Plastic, while waste deposited at KFD has five percent Plastic. The content by subcategory is lower at KFD than at CTRC and St. Johns for all subcategories except Durables.

The plastic content of the waste stream is essentially constant throughout the year, although the subcategories exhibit varying seasonal content. The highest seasonal Container content occurs in the winter, while the highest content for Durable and Other Plastics occurs during the summer and spring, respectively. Milk Jugs and Containers exhibit a downward trend from winter through summer, and Durables exhibit an upward trend during these seasons.

The percentage of plastics in Metro's waste stream is approximately the same as estimated by U.S. EPA, but higher than found in the New Jersey and U.S. DOE studies. The Michigan range of 2.6 to 4.0 represents the recyclable plastics. The recyclable plastics in Metro's waste comprise approximately two percent of the waste stream. Although the percentage of recyclable plastics in Metro's waste is the same as the national average, the portion of recyclable plastics is relatively small. However, the form of recyclable plastics lends them to relatively easy recycling through a source separation and/or curbside collection program in conjunction with other components.

The other category of plastics is considered to be non-recyclable plastics at this time. Thus, this plastic

component will need to be managed by incineration, landfilling, waste reduction, or some combination of these methods.

Yard Debris. Yard Debris comprises approximately 11 percent of the waste landfilled. Yard Debris is divided into two subcategories; Leaves and Grass, and Prunings. Leaves and Grass constitute slightly more than six percent of the waste stream, while Prunings measure approximately four percent.

Waste deposited at municipal waste sites, CTRC and St. Johns, has a slightly lower content of Yard Debris, at ten percent, than waste deposited at KFD, a limited purpose landfill, which has a Yard Debris content of 12 percent. Yard waste at KFD arrived mostly from self hauls and landscaping firms in loads that were over 90 percent Yard Debris. At CTRC and St. Johns, Leaves and Grass compose seven percent of the waste stream. KFD's Prunings content at seven percent is substantially higher than that of CTRC and St. Johns, at two and four percent, respectively.

The highest percent of Yard Debris occurs in the fall at 15 percent, followed by the content in the spring at 14 percent, and the content in the summer at 11 percent, reflecting the long nine-month growing season typical for the Pacific Northwest. Only winter showed a substantial drop; only three percent of the total waste stream as Yard Debris. However, a high potential for substantially reducing the quantity of Yard Debris seems likely through a separate collection and composting program for Grass and Leaves and possibly Prunings.

Wood. Wood comprises approximately 13 percent of the waste landfilled. Waste deposited at CTRC and St. Johns has eight percent Wood, while waste deposited at KFD has 27 percent Wood. It is the largest waste category for KFD. The difference between KFD's Wood percentage and that of CTRC and St. Johns is one of the largest for the waste categories. This probably reflects the fact that KFD receives more demolition and construction debris.

The seasonal Wood content of the waste stream is substantially the same for winter, spring, and summer. However, significant decline in the Wood percentage occurs from summer to fall, from approximately 14 percent down to nine percent, possibly reflecting a stockpiling of wood scrap for the home heating season.

Wood waste comprises a substantially greater portion of Metro's waste stream than any other waste stream. Due to its high percentage (i.e., 13 percent) and demonstrated successes on the east and west coast in the recovery and processing of

wood to produce fuel, the recovery of wood through the processing of selected waste loads should be investigated at KFD. Wood recovery programs at CTRC and St. Johns may also be feasible if segregated waste loads can be identified.

Textiles. Textiles comprise approximately four percent of the waste landfilled. The seasonal content of Textiles has an increasing trend from fall through summer. The fall percentage of two percent rises to five percent during the summer. Textiles are typically not recyclable and have minimal reuse value. Textiles have a high BTU value and can easily be incinerated.

Food Waste. Food Waste comprises approximately seven percent of the waste landfilled. Waste disposed at CTRC and St. Johns have nine and eight percent Food Waste, respectively, while KFD has less than 0.3 percent Food Waste. This reflects the limited purpose landfill status of KFD, which precludes the disposal of putrescible wastes there.

The seasonal content of Food Waste is substantially the same for winter, spring and summer. The food waste percentage is highest in the fall at eight percent.

Disposable Diapers. Disposable Diapers comprise approximately one percent of the waste landfilled. Waste deposited at CTRC and St. Johns has 1.7 and 1.3 percent, respectively. KFD's waste contained no disposable diapers.

The seasonal Disposable Diaper content of the waste stream is nearly constant at one percent, with a slight increase in the winter. This can be attributed to the math associated with the smaller quantities of Yard Debris that is disposed during the winter months.

Fines. Fines comprise approximately two percent of the waste landfilled and is the twelfth largest waste category. Waste deposited at both CTRC and St. Johns has approximately two percent Fines. KFD's waste has a Fines percentage of less than 0.5 percent.

The seasonal Fines content is substantially the same for spring and summer. It appears to exhibit an increasing trend from spring through winter, i.e., from one to two percent.

Miscellaneous Organics. Miscellaneous Organics comprise approximately seven percent of the waste landfilled and is the seventh largest category of the waste stream. Waste deposited at CTRC and St. Johns has eight and six percent Miscellaneous Organics, respectively. KFD's waste has

approximately seven percent Miscellaneous Organics, which is the same percentage as the weighted means for CTRC and St Johns combined.

The seasonal Miscellaneous Organics content of the waste stream varies from five percent in the fall and spring to two percent in the winter, and ten percent in the summer.

Recyclable Glass. Recyclable Glass, which includes the subcategories Beverage Glass and Other Recyclable Glass, comprises approximately three percent of the waste stream. Waste deposited at CTRC and St. Johns has four and three percent Recyclable Glass, respectively. KFD's waste has less than 0.5 percent Recyclable Glass. Recyclable Glass at CTRC is about evenly divided between Beverage and Other Glass subcategories. Beverage Glass is the same percentage at CTRC and St. Johns.

The seasonal Recyclable Glass content of the waste stream is substantially the same during summer, fall and winter. The percent in the waste decreases from winter to spring by one percent; i.e., from three to two percent. Beverage Glass has its lowest percentage during the spring at 1.2 percent, and its highest during the summer at 2.1 percent. The fall and winter contents are essentially the same at 1.5 percent.

Other Glass has its lowest percentage in spring, 0.8 percent, and increases through the remaining seasons to approximately two percent in the winter.

At 2.8 percent, Recyclable Glass in Metro's waste stream appears to be on the low end when compared to the waste composition of Michigan's waste. Although the range is from 3.1 to 7.0 percent for the Michigan waste, only one of the six Michigan sites had Recyclable Glass below 5.5 percent. Thus, it would appear that a substantial portion or recyclable glass is not entering the waste stream for disposal. However, efforts to increase the level of glass recycling should be investigated due to the relative ease of source separating Recyclable Glass. The situation with Recyclable Glass is similar to that for the recycling of Plastics. In particular, the source separation and/or curbside collection programs may be applicable to reducing the amount of Recyclable Glass in Metro's waste stream.

Aluminum. Aluminum, with the two subcategories Food Containers and Other Aluminum, makes up less than one percent of the waste stream. Waste deposited at KFD had slightly higher Aluminum content than waste received at CTRC and St. Johns. Approximately 97 percent of the Aluminum at KFD was of the Other Aluminum subcategory. At CTRC and St. Johns,

the Other Aluminum subcategory comprised 70 and 65 percent of the Aluminum category, respectively.

Based on experience with other areas, this lack of Aluminum in the waste stream is typical of areas having bottle bill deposit legislation. Aluminum has a high secondary value, making it a desirable target for recycling programs. Educational programs to increase the public awareness as to recyclable Aluminum items other than Food Containers, would help to increase the total amount of Aluminum recycled in the Metro region.

Ferrous Metals. Ferrous Metals comprise approximately seven percent of the waste landfilled and is the sixth largest category of the waste stream. The Ferrous Metals category consists of two subcategories; Other Ferrous Metals and Ferrous Food Containers. The subcategory Other Ferrous Metals is 3.5 times greater than Ferrous Food Containers.

Waste deposited at CTRC and St. Johns has six percent Ferrous Metals, while waste deposited at KFD has 11 percent Ferrous Metals. The Ferrous Metals subcategories at CTRC and St. Johns constitute two and four percent of the waste stream for Food Containers and Other Ferrous Metals, respectively. The Other Ferrous Metals subcategory at KFD comprises over 98 percent of the Ferrous Metals category.

The seasonal Ferrous Metals content of the waste stream is substantially the same for summer, fall, and winter. It increases from seven percent in the winter to eight percent in the spring. The Other Ferrous Metals subcategory exhibits a similar pattern as the total category.

The Ferrous Metals content in Metro's waste stream was slightly less than the national average of 8.2 percent. However, it was more than the quantity of Ferrous Metals found in the U.S. DOE study, the Santa Clara study, and the Michigan study. The reasons are not clear, and the majority of the Ferrous Metal falls into the category of Other. Thus, the consideration of increasing Ferrous Metals recycling should be carefully reviewed. Although it composes 7.2 percent of the waste stream, the relative ease with which it can be removed from the waste stream and collected needs to be considered in possibly targeting this component for increased levels of recycling.

Non-ferrous Metals. Non-ferrous Metals comprise less than 0.5 percent of the waste landfilled. Waste deposited at CTRC and St. Johns has 0.2 percent Non-ferrous Metals, while waste deposited at KFD has 0.9 percent Non-ferrous Metals.

The seasonal Non-ferrous Metals content of the waste stream varies over the four seasons. This category exhibits a decreasing trend from winter through fall. During the fall sort, this category was included in the Miscellaneous Organics. This explains the zero percent for the Non-ferrous Metals category during the fall sort.

Miscellaneous Organics. Miscellaneous Organics comprise approximately eight percent of the waste landfilled. It is the fourth largest category of the waste stream. Waste deposited at CTRC and St. Johns has six and five percent Miscellaneous Organics, respectively. KFD's waste contains 17 percent Miscellaneous Organics.

The seasonal Miscellaneous Organics content of the waste stream varies over the seasons. The highest percentage occurs in the winter at ten percent, and the lowest occurs in spring at seven percent.

Reusables. Reusables comprise less than 0.5 percent of the waste landfilled. The seasonal Reusable content of the waste varied from a high in fall to a low in spring. Winter, spring, and summer waste contained less than 0.5 percent Reusables, while fall waste contained approximately one percent.

Hazardous Waste (HW). Hazardous Waste comprises less than 0.5 percent of the waste landfilled. It is the next to smallest category and equal to the Other category. Waste deposited at CTRC and St. Johns has less than 0.1 HW. KFD's waste has approximately 0.6 percent HW. At CTRC and St. Johns, HW constitutes the lowest percentage in the waste stream. At KFD, HW is the eleventh largest category.

The seasonal HW content varies significantly. The spring waste has no measurable HW, while the summer waste has 0.6 percent, and fall and winter were less than 0.1 percent. The summer high may reflect an increase in outdoor activities, such as painting or spraying for weeds and insects.

Other. Other waste category comprises less than 0.5 percent of the waste landfilled. It constitutes the lowest percentage of the waste stream. Waste deposited at CTRC and St. Johns has approximately 0.1 percent of Other Waste. KFD's waste contains 0.4 percent of Other Waste.

The seasonal Other Waste content varies significantly. The spring has no measurable waste in this category, while fall has approximately 0.5 percent. Summer Other Waste has the next highest content at 0.1 percent, while winter was less than 0.1 percent.

Drop Boxes

The drop boxes sampled were comprised of compacted loose waste. A total of 292 drop boxes were sampled, of which 249 contained loose waste. The percentages are not weighted to the quantities of waste compacted and loose drop box containers.

The two highest percentage categories are Paper and Wood at approximately 25 and 21 percent, respectively. The combination of these categories constitute 46 percent of the drop box waste stream. In comparison, Paper and Wood comprise 29 and 13 percent, respectively, of the total waste stream, or a combined percentage of 42 percent.

Within the Paper category for the drop boxes, the combined percentages of OCC, Newspaper, and Office Paper is 14 percent. These subcategories comprise 16 percent of the total waste stream.

The Plastics content for the drop boxes and the total waste are the same as are the Other Plastics.

The Wood percentage in drop boxes is approximately twice that of the percentage for the total waste stream. This probably reflects the heavy use of drop boxes at construction, demolition sites, and broken wooden pallets. However, Yard Debris in drop boxes is approximately one half the percentage of Yard Debris for total waste stream, since few homeowners use drop boxes for yard debris.

Ferrous Metals, Miscellaneous Organics, Textiles, Aluminum, Reusables, and Other Wastes percentages are approximately the same for drop boxes and the total waste stream. Food Wastes, Diapers, Fines, and Recyclable Glass percentages are significantly lower for drop box waste than the total waste stream. Non-ferrous Metals, Miscellaneous Inorganics, and HW comprise significantly higher percentages of drop box waste than the total waste stream.

High-Grade Waste Analysis

Purpose of High-Grade Waste Analysis. An analysis was performed in order to identify sources of commercial waste that could be readily recycled through source separation or dump-and-pick recovery operation. In addition, the analysis sought to identify problem contaminants and discern whether generators could increase recovery by altering their waste handling practices. The exhibits which summarize the results

of the High-Grade Waste Analysis are contained in Appendix D. These exhibits are based on 58 waste samples obtained during a five-day sampling effort.

Though waste samples were sorted into 27 categories, including Glass Containers, Tin Cans, Aluminum, Non-ferrous Metals and Ferrous Metals, Old Corrugated Containers (OCC), Newspaper, and Office Paper, this report focuses mainly on OCC and Office Paper. These two waste categories occurred in sufficiently high percentages, making recovery feasible. Other categories either occurred in low percentages, such as Glass Containers, or lacked marketability, such as Mixed Waste Paper and Plastics.

Methodology. The consultants' staff met with haulers and local government officials to identify sources of high-grade loads and obtain cooperation in delivering those loads for sorting.

The sources included shopping malls, mixed retail stores, fast food restaurants, full-service restaurants, multi-tenant office buildings, banks and savings and loans, schools, manufacturers, and others.

Haulers were surveyed to discuss scheduled delivery of high-grade waste loads to the Clackamas Transfer and Recycling Center (CTRC). Haulers delivered loads from drop boxes and front-end loaders according to their regular collection schedules. In addition, several special collection routes were established to obtain wastes from business locations in one desired category: banks, full-service restaurants, and multi-tenant office buildings. These special loads were collected in front-end and rear load trucks.

A crew of six hand-sorted 200-to-300 pound waste samples into 27 categories, according to procedures used for the full waste stream analysis. A total of 10 to 12 loads per day were sampled and sorted during the five-day period.

One drawback of the sampling method was the tendency of the CTRC loader operator to drop very large pieces of OCC, such as appliance boxes. These pieces were not delivered to the sorting area, and this lowered the amount of OCC in the sample, which is of particular importance to this study.

Shopping Malls. A high percentage of shopping mall waste was OCC, and appeared to be readily recoverable through either source separation or dump-and-pick system. The two samples from a large shopping mall approached 50 percent OCC. The OCC was clean, because wet wastes from restaurants and other stores were bagged separately.

Mixed Retail Stores. While the percentage of recoverable wastes is not as high for mixed retail stores as for shopping malls, some loads contained high levels of OCC. The average for the group was 24 percent OCC, but one load contained 80 percent.

Fast Food Restaurant. The OCC average for fast food restaurants was 16 percent, even lower than for mixed retail. But again, the range was wide, and individual restaurants appeared to be candidates for recovery. During sorting, two loads were on the floor side-by-side. One load had only two percent OCC, while the load from another fast food outlet in the same chain contained 45 percent OCC. Phone calls to the two outlets confirmed that the first had an OCC recovery system in place, while the second did not. The loads from fast food restaurants contained an average of 44 percent mixed waste paper.

Full-Service Restaurants. Waste from full-service restaurants did not appear to be desirable for high-grade recovery because of contamination problems and small amounts of recoverable materials. The average amount of OCC was about the same as for fast food restaurants, but the range was narrower. The average amount of glass containers in the samples was ten percent.

Multi-Tenant Office Buildings. Only one waste sample was obtained from 27 multi-tenant office buildings, making analysis difficult. Office paper was found in moderate quantities (18 percent).

Banks and Savings and Loans. A special route was established by a garbage hauler to deliver wastes from 14 banks and savings and loan branches. A high percentage (58 percent) of high-grade ledger paper was found in the sample. Many large bank offices have successful office paper recovery programs, and it appears small branch offices could also reduce their waste substantially through a recovery program. However, the absolute amount of materials was small, about 850 pounds for the entire load, and it was not known whether each location's contribution was of a similar size. Servicing these smaller generators might be effective in recovering a significant amount of recyclables.

Schools. Recovery of large quantities of recyclables from school wastes does not appear promising. The average amount of office paper in the nine samples was 14 percent. Loads from schools contained an average of 29 percent mixed paper.

Grocery Stores. Grocery stores frequently have OCC recovery systems in place and the lack of recoverable materials in their wastes probably attests to the success of those

programs. The highest amount of OCC found in a grocery store sample was ten percent.

Manufacturers. The manufacturers' samples were a diverse group, and this diversity is reflected in the range of OCC found in the eight samples. While an average for the group was 23 percent, individual samples ranged from one percent to 61 percent OCC.

Other. Twelve samples were taken from a variety of businesses that did not fall into the previous categories. These included a food processor, two public warehouses, a construction company, a hotel, a general distributorship, a resort, a furniture store, and others. Amounts of OCC ranged from 1 to 42 percent, reflecting either existing recovery systems or differing use of materials. Samples from the distributorship and the food processor contained the highest amount of OCC.

Conclusion. Among the commercial groups in the study, large shopping malls and branch offices of financial institutions (as a group) appear to be the best untapped sources of recoverable OCC and office paper, respectively. To make recovery feasible, shopping malls will have to keep OCC separate from wet wastes, as did the one in the study. More research is needed to determine wet wastes, as did the one in the study. More research is needed to determine whether office paper separation programs at banks and savings and loans would make recovery of high-grade paper feasible.

Individual mixed retail stores, fast food restaurants, manufacturers, and other appear to have high potential for OCC recovery, as long as the fiber is kept uncontaminated. Within all four groups, the percent of OCC varied widely.

More investigation would be needed to determine whether all multi-tenant office buildings are poor candidates for recovery or whether office paper recovery systems are already in place in some buildings and could be duplicated in others to further reduce wastes.

Findings and Conclusions

General Comments

The findings and conclusions presented in this chapter are for the Portland Metropolitan region and are based on data collected during the course of the Waste Characterization Study. The general approach used and described in previous sections can be used in estimating waste quantities, composition, and generation rates in subgroups within the

region, including blocks of census tracts, as identified in the data base system. Results from this study may be compared to other locations; however, considerable caution should be exercised. If such use is attempted, comparisons between Portland Metro region and other locations should also be made. These comparisons should include population, geographic location, residential vs. commercial mix, urban vs. rural mix, the bases of local economy, and the affluence of the residents. Other factors to be considered include economic conditions and seasonal variations, the latter including agricultural, university, and other activities.

The data collected for this study is very reliable due to two factors. First, nearly two times the originally proposed amount of data was gathered, allowing more accuracy with greater precision. A total of 705 samples, averaging over 280 pounds each, were taken over four seasonal sampling periods. Second, the field data was gathered in a careful and conscientious manner, with attention to details specific to Metro's goals and objectives. This was balanced with an awareness of the need for uniformity in the information gathering system to facilitate analysis of the data by computer.

In addition, the data collected for this study was in a very manageable format due to two factors. First, the R-Base System V data base software has the capability of managing and manipulating the large amount of data in response to almost any question posed by interested parties. Second, the waste was sorted into 27 categories designed to anticipate the needs of future recycling programs, legislative interests, and issues concerning the packaging industry.

Findings

1. There are significant amounts of potentially recoverable materials in the waste being disposed of at landfills in the Metro region. The most notable components of the waste stream available for recovery are listed below:

    - Paper categories represented over 29 percent by weight of the waste stream, including nine percent OCC/Kraft and 13 percent Other Paper;
    - Wood at almost 13 percent;
    - Yard Debris at over ten percent, averaging 14 percent during the spring and fall;
    - Plastics over seven percent; and

- Ferrous Metals over seven percent.

2. The historically recyclable materials, including Newspaper (3.43 percent), Recyclable Glass (2.75 percent), Aluminum (0.98 percent), Other Non-ferrous Metals (0.38 percent), and Ferrous Food Containers (1.58 percent) make up a combined total of less than ten percent of the waste stream.

3. During the entire survey, a total of 2,040 returnable beverage containers were found, an average of three containers per sample, or 20 containers per ton of waste sampled. However, only 432 wine coolers were found, less than one per sample, or five containers per ton of waste sampled. A total of 1,819 milk jugs were found, an average of 18 per ton.

4. Disposable diapers make up a measurable portion of the waste stream and account for approximately 1.5 percent of the municipal waste stream. No diapers were found at limited purpose landfills.

5. The amount of hazardous waste being disposed of at Metro region landfills appears low, representing 0.03 percent of the municipal solid waste disposed. The amount of hazardous waste being disposed of at limited purpose landfills is approximately 0.61 percent of the total going to limited purpose landfills.

6. There are large fluctuations in the amount of yard waste being disposed of throughout the year, with the largest amount being disposed of in the spring and fall (approximately 14 percent of the seasonal waste stream), while the winter and sampling period indicated a low of less than three percent. The seasonal variation in yard waste is indicative of the nine-month growing season typical for the Pacific Northwest west of the Cascades.

7. The municipal solid waste disposed is composed of 83.8 percent combustible materials, while only 68.6 percent of the waste being disposed at limited purpose landfills is combustible.

8. Five samples of residential waste yielded an average energy content of 6,131 BTU per pound at 34.1 percent moisture content. Five samples of commercial waste yielded an average energy content of 7,319 BTU per pound at 11.7 percent moisture content. These are both well above the national average, but should be adjusted to reflect that only the combustible portion of the waste stream was sampled.

Conclusions

1. There are significant quantities of potentially recoverable, recyclable, and combustible materials in the waste being disposed of to landfills in the Metro region. This fact, coupled with probable local and overseas markets for secondary materials, may support additional organized recycling. Therefore, further recycling programs should be undertaken.

2. Metro should continue to organize and participate in regional activities and study efforts for cooperative waste utilization and reduction strategies. Metro is already actively exploring solid waste management alternatives on a regional basis. There are committees now working on setting waste reduction goals and identifying programs for implementing the goals.

3. Metro should continue to implement its public outreach and education programs to make the public aware of solid waste management problems, and the positive role they can play, such as participating in recycling programs.

4. Metro should continue to identify and implement collection systems that would take advantage of the natural separation and uncontaminated condition of solid waste within the commercial and industrial sectors identified in the High-Grade Waste Analysis.

5. Current recycling is already having a significant impact on the waste being disposed as compared to other urban waste sheds. The five typically recyclable materials, Newspaper, Recyclable Glass, Aluminum, Other Non-ferrous Metals, and Ferrous Food Containers, make up less than ten percent of the waste disposed of in the Metro region.

6. The bottle bill is having a distinct impact on the amount of Recyclable Glass and Aluminum beverage containers being disposed. The Portland Metro region shows a significantly lower amount of Recyclable Glass and Aluminum in its waste stream than areas not having a bottle bill.

7. Newspaper recycling is also having a major impact on the amount of waste paper being disposed. Other similar communities have as high as nine percent of the waste stream as Newspaper, while the Portland Metro region shows less than 3.5 percent.

8. Metro should continue implementation of programs to educate the public concerning the proper disposal of hazardous waste. Based on the results of the waste characterization study, it appears Metro's programs have been very successful at minimizing the amount of hazardous waste in the waste stream. Metro should increase public education programs during the summer to coincide with the increase in hazardous waste.

9. The fact that samples for energy content analysis were taken only from the combustible portion of the waste during the fall sample when the weather had been dry may provide somewhat optimistic (high) heat (BTU) values when projected over the year for the entire waste stream.

10. This waste characterization study and the energy content analysis provide useful data related to the amount and energy value of wastes in the Portland Metro region. However, decision-making regarding a waste-to-energy facility or warranties of energy value must be supported by further analysis and should not be based solely on the results of the samples taken during this limited study effort.

PORTLAND RECOVERY LEVEL AND MARKET
CONDITIONS FOR RECYCLABLE MATERIALS REPORT

Study Methodology

To update the 1985 recovery level and market conditions report, Resource Conservation Consultants (RCC) performed the following work:

1. Processors of secondary materials from the tri-county Portland metro area and end users of those materials were identified based on previous RCC research, published lists, and interviews with industry officials (see Page 70).

2. A survey form was developed with questions about plant capacity, operating level, consumption of post-consumer secondary materials, consumption of materials from the tri-county area, plans to increase or decrease consumption, near-term demand, and factors affecting demand of recycled materials.

3. Telephone and personal interviews were held with representatives from all the firms listed below.

4. Export data from the U.S. Department of Commerce were reviewed.

5. The data were compiled, analyzed with the waste composition data, and provided to Metro periodically during the study process.

Old Corrugated Containers/Kraft Paper (OCC)

Material Definition for Waste Reduction Goals

Kraft linerboard and containerboard cartons and shipping boxes with corrugated paper medium (unwaxed). This category also includes kraft (brown) paper bags.

Metro Region Recovery Levels

Old corrugated containers (OCC) are utilized by several mills in the Pacific Northwest, primarily in the manufacture of corrugating medium and paperboard. Roofing felt mills formerly used OCC, but secondary paper usage by Northwest roofing producers has been discontinued in recent years.

The nine waste paper processors listed on Page 70 handle old corrugated containers. The purchased and packed 77,220 tons

of OCC from the tri-county area in 1986. With an additional 86,514 tons disposed each year, the recovery rate for corrugated containers was 47 percent.

Market Demand

About 390,000 to 400,000 tons of old corrugated containers are purchased annually by regional mills. In addition, about 100,000 tons are exported each year. Northwest demand is expected to grow about 38,000 tons annually by the end of the decade. Also, Northwest consumers purchase secondary fiber from outside the region and therefore desire fiber over these more distant sources.

Old Newspapers (ONP)

Material Definition for Waste Reduction Goals

Printed groundwood newsprint; referred to as No. 1 News. This category includes glossy non-recyclable paper typically used in advertisements and delivered with newspapers.

Metro Region Recovery Levels

Old Newspapers are processed by several Portland area firms and sold to paper and paperboard mills, to insulation manufacturers and to export markets. The largest share of newspaper recycled in the Northwest is consumed by Jefferson Smurfit Newsprint at its two Oregon mills.

Nine processors of newspapers in the Metro area were interviewed for their purchase levels.

In 1986, ONP recovery in the Portland tri-county area reached 61,560 tons. With 33,156 tons disposed in the region each year, the recovery rate for waste newspapers was 65 percent.

Market Demand

The primary consumers of ONP are paper mills in the manufacture of newsprint and other paper products. In addition, a smaller amount of consumption occurs by several companies that manufacture cellulose insulation or fruit packing trays.

Consumption of Old Newspaper in the Pacific Northwest is approximately 365,000 tons annually. As much as 60,000 to 70,000 tons are shipped to foreign mills each year. Although no existing Northwest consumer has announced firm plans to increase consumption in the near term, it should be noted that additional waste fiber from the Portland area is highly

desired as consumers (particularly the large Jefferson Smurfit mills in Oregon) buy newspaper from suppliers in other states.

Overhanging the market is the consideration by Smurfit of converting one of the papermaking machines at the Oregon City mill to another grade of paper. This could lead to a decline in Old Newspapers demand, although the company is also considering boosting consumption at its more modern Newberg facility.

Office Paper

Material Definition for Waste Reduction Goals

Printing, writing and computer paper including both groundwood and thermo-chemical pulps. Both pulp substitutes and high-grade de-ink fibers are included. This category is composed of high-grade paper which includes white ledger, colored ledger, computer printouts, computer tab cards, bond and copy machine paper.

Metro Region Recovery Levels

High-grade office waste paper, including white ledger, computer printout and colored ledger, is processed by a number of local waste paper packers. End users of the material include paperboard producers and tissue manufacturers.

Seven firms in the Metro area that process high-grade waste paper were interviewed to determine the quantity of material they handle. High-grade paper is generated both as post-consumer waste (e.g., from office buildings) and as industrial scrap (e.g., clippings). Since the waste paper from large commercial and industrial processes is not traditionally found in the waste stream, it is not included in determining recovery levels.

For 1986, office waste paper recovery in the tri-county region was 11,412 tons. With 37,989 tons disposed, the recovery rate for waste office papers was 23 percent.

Market Demand

Regional demand for high-grade fibers (de-ink and pulp substitute grades) shows the most promise. With regional consumption at approximately 115,000 tons per year, mill representatives report that they will be able to use an

additional 10,000 tons per year by 1990. In addition, approximately 100,000 tons per year of high-grade fiber is exported from the Northwest.

The majority of high-grade paper consumed by end users is not post-consumer waste--it is cuttings and other wastes from manufacturing processes. Few Northwest mills consume post-consumer office paper. The firms that do have been unwilling to release information regarding their consumption levels of high-grade office paper.

Mixed Paper

Material Definition for Waste Reduction Goals

Low grade paper. This category includes magazines; construction paper; books; non-corrugated paperboard, such as boxboard and chipboard; carbon paper; tissue; and paper food cartons.

Metro Region Recovery Levels

Mixed waste paper consists of a mixture of different paper stock grades such that it cannot be sold as a specific grade (e.g., as newspaper or computer printout). The dominant use of mixed paper is in the manufacture of chipboard, boxboard, tube board, gypsum wall board and other paperboard products.

Relatively few processors and end users of mixed grades exist in the area. Much of the processed mixed waste paper is exported to Asian markets.

The estimated 1986 recovery level for mixed waste paper in the Metro region was 13,800 tons. This represents a recycling rate of ten percent, with 126,242 tons of mixed waste paper being landfilled.

Market Demand

Little mixed waste paper is consumed in the Northwest--only about 7,500 tons annually. Paper industry executives say that this consumption level will not change in the near term. The dominant market force is exporters, who ship about 70,000 tons of mixed paper annually to offshore mills.

Plastics

Material Definition for Waste Reduction Goals

Plastic milk jugs, LDPE and HDPE plastic, and other mixed thermoplastics.

Metro Region Recovery Levels

Plastics recycling occurs primarily through the return of PET soft drink containers under the deposit law. This material is sold primarily to a producer of staple fiber. In addition, one drop-off recycling center in the region accepts mixed plastic containers which are then processed by a Vancouver, Washington firm.

Approximately 800 tons per year of plastic soft drink bottles are recovered annually from the Metro area waste stream. An additional 15 tons of mixed plastics are recovered. With 60,608 tons of material landfilled per year, the recycling rate is approximately one percent.

Market Demand

Currently the PET recovered under the deposit law is being shipped out-of-state, and the costs are being subsidized. This lends a questionable status to the future of the market since local, cost effective markets do not exist for the material. The California redemption law may become feasible to establish end users on the West Coast.

The status of markets for mixed plastics is also questionable. Several processors have been proposed or implemented on a small scale which have potential. However, the difficulty of handling, storing and transporting the bulky, lightweight material makes the economics of marketing mixed plastics uncertain.

Yard Debris

Material Definition for Waste Reduction Goals

Prunings (limbs) - naturally occurring woody material from trees and shrubs and leaves/grass clippings - naturally occurring vegetative material and other fine organic waste from park, lawn, and garden maintenance.

Metro Region Recovery Levels

Yard debris is currently processed at three Portland area locations, with one additional site, St. Johns Landfill,

collecting materials for transport to area processors. Recovery figures for yard debris were calculated from the receipt at the four sites. The yard debris received at the sites is delivered by self-haul vehicles (private or commercial) or packer trucks from two curbside collection programs.

Since yard debris is measured upon receipt by volume in cubic yards, it was converted to tons at a rate of 200 pounds per cubic yard.

Records of receipt of yard debris by month for each center were obtained. Two of the centers, East County Recycling and St. Johns Landfill, have not recorded receipts for a full year. Due to the seasonal variability of delivery of material, it is necessary to determine yearly quantities, rather than to estimate annual figures from a single month. Since August and September were missing for all centers, an average of the receipts for July and October were used for each of the missing months.

The recovery level for the period of August 1986 though July 1987 was 28,401 tons. Since 101,593 tons were landfilled, yard debris was recycled at a rate of 22 percent. In that period, 38,937 tons were processed and sold as final products.

Market Demand

The future demand for yard debris compost is difficult to predict since the material must penetrate new markets, specifically the landscape and nursery industries. As has been experienced by marketing efforts for other composted waste products, many pitfalls could arise.

One measurement of the potential for market growth is the recent record of sales of the final compost product. For the first time since the recovery of yard debris began in the Portland metro area, sales in 1986 exceeded receipts of the raw material. The following table shows the quantity of compost sold by the Portland area processors as a percentage of yard debris received.

YEAR	PERCENT
1983	52
1984	50
1985	97
1986	117
1987	138

If this same trend continues and if the supply does not increase too rapidly, the market should grow in supply. The

size of the potential market for yard debris compost has been determined to be adequate to consume all available yard waste.

Wood

Material Definition for Waste Reduction Goals

Wood and dimensional lumber and other woody construction materials resulting from remodeling, repair, demolition, or construction of residences, buildings and other structures.

Metro Region Recovery Levels

Recovered quantities for wood are not available.

Market Demand

The primary market for wood from the waste stream is users of hog fuel. Dry wood, such as waste lumber, makes a high-BTU hog fuel. However, the depressed hog fuel market discourages any optimism for increasing the marketing of waste wood products.

Glass Containers

Material Definition for Waste Reduction Goals

Beverage - all beverage container glass. Included are wine bottles, wine cooler bottles, liquor bottles, pop bottles, beer bottles, juice and other glass beverage containers. Recyclable glass - other potentially recyclable container glass. This category includes glass food jars, medicine bottles and empty chemical bottles.

Flat, pressed, blown and non-recyclable glass products such as light bulbs, ceramics, window, auto, and cooking ware glass are not included.

Metro Region Recovery Levels

Only one end user of waste glass containers, called cullet, exists in the state--Owens-Illinois (O-I) in Portland. In addition to cullet consumption, a portion of the glass containers that are consumed in Oregon are reused under the deposit law. Statistics are not available on the number of bottles refilled by bottling plants and are therefore not included in the recovery figures.

Generally, the source of recycled glass containers, whether from the tri-county area or other portions of the state, is not well documented. However, the quantities collected in Oregon are recorded. Therefore, the tri-county recovery figure is calculated as a share of state recycling and is based on population. This may yield a somewhat lower recovery level than is the case since recovery may be higher in the Metro region than elsewhere.

Glass Container recovery in the Metro region last year is estimated at 14,100 tons. With 25,582 tons of glass containers disposed each year, the recovery rate for glass containers is 35 percent.

Market Demand

Container glass is produced in three colors -- flint, amber, and green. The supply of all colors is increasing, with a 20 percent increase since last year. However, these increased supplies have posed no difficulties for the end user, except for green cullet. O-I's ability to use green cullet is nearing capacity due to low production of green bottles in the Northwest. In the past it has been necessary to ship quantities of green cullet to California, at a loss to the company. If present trends continue, the same situation may arise again.

With the exception of green cullet, the end user foresees no problem with consuming all cullet that will be generated by recycling programs in the Northwest. The percentage of secondary cullet used in the production of new glass is flexible, and could potentially be increased from the current level of approximately 35 to 45 percent up to 60 to 70 percent.

Ferrous Metal -- Tin-Plated Food and Beverage Containers

Material Definition for Waste Reduction Goals

Tin-plated ferrous food and beverage containers, alloyed metals are included. This category includes soup and vegetable cans, food tins, etc.

Metro Region Recovery Levels

Tin cans are collected in curbside programs and at drop-off centers. All material collected in the Northwest is processed by a single firm, MRI Inc., in Seattle. The tin is separated from the ferrous scrap, and both materials are sold for recycling.

Portland-area processors which send material to MRI were surveyed regarding the volume of material purchased form Metro area suppliers. The recovery level in 1986 was 864 tons. With 15,273 tons of tin-plated containers disposed each year, the recovery rate is five percent.

Market Demand

The market for tin cans can absorb increased supply. Currently MRI is operating at two-thirds of capacity and can expand with increased supply. This user could "easily" consume an additional 500 tons per month, which exceeds expectations for recovery by existing and newly established recycling programs in the Northwest.

Scrap tin can supply has been steadily increasing for the last several years, with a 25 percent increase in supply from Oregon between 1986 and the present. However, post-consumer tin cans still amount to only 15 percent of the feedstock of MRI. Post-consumer scrap material purchases can be expanded by adding an additional shift, displacing industrial scrap with post-consumer material, or expanding operations. The markets for final products (tin and tin-chemicals, and steel bundles) are not a limiting factor.

Other Ferrous Metal

Material Definition for Waste Reduction Goals

Ferrous and alloyed ferrous scrap materials derived from iron including household, industrial and commercial products not containing significant contaminants. This category includes scrap iron and steel to which a magnet adheres. Stainless steel and white goods (large appliances) were not included in this category in the waste sorting.

The surveys to determine regional ferrous metals recovery included white goods.

Metro Region Recovery Levels

Ferrous scrap metals in the form of old appliances and miscellaneous iron and steel scrap are processed by scrap yards. One yard processes nearly all the material collected in the Portland area.

Post-consumer scrap must be distinguished from industrial scrap for the purpose of this study. Material from these sources, however, is often mixed together and processors find it difficult to estimate precisely their recovery level by source.

By far the greatest proportion of material that is processed comes from industrial sources. In addition, bulk discards such as old automobiles, railroad cars and rails, and building beams are processed. These materials do not appear in the municipal solid waste stream and are not included in the calculation of recovery levels.

Post-consumer scrap includes such items as appliances, bike frames and wheel rims. The recovery level of post-consumer ferrous is estimated at 40,000 to 53,000 tons per year. With 54,228 tons landfilled annually, the recycling rate for ferrous metals is between 42 percent and 49 percent.

Market Demand

Industry spokesmen are confident that all ferrous scrap that could be extracted from the waste stream could be consumed by local markets within their existing capacity.

Aluminum and Non-Ferrous Metals

Material Definition for Waste Reduction Goals

Metals that are not derived from iron, including aluminum, copper, brass, bronze, aluminum bronze, lead, pewter, zinc and other metals to which a magnet will not adhere. Metals that are significantly contaminated are not included.

Metro Region Recovery Levels

Non-ferrous scrap metals are recovered from industrial and post-consumer waste streams and processed in scrap yards or returned under the beverage container deposit system. As with ferrous metals, it is difficult to determine what portion of non-ferrous metals purchased by local scrap processors is from industrial sources and what portion is post-consumer discards.

Post-consumer non-ferrous scrap metal includes such items as aluminum lawn chairs, window frames, and siding; copper and brass plumbing parts; copper wire; and lead batteries.

Five local non-ferrous metal scrap processors were surveyed regarding their post-consumer scrap purchases. In addition, the regional market for used aluminum beverage cans returned under the deposit law was surveyed.

The 1986 recovery level for non-ferrous scrap metals in the tri-county region was 20,300 tons. With 13,146 tons of non-

ferrous metals discarded annually, the estimated recycling rate was 61 percent.

Market Demand

As with ferrous metals, the markets for non-ferrous scrap do not anticipate any difficulty in handling additional material from the waste stream. Since the quantities of post-consumer waste, even at high recovery levels, would be small compared to post-industrial waste, the required market expansion would be modest.

FIRMS CONTACTED TO DETERMINE EXISTING RECOVERY AND FUTURE DEMAND LEVELS
(Portland area unless otherwise noted)

Waste Paper Processors

E Z Recycling
Far West Fibers
General Paper Stock
Independent Paper Stock
K B Recycling
Oregon Paper Fiber
Oregon Processing and Recovery Center
United Recycling
Weyerhaeuser Company

Waste Paper End Users

Oregon
Energy Guard Inc., Clackamas
Georgia-Pacific Inc., Toledo
International Paper Co., Gardiner
Jefferson Smurfit Newsprint Corp., Newberg and Oregon City
Western Pulp and Paper Products, Corvallis
Weyerhaeuser Co., North Bend and Springfield
Willamette Industries, Inc., Albany

Washington
Container Corporation of America, Tacoma
Crown Zellerbach, Corp., Camas
Georgia-Pacific Corp., Bellingham
Grays Harbor Paper Co., Hoquiam
Inland Empire Paper Co., Spokane
Keys Fiber, Wenatchee
Longview Fiber Co., Longview
Michelson Packaging, Yakima
Scott Paper Co., Everett
Simpson Paper Co., Tacoma

Washington (continued)
Sonoco Products, Sumner
Specialty Insulation, Spokane
Thermoguard Insulation, Seattle

British Columbia
Belkin Paperboard Industries, Burnaby
Island Paper Mills, New Westminster

Plastic Collectors, Processors and End Users

Environmental Learning Center, Clackamas Community College
Rose City Recycling

Yard Debris Receivers and Processors

Information furnished by Metro for:
- East County Recycling
- Grimm's Fuel Co.
- McFarlane's Bark Co.
- St. Johns Landfill

Cullet Processors

Owens-Illinois, Inc.

Ferrous Metal Processors

Acme Trading and Supply Co.
K B Recycling
Oregon Processing and Recovery Center
S.J. Nudelman and Son
Schnitzer Steel Products Co.

Ferrous Metal End Users

Cascade Steel Rolling Mills
MRI, Inc., Seattle
Oregon Steel Mill

Non-Ferrous Metal Processors

Alcoa Aluminum
Calbag Metals Co.
Oregon Processing and Recovery Center
Pioneer Systems, Inc.

Rose City Recycling
S.J. Nudelman and Son
Schnitzer Steel Products Co.

Section VI

HAZARDOUS WASTE PROGRAMS

Metro is interested in two aspects of the hazardous waste issue: household quantities of hazardous waste and conditionally exempt quantities of hazardous waste. Hazardous wastes are residues that are ignitable, corrosive, reactive or toxic. Household hazardous wastes include solvents, some types of pesticides and some types of paints. Conditionally exempt quantities of hazardous waste can be any type of hazardous waste generated by a small business (under 220 pounds/100 kilos per month).

Household hazardous waste and conditionally exempt quantities of hazardous waste are of concern to Metro because these types of wastes can be disposed of in municipal landfills. These pose a potential risk to landfill workers and may potentially contribute to groundwater contamination. The Metro Council adopted a policy which states that Metro will not knowingly accept any quantity of hazardous waste at its facilities.

Hazardous Waste Management Plan

A Hazardous Waste Management Plan (1986) was adopted to secure interagency cooperation to provide recycling and disposal options of hazardous wastes for the general public. Establishment of alternative disposal locations or methods is believed to be outside the scope of Metro's authority. However, Metro can undertake programs to prevent disposal of improper material at its sites. The Hazardous Waste Management Plan outlines several programs to provide options to the general public.

These programs include a pilot project for collection of household hazardous waste and establishment of additional task forces to develop a directory of disposal options for household hazardous waste and to further study the small quantity generator problem. Also included in the plan was the addition of a hazardous waste category in the waste composition study.

Options on how best to collect household hazardous waste and hazardous waste from conditionally exempt generators need to be evaluated. Several options are available:

- collection events
- permanent sites
- special area of transfer stations
- door-to-door pickup service

Section VII

RATES

Disposal rates are established on a cost-of-service basis. Rate setting is in accordance with ORS Chapter 268, which states Metro may collect user charges to pay for services and the planning, construction, and maintenance of facilities, equipment, and improvements. Commercial and self-hauling disposers pay according to their relative costs of providing service.

The disposal fee is comprised of several components--the base rate, regional transfer charge, convenience charge, user fee, and Oregon Senate Bill 662 fees. Each element pays for specific costs and is charged to specific users.

A brief description of each component follows:

- The base rate covers the cost of disposing of waste at the St. Johns Landfill, and is paid by users of St. Johns and Metro's transfer system, presently composed of the Clackamas Transfer and Recycling Center.

- The regional transfer charge, along with the convenience charge, pays for the cost of operating Metro's transfer system. The transfer charge is collected from all disposers in the region except commercial haulers at limited use landfills (landfills not taking food or some other type of waste).

- The convenience charge is collected only at Metro's transfer and recycling center system, and helps pay the cost of the transfer system.

- The user fee pays the cost of solid waste programs not directly related to operation of the disposal or transfer system. Such programs include management and administration of Metro's solid waste disposal system, waste reduction programs, and solid waste system planning and development. The user fee is collected on all waste generated in the region.

- Senate Bill 662 fees (1985 Legislative Session) include the rehabilitation and enhancement fee and the landfill siting fee. The former collects funds for the benefit of the neighborhood around the St. Johns Landfill. The amount is set by legislation

at fifty cents per ton for all waste disposed at that landfill. The latter pays the costs the Department of Environmental Quality incurs in siting and analyzing a new regional landfill to succeed St. Johns. The amount is one dollar per ton for all waste generated in the region. The rehabilitation and enhancement fee is due to terminate when the St. Johns Landfill closes. The landfill siting fee will be discontinued when all the Department of Environmental Quality's costs of identifying and analyzing the region's new landfill have been covered.

The total anticipated costs in each area, divided by the relevant waste flow figure, result in the fee for that item. The sum total of all the fees is the tipping fee. For example, the tipping fee at the St. Johns Landfill is the sum of the base rate, regional transfer charge, user fee, and Senate Bill 662 fees.

Some rate incentives to encourage waste diversion to or away from certain sites have been implemented.

- Commercial users of limited use landfills are not charged the regional transfer charge. This economic incentive was instituted to encourage use of limited use facilities rather than general purpose sites. Saving space at general purpose sites is a priority adopted by the Metro Council.

- Users of non-Metro facilities do not have to pay the landfill siting fee. Metro site disposers absorb the extra cost of non-Metro facility disposers' obligation for this item. The purpose of this measure is to encourage the use of non-Metro sites in order to extend the life of the St. Johns Landfill.

Disposal rates will rise as services and facilities are added to the solid waste system. It is projected that the cost of disposal will reach approximately $45 - 50 per ton by the end of 1988. Cost of disposal projections for 1991 are approximately $55 - 60 per ton.

Section VIII

CASE STUDIES OF FACILITY SITING PROCESSES

Since its inception in 1979, Metro has undertaken five siting processes. The facilities to be sited included two recycling centers, a sanitary landfill, two transfer and recycling centers and a resource recovery facility. As of September 1987, only one transfer and recycling center has been built. The land use issues of each siting process are presented to assist the region in adopting suitable policies and ordinances to successfully site solid waste facilities.

Regional Landfill Siting

In December 1979, the Metro Council created the Regional Landfill Siting Advisory Committee, a citizen committee charged with overseeing the landfill siting process. An Interagency Solid Waste Task Force Technical Committee was formed jointly by DEQ and Metro in January 1980. The task force identified 46 potential landfill sites, and in June 1981, the Metro Council selected the Wildwood site in Multnomah County for the regional landfill.

Metro applied for a conditional use permit to construct a landfill under a community services use designation. The Multnomah County staff recommended approval of the application to the hearings officer. The hearings officer denied the conditional use permit stating that the proposed use would not fully meet any of the criteria specified in the County Code. The approval criteria are stated in Chapter 11.15.7015 of the Multnomah County Code, and are as follows:

"The applicant for the community services use designation must show that the proposed use..."

- is consistent with the character of the area.
- will not adversely affect natural resources.
- will not conflict with farm or forest uses in the area.
- will not require public services other than those existing or programmed for the area.
- will not create hazardous conditions.
- will satisfy the following policies of the Comprehensive Plan:

- No. 2, Off-Site Effects
- No. 11, Commercial Forest Land
- No. 13, Air and Water Quality and Noise Level
- No. 14, Development Limitations
- No. 16, Natural Resources
- No. 20, Arrangement of Land Uses
- No. 22, Energy Conservation
- No. 31, Community Facilities and Uses Location
- No. 36, Transportation System Development Requirements
- No. 37, Utilities
- No. 38, Facilities

The hearings officer ruled that Metro's proposal was inadequate to assure that these criteria would be met. The hearings officer further ruled that "mitigating conditions" could not be substituted for the criteria stated in the county ordinance.

In November 1982, Metro appealed the hearings officer's decision to the Board of County Commissioners. Following two public hearings, the Board of County Commissioners granted approval of a conditional use permit. The Board of Commissioners found that the application was consistent with all county ordinances and plan criteria applicable to sanitary landfills.

In January 1983, West Hills and Island Neighbors, Inc. appealed the Board of County Commissioners' decision to the Land Use Board of Appeals (LUBA). In June 1983, LUBA remanded the matter to Multnomah County. LUBA concluded that the county should adhere strictly to the language in the plan and ordinances covering the community services use designation. If the existing language would not allow the siting of a sanitary landfill, then the county should revise the siting criteria and appropriate ordinances. LUBA also stated that "mitigating conditions" were not the appropriate vehicle to meet the criteria stated in the ordinance and plan policies.

In July 1983, Metro and Multnomah County appealed the LUBA decision to the Oregon Court of Appeals. In June 1984, the Oregon Court of Appeals upheld the LUBA decision that Multnomah County must either strictly interpret or change its original landfill siting criteria.

In August 1984, Metro appealed the Court of Appeals decision to the Oregon Supreme Court. In October 1984, the Supreme Court declined to review the Court of Appeals ruling.

In July 1983, Metro asked Multnomah County to revise the appropriate sections of the county code relating to landfill

siting criteria. Numerous drafts and public hearings were presented to the Multnomah County Planning Commission for revision of the landfill siting criteria. In December 1984, the Multnomah County Planning Commission approved new landfill siting criteria changes to the code but specifically excluded Wildwood from consideration under the new ordinances in the code. Metro appealed the Wildwood exclusion to LUBA. In June 1985, LUBA denied Metro's appeal of the Wildwood exclusion. Metro decided not to appeal this denial.

After four years of pursuing the Wildwood site, the issue was closed. Land use issues and adequate criteria for mitigation measures were clearly an issue in the Wildwood situation. The Zoning Code and Comprehensive Plan did not provide realistic criteria for siting a sanitary landfill.

Oregon City Resource Recovery Facility and Transfer and Recycling Center

In August 1977, the Oregon City Planning Commission amended the city's Comprehensive Plan to allow a resource recovery facility in an M-2 industrial zone. Metro staff worked closely with the Oregon City staff to develop appropriate language for inclusion of resource recovery facilities in the Zoning Code.

Metro proceeded to purchase a 13-acre site at the intersection of Washington Street and I-205 in Oregon City. The area near Rossman's Landfill had been identified in the 1974 Solid Waste Management Plan as an appropriate site for a transfer station. No additional siting process was undertaken when the area was selected for a resource recovery facility.

After a third party review of mass incineration technology, the Oregon City Planning Commission granted three conditional use permits for construction of the resource recovery facility, a steam pipeline and the Clackamas Transfer and Recycling Center. Construction on the transfer center began shortly after receiving a permit from the city.

In July 1981, Oregonians for Clean Air, opponents of the resource recovery project, filed a land use appeal to LUBA alleging that no written findings for the permits were issued by Oregon City. In December 1981, LUBA dismissed the opponents' appeal because the appeal was not filed in a timely manner. LUBA did not rule on the opponents' issue of whether Oregon City's action amounted to a final decision. No further land use issues were raised in the siting of the resource recovery project.

Prior to the LUBA decision, the opponents began another tack to stop the resource recovery project--special elections. In November 1981, a city-wide special election was held and the voters rejected an attempt to amend the City Charter to require a vote on the resource recovery project.

Following public hearings on the draft air quality and solid waste permits issued by DEQ and the Environmental Protection Agency and additional independent reviews by community leaders on financial and environmental issues, another special election was held. In November 1982, Oregon City voters, by a 51 to 49 percent margin, decided to prohibit the siting of a resource recovery facility in Oregon City. In recognition of the vote in Oregon City, the Metro Council adopted a resolution calling for termination of work on the resource recovery project.

The demise of the resource recovery siting process was not a land use issue. Since LUBA dismissed the appeal filed by Oregonians for Clean Air, it is unclear whether the work done to amend the Comprehensive Plan was sufficient to eliminate any potential land use problems.

West Transfer and Recycling Center

In June 1984, an eight-member advisory group was formed to assist Metro staff in selecting a site for the West transfer and recycling center. The advisory group was comprised of local government staff from Beaverton, Tigard and Washington County, representatives of the collection and recycling industry, a DEQ representative and three Washington County citizens. The advisory group reviewed approximately 80 sites and held numerous public meetings and hearings before making a recommendation on a site to the Metro Council.

In August 1986, the Metro Council selected a final site located at 209th and T.V. Highway in Aloha. The site selected is zoned industrial. The Community Development Code lists specific concerns relating to neighborhood impacts and facility design which the applicant must address in filing an application.

These are stated in Section 430-120 of the Code:

> Solid waste transfer stations may be permitted subject to the following:
>
> - There shall be a minimum lot size of five (5) acres.

- Transfer stations shall be located adjacent to a collector, arterial or limited-access highway.

Application for a solid waste transfer station shall include a Master Plan which includes but (shall) not be limited to:

- Location, sizes and function of all structures, screening and buffering.

- Street construction and traffic control plan, including access, stacking lanes, circulation and parking.

Written material indicating:

- Measures to be taken to control noise, dust, odor and litter (on-site and off-site).

- Maximum daily capacity of facility.

- Daily and peak trip generation.

In September 1986, the Aloha Reedville Citizens Association (ARCA) appealed the siting decision to both LUBA and Washington County Circuit Court. The issues raised in these suits were whether the standards and criteria of the siting process and the Solid Waste Management Plan were followed in selecting the site at 209th and T.V. Highway.

In December 1986, Metro filed an application to build a transfer station. At the time the application was filed a transfer station was a permitted use in an industrial zone. The Washington County Community Development Code was subsequently changed to require a conditional use permit for a transfer and recycling center in an industrial zone. In December 1986, ARCA filed an appeal to LUBA over the acceptance of Metro's application by Washington County. This suit was merged with the earlier LUBA suit and the Washington County Circuit Court suit.

In March 1987, Washington County staff issued a permit for the facility. ARCA appealed the staff's decision to a hearings officer. The issues raised were ones of environmental protection, transportation access, and compliance with the Solid Waste Management Plan. In July 1987, the hearings officer denied the permit for the facility. The hearings officer's findings stated the application was incomplete because criteria from the Solid Waste Management Plan were not included in the application; that the site selected was

not in an industrial area and therefore, according to the Solid Waste Management Plan a conditional use permit should have been filed; and as submitted the proposed use would create unacceptable traffic impacts.

In July 1987, the Metro Council decided not to appeal the hearings officer's findings and withdrew the cases before LUBA and the Washington County Circuit Court.

In this case, both the Community Development Code and the Comprehensive Plan addressed the siting of a transfer and recycling center. However, the proposed use appeared to be inconsistent with Metro's Solid Waste Management Plan. Traffic impacts were a major concern.

Portland Eastside Recycling Center

In 1979, Metro began a siting process to select a location for a Portland Eastside Recycling Center. Thirty sites were evaluated by a citizen advisory group. A site located at Southeast 39th and Powell was selected and the land use process initiated. This site was zoned C-2, general commercial.

In August 1980, Metro submitted an application to the city of Portland for a revocable permit for a recycling center. At the time the application was filed, a recycling center was not a permitted use in a general commercial zone. A revocable permit alters or exempts an applicant from any provisions or regulations in the Zoning Code.

In October 1980, the planning staff recommended approval of a revocable permit to the hearings officer. After receiving testimony from surrounding property owners and residents, the hearings officer recommended approval of the permit with 13 conditions. The conditions dealt with mitigation measures to protect the neighborhood and general operating requirements. Both the planning staff and the hearings officer based their recommendation on the city's Energy Policy which states in Policy #4, Objective 9:

> To encourage voluntary recycling of other solid wastes and motor oil through a program of education and promotion and the siting of private recycling depots throughout the city and at landfill sites.

The hearings officer concluded that the concerns raised by the neighborhood association regarding traffic and aesthetics would be handled by the conditions attached to the permit.

In November 1980, the Creston-Kenilworth Neighborhood Association appealed the decision of the hearings officer to the planning commission. The planning commission decided to hear the appeal of the permit and also to consider interim recycling center policy guidelines. (Portland's Comprehensive Plan had not yet been acknowledged by Land Conservation and Development Commission (LCDC). The amended plan allowed recycling centers in general commercial zones as conditional uses. Until the plan was adopted by LCDC, interim policies were needed.)

The neighborhood association argued that a recycling center was incompatible with C-2 zoning since the proposed use represented a warehouse and storage function, not a commercial establishment. They further stated that the comprehensive plan was deficient in allowing recycling centers as conditional uses in commercial zones without providing conditions or criteria.

The planning commission also approved the permit request and added two conditions to the permit. The two additional conditions dealt with locking of storage drums and signs to prevent theft. A total of fifteen conditions were attached to the permit. The planning commission also directed staff to prepare more thorough siting and mitigation criteria for code amendments, planning commission review and adoption by the city council.

In December 1980, the Creston-Kenilworth Neighborhood Association and Foto Mart Incorporated filed an appeal of the planning commission's decision to the city council. In January 1981, the issue was discussed at the city council. The city council heard testimony in opposition to and support of granting a permit for the recycling center. The vote was 2-2. Traffic impacts were a major concern of the two commissioners who voted against the proposal. In April 1981, the city council carried the item forward until a fifth commissioner was elected. At this time, Metro no longer had an interest in the property. The issue was not considered by the city council at this time.

In this case, both the Zoning Code and Comprehensive Plan addressed the siting of recycling centers. More specific criteria for siting criteria and mitigation measures were requested by the planning commission.

Beaverton Recycling Center

In 1979, Metro began a siting process to locate a recycling center in Beaverton. The site selected was located on Southwest Fifth Street in Beaverton. The site was zoned

industrial and the proposed use was a permitted use in an industrial zone. The site had been condemned by the Beaverton Urban Renewal Agency.

In July 1980, Metro received approval to build a recycling center from the Beaverton Board of Site and Design Review. Additional conditions were attached to the permit. The conditions specified landscaping requirements, exterior lighting concerns, sign plans and cleanliness requirements.

On October 6, 1980, Hoffman Construction, an adjacent property owner, appealed the Board of Site and Design Review's decision to the city council. The issues raised included concerns about 24-hour service, an inadequate lighting plan, noise from trucks and operation of the facility, impact to the neighborhood, traffic concerns and compliance with the Zoning Code. The city council supported the findings of the city attorney and denied the appeal submitted by the adjacent property owner. The city attorney concluded that increased traffic had been considered. No traffic problems would be created. An adequate exterior lighting plan had been submitted. A statement of compliance with site development requirements and a master plan had been submitted. Reports on noise, traffic control, hours of operation and environmental concern were not required but had been adequately addressed by the applicant. Screening was adequate. No further land use issues were raised.

As the former owner of the selected site prior to condemnation, Hoffman Construction appealed the price paid for the property by the Beaverton Urban Renewal Agency. This appeal caused delays and Metro did not pursue construction of the facility.

The demise of the Beaverton Recycling Center is not attributed to land use issues. The adjacent property owner found another route by which to prevent the siting of a recycling center.

Other Facility Siting Processes

Metro has also been involved with two additional siting processes: a new regional landfill and resource recovery facilities. In both cases, Metro did not conduct the site selection process or select the final site.

Regional Landfill Siting

The 1985 Legislature, through passage of Senate Bill 662, gave the Department of Environmental Quality (DEQ) and the

Environmental Quality Commission (EQC) the responsibility and authority to site a solid waste disposal facility for the Portland metropolitan area. The DEQ, not Metro, began a process to select an environmentally acceptable landfill site. Senate Bill 662 stated that the selected disposal site "must comply with the state-wide planning goals and acknowledged comprehensive plan and land use regulations of the local government unit with jurisdiction over the area in which the disposal site is located." The bill further states that the "standards established by the act take precedence over provisions in the comprehensive plan or land use regulations of the affected local government, and the Commission may select a disposal site in accordance with those standards instead of, and without regard to, any provisions for locating and establishing disposal sites that are contained in the comprehensive plans or land use regulations of the affected local government unit." In short, with passage of Senate Bill 662, no local land use permit was required to site the new regional landfill.

The DEQ, with a team of consultants, developed a comprehensive set of landfill siting criteria. The criteria were reviewed through a number of public meetings, hearings and by a peer group of professionals. There were three categories of criteria: pass/fail, site evaluation and final decision. The pass/fail criteria were used to eliminate areas obviously incompatible with landfill development. The site evaluation criteria were used to evaluate and rank all the potential sites. The final decision criteria were used to evaluate the three final sites.

A list of 142 landfill site study areas was pared to 19 landfill site study areas in June 1986. These site study areas were evaluated for their suitability as a landfill by the DEQ, technical consultants and the public in July and August 1986. Using this information, the sites were reevaluated (using the site evaluation criteria) and ranked according to their numeric scores. In October 1986, the three top ranked sites--Wildwood, Ramsey Lake, and Bacona Road--were then the subject of intense study and public review. In May 1987, the DEQ narrowed the list of sites from three to two, eliminating the Wildwood site. In June 1987, the EQC selected the Bacona Road site in Washington County for the new regional landfill location.

Contested case hearings were held on the site selection process. In view of continued litigation of the EQC selected site, Metro solicited landfill bids to allow the private sector to come forward with a more workable site--both environmentally and politically. As a result of the bid process, Metro signed a 20-year contract with Oregon Waste Systems, Incorporated for final disposal service.

Resource Recovery Siting

In January 1986, Metro issued a request for qualifications from firms interested in building resource recovery facilities. The types of facilities under consideration included refuse-derived fuel, mass incineration and mass composting. Five firms responded to Metro's request for proposals:

Combustion Engineering	Refuse-derived fuel plant
Fluor Engineers /Southern Electric Industry	Mass incineration plant
Schnitzer Steel/Ogden Martin	Mass incineration plant
Riedel Environmental Technologies	Mass composting plant
Reuter	Mass composting plant

The resource recovery proposers were given the responsibility to select appropriate sites for the facilities and to pursue the necessary permits. In January 1987, proposers provided information about primary and secondary sites appropriate for the facilities. A total of eleven sites were suggested by the proposers.

Metro's involvement in the siting process was limited to facilitating public meetings and hearings and responding to inquiries from both elected officials and the general public. Metro staff provided background information and land use information to an advisory group examining the resource recovery proposals. The staff did not make a recommendation on preferred sites.

After several public meetings, the advisory group made a recommendation on preferred sites to the Metro Council. A site at 5437 N.E. Columbia Boulevard in Portland was selected for a mass composting site. A site in St. Helens at the Port of St. Helens was selected for either a mass incineration plant or a refuse-derived fuel plant.

In April 1987, Riedel Environmental Technologies applied for a conditional use permit for a mass composting facility. The Portland planning staff recommended approval of the permit to the hearings officer with 16 conditions.

In June 1987, a public hearing on the application was held. The hearings officer recommended approval of the permit with additional conditions. These conditions included:

Avoidance of undue environmental impact (air, olfactory, water or noise) to its host neighborhood is crucial to the approval and continuance of this Conditional Use. Such adverse impact can be grounds for its termination.

No appeals were filed on the permit.

No site for the mass incineration project has been permitted. Continued public opposition to the facility and various proposed sites have effectively put the project on hold until a site can be secured.

Observations

Nationwide, solid waste facilities are difficult to site and difficult to gain acceptance by the general public. In many respects, the siting experiences of the Portland metropolitan region are not atypical.

The case studies reveal some useful lessons.

- Neighborhood impacts have traditionally been addressed through mitigation measures developed as conditions to conditional use permits or through criteria stated in the zoning code. Repeatedly, citizens have desired a stronger role in developing mitigation measures and have legally challenged the adequacy of mitigation measures.

- The language in zoning codes and comprehensive plans has been interpreted literally by the legal system. Mitigation measures and selection criteria must be clear and attainable through effective programs.

- Mechanisms, other than land use issues, are available to stop the siting of a solid waste facility.

- Applications for permitting solid waste facilities must be able to withstand the entire appeals process of Oregon land use regulations.

Section IX

SUMMARY OF THE "VALUATION OF THE POTENTIAL EXTERNAL EFFECTS AT SELECTED TYPES OF PROTOTYPICAL SOLID WASTE FACILITIES"

Chapter 1: Introduction

1. The purpose of this report is to identify, describe, and estimate the value of the potential and likely environmental effects on land surrounding five types of solid waste facilities:

   1) limited purpose landfills, 2) transfer stations, 3) yard debris processing centers, 4) material recovery centers, and 5) special waste collection centers.

2. An understanding and estimation of the external costs potentially caused by these facilities (i.e., the costs that residents and property owners near a facility may incur as a result of effects that occur outside the boundaries of the facility) have two important uses for decision-makers. First, by considering the full costs that these facilities impose on society, decision-makers may make different and more efficient decisions about the location, scale and design of the needed solid waste facilities. Second, by considering the distribution of these costs on residents and property owners located near these facilities, decision-makers will be more likely to find fair and politically acceptable solutions for siting these facilities.

3. In concept, we estimate the value of external effects by estimating 1) what type of effects might occur as a result of constructing and operating solid waste facilities, 2) how likely is it (the probability) that such effects could occur given existing or likely standards for construction and operation, and 3) the value of the effects if they do occur.

4. In its analysis of the costs of external effects, Metro must keep in mind the difference between 1) how technicians (engineers, economists) value risk and how residents and property owners value risk, and 2) a regional perspective on risk (in which the region gains net benefits from the successful siting of a solid waste facility) and local perspective (in which a community may suffer, or feel it suffers, net losses from the proximate location of a solid waste facility).

Chapter 2: Description of Facilities and External Effects

1. The type, size, and site of a solid waste facility are the three principal determinants of its potential external effects. But potential effects are not a very useful estimate of likely effects, primarily because federal and state government agencies, in the interest of the citizens they theoretically represent, have imposed restrictions on the construction and operation of solid waste facilities. Most potential effects, however, are eliminated or dramatically reduced by existing standards. Additional proposed restrictions would reduce them even more.

Chapter 3: Technical Risk

1. Technical risk is an estimate made by technical experts of the expected value of a loss that results from the construction, operation, closure, and post-closure of a solid waste facility. It is defined as the expected value of such a loss and equals the (probability) that the loss will occur multiplied by its (value) if it does occur.

2. Engineers familiar with the characteristics of solid waste facilities believe that the probabilities of significant external effects occurring at these facilities is very small. None of them, however, is able to quantify precisely what "very small" means. We found no scientific evidence to allow us to make direct numeric estimates of the probabilities of significant external effects.

3. Nonetheless, the expected value of losses from external effects (the technical risk) is low for the prototypical facilities as we have defined them, given expected standards for siting, construction, operation, closure, and post-closure monitoring.

4. Significant increases in the probabilities of loss of life or health are unlikely at the solid waste facilities we reviewed.

   In the examples we presented, the expected value of these effects were on the order of tens or hundreds of dollars per year, not thousands, and very probably not tens of thousands.

5. Disamenities or nuisances are much more likely, but their values are also smaller if they do occur. Of all the effects possible, the only ones with the potential

to have significant technical risk are those related to the transportation of waste: litter, noise, and congestion. These external effects may be very close to zero if a site is found near a low-density, industrial area or a major highway. If a site has opposite characteristics, the value of the external disamenities will certainly exceed the value of potential health effects, and may reach tens or even hundreds of thousands of dollars per year, though the siting process should eliminate such high-value sites.

Chapter 4: Perceived Risk

1. Perceived risk is an estimate of economic damage made by individuals of their expected value of the losses they believe they suffer from the external effects that result from the construction, operation, closure and post-closure effects of a solid waste facility. The risk that individuals perceive may differ markedly from (usually, it will exceed) the technical risk as estimated by experts because people may 1) disagree with the technical assessment of either the probability that an external effect will occur or its value if it does, 2) mistrust experts and governments in general, 3) have incomplete knowledge or a misunderstanding of the technical information, or 4) include in their estimates other values they have about participation, control over risk, or technology.

2. The information we have reviewed on the effects of solid waste facilities on property values supports the conclusion that they are unlikely to have significant effects unless the properties surrounding them are perceived to be at greater risk then the estimates of technical risk appear to indicate. Of the studies we reviewed, the only one that found significant negative effects on property values was one at which the facility in question had existing, known problems. This finding suggests that people's estimates of perceived risk do consider estimates of technical risk.

Chapter 5: Conclusions

1. Our analysis can help Metro 1) understand the differences between the way experts and citizens think about risk and the external costs of solid waste facilities, 2) convince citizens that Metro cares about those risks and has thoroughly studied them, 3) decide with citizens which of the risks are potentially large enough to merit more detailed study

(e.g., of the probabilities of failures, or surveys of how citizens estimate risk), 4) design further analyses to estimate more specifically the risk of external effects deemed important, and 5) design cost effective and fair policies to mitigate external effects and compensate citizens for some portion of the external effects that remain.

2. Concerning the risks of the solid waste facilities we reviewed in this study:

   a. The distinction between technical and perceived risk is important.

   b. Technical risk is likely to be small.

   c. The better Metro can communicate the technical risk to the public, the smaller will be its perceived risk.

   d. The probabilities of external effects are more uncertain than the value of such effects if they were to occur.

3. When it proceeds to site-specific analysis, Metro should use a variety of techniques to estimate the value of external effects: 1) estimates of technical risk, with increased effort to estimate the probabilities of high-value events, 2) estimates of changes in property values, which our analysis suggests could vary from zero to ten percent of the original value, 3) estimates of the costs abatement or mitigation measures that reduce risk to insignificant levels, and 4) estimates reported in surveys of residents and property owners of their perception of damages.

4. Perceived risk diminishes with increases in credible information and substantive participation. Metro should view the costs of public involvement as necessary costs for siting: doubling or tripling the budget for communication with citizens is likely to be a small cost relative to their estimates of perceived risk in the absence of that communication.

5. Perceived risk depends on perceptions--to the extent that Metro can reduce the visibility of solid waste facilities it reduces the perpetual cues that lead to high estimates of risk by local residents. The implication is that increased investments in larger buffers, landscaping, and good design are likely to have big impacts on the feasibility of siting.

6. Finally, our analysis shows that local residents and property owners will certainly oppose regional facilities that impose what they perceive to be local external effects. To reduce that opposition Metro must offer to abate, mitigate, or compensate for those external effects. We believe concerns that compensation packages are immoral because they "buy people off" are misplaced. The facilities must be sited somewhere; risk cannot be eliminated. People should be compensated for taking that risk, and be allowed to decide what fair compensation would be.

GLOSSARY

1. Energy recovery - the recovery in which all or a part of the solid waste materials are processed to utilize the heat content or other forms of energy, of or from the material. (ORS 459)

2. General purpose landfills - those facilities which accept all types of residential, commercial, and industrial wastes, excluding hazardous wastes, for disposal in the ground. (SWMP, Landfill Chapter 1988)

3. Hazardous waste - unwanted materials or residues that cause or significantly contribute to, an increase in mortality, or an increase in serious irreversible, or incapacitating reversible, illness or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. (ORS 466.005)

4. Limited purpose landfills - those facilities which are prohibited from accepting putrescible waste and hazardous waste, but are permitted to receive commercial and industrial solid wastes that are non-putrescible, and demolition debris for disposal by burying in the ground. (SWMP, Landfill Chapter, 1988)

5. Low-grade waste - waste having a generation characteristic which results in a relatively homogeneous uniform material, and/or by its nature may not require disposal at a facility with all the environmental controls of a general purpose landfill. (Staff)

6. Material recovery - the process of obtaining from solid waste, by pre-segregation or otherwise, materials which still have useful physical or chemical properties after serving a specific purpose and can, therefore, be reused or recycled for the same or other purpose. (ORS 459)

7. Mixed waste - solid waste containing both recyclable and non-recyclable material; includes high-grade loads. (Staff)

8. Non-putrescible waste - non-food solid waste and demolition debris not capable of being rapidly decomposed by microorganisms, which does not emit foul-smelling odors during decomposition. (SWMP, Landfill Chapter, 1988)

9. Putrescible waste - solid waste containing organic material that can be rapidly decomposed by microorganisms which may give rise to foul-smelling, offensive products during such decomposition or which is capable of attracting or providing food for birds and potential disease vectors such as rodents and flies. (OAR, Chapter 340, Division 61, Section 10)

10. Recycling - any process by which solid waste materials are transformed into new products in such a manner that the original products may lose their identity. (ORS 459)

11. Resource recovery - the process of obtaining useful material or energy resources from solid waste and includes: energy recovery, material recovery, recycling, and reuse. (ORS 459)

12. Reuse - the return of a commodity into the economic stream for use in the same kind of application as before without change in its identity. (ORS 459)

13. Solid waste - all putrescible and non-putrescible wastes, including but not limited to garbage, rubbish, refuse, ashes, waste paper, and cardboard; sewage sludge, septic tank and cesspool pumpings or other sludge; commercial, industrial, demolition and construction wastes; discarded or abandoned vehicles or parts thereof; discarded home and industrial appliances; manure, vegetable or animal solid and semi-solid wastes, dead animals and other wastes; but the term does not include:

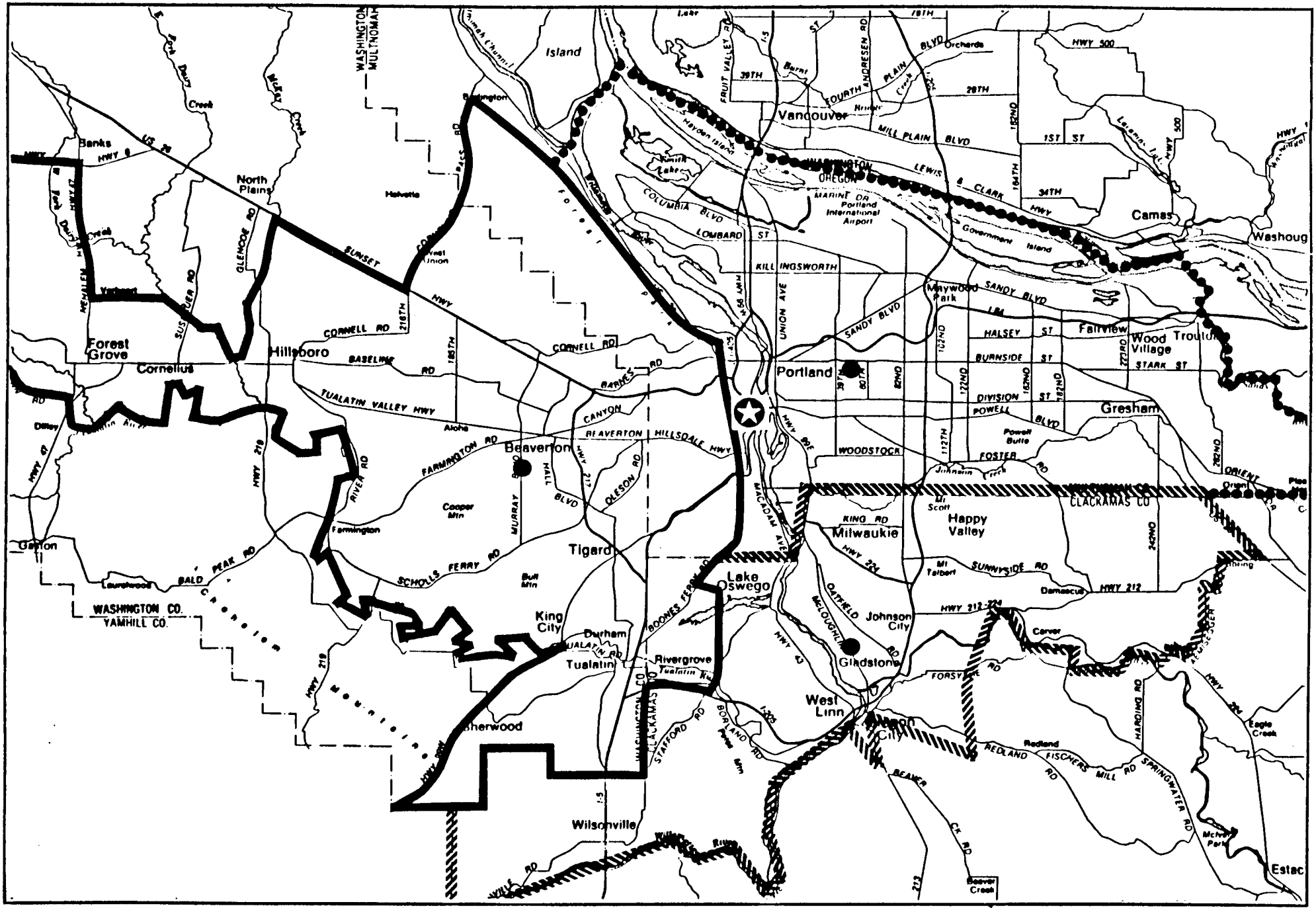
    a) Hazardous waste as defined in ORS 466.005

    b) Materials used for fertilizer or for other productive purposes or which are salvageable as such materials are used on land in agricultural operations and the growing or harvesting of crops and the raising of fowls or animals. (ORS 459)

14. Source separated waste - recyclable material which has been kept from being mixed with solid waste by the generator in order to reuse or recycle that material.

15. Waste reduction - to substantially reduce the volume of solid waste that would otherwise be disposed of in land disposal sites through techniques including, but not limited to, rate structures source reduction, recycling, reuse and resource recovery. (ORS 459)

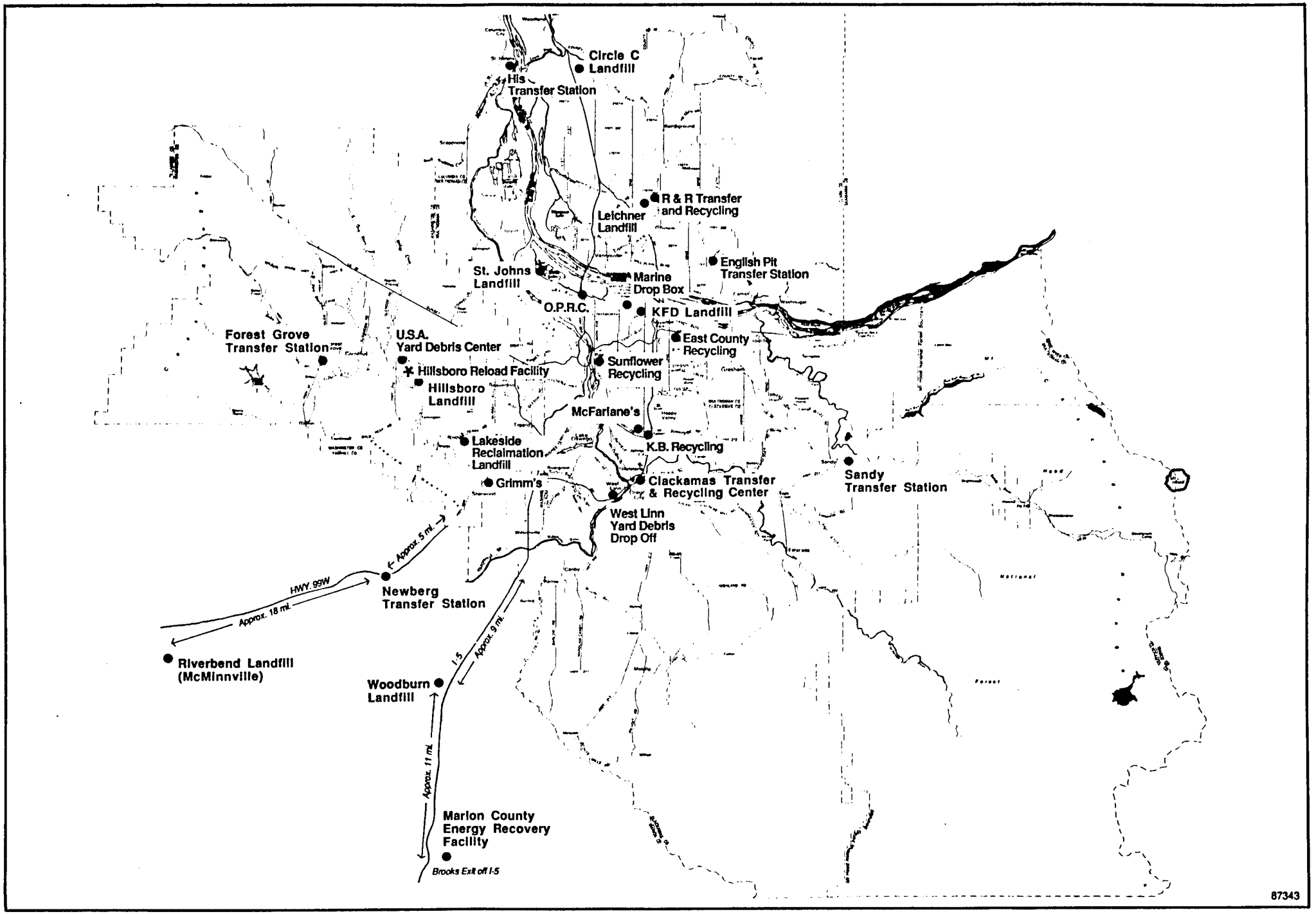
APPENDICES



METRO

Regional Waste Sheds and Centers of Waste 2005

- East waste shed
- South waste shed
- West waste shed
- Center of regional waste shed
- Center of local waste shed



METRO

Solid Waste Facilities (1987)

* Not yet built

WASTE DISPOSED OF AT LANDFILLS/WASTE-TO-ENERGY FACILITY (tons)

Facility	Year				
	1983	1984	1985	1986	1987
St. Johns (Multnomah Co.)	448,277	561,135	684,457	664,061	639,875
K F D (Multnomah Co.)	91,426	109,781	124,617	157,191	175,941
Hillsboro (Washington Co.)	22,182	28,032	37,163	46,660	53,866
Newberg Landfill (Yamhill Co.)	56,445	37,663	Closed	September	1984
Lakeside (Washington Co.)	29,226	30,640	34,735	42,300	44,387
Rossman (Clackamas Co.)	100,416	Closed			
Riverbend (Yamhill Co.)	2,166	18,436	30,383	33,681	36,638
Woodburn (Marion Co.)	14,087	16,461	7,994	2,284	1,189 (ash)
Marion County Waste-to-Energy Facility				12,883	39,643

AMOUNTS RECYCLED AT MAJOR FACILITIES (tons)

Facility	Year		
	1985	1986	1987
OPRC	764	2,907	6,270
East County	Not Operating	1,059	1,575
Grimm's	6,011	6,818	5,528
McFarlane's	11,271	14,176	24,232
Marine Drop Box	--	1,325	1,575

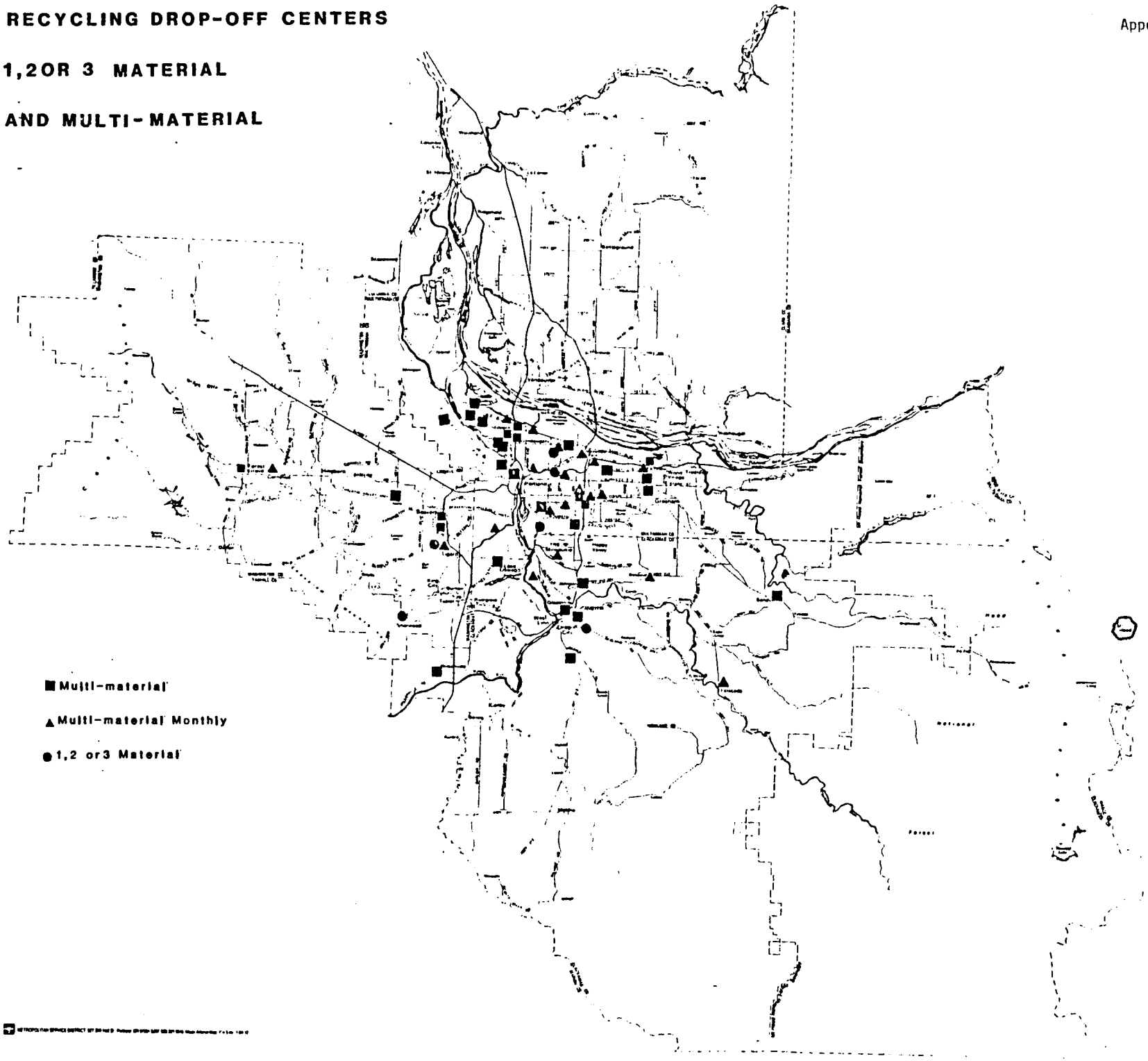
Land Use Zones of Existing Solid Waste Facilities

FACILITY	ZONE
Oregon City	
Clackamas Transfer and Recycling Center	M2-Heavy Industrial
Forest Grove	
Forest Grove Transfer Station	GI-General Industrial
Clackamas County	
Sandy Transfer Station	Transitional Timber District
K. B. Recycling	I-3, C-3 General Industrial, General Commercial
McFarlane's Bark	I-3 General Industrial
West Linn Yard Debris Center	I-3 General Industrial
Washington County	
Hillsboro Reload Facility	EFU-Exclusive Farm Use
Hillsboro Landfill	EFU-Exclusive Farm Use
Lakeside Reclamation	EFU/AFS-Exclusive Farm Use, Agricultural and Forest District
Grimm's	MG-General Manufacturing
Washington County Unified Sewerage Agency	AF20-Agricultural and Forest Land
Yamhill County	
Newberg Transfer	PWS-Public Works Safety
Riverbend Landfill	PWS-Public Works Safety
His Transfer	M2-Light Industrial
City of Portland	
St. Johns Landfill	M1-Heavy Manufacturing/Farm and Forest
Riedel Waste Disposal	M2-General Manufacturing
OPRC	M1-Heavy Manufacturing
East County Recycling	R7/SR-One family residential
Marine Drop Box	M2-General Manufacturing
Sunflower Recycling	M1-Heavy Manufacturing
Marion County	
Woodburn Landfill	EFU-Exclusive Farm Use
Marion County Waste-to-Energy Facility	EFU-Exclusive Farm Use

RECYCLING DROP-OFF CENTERS

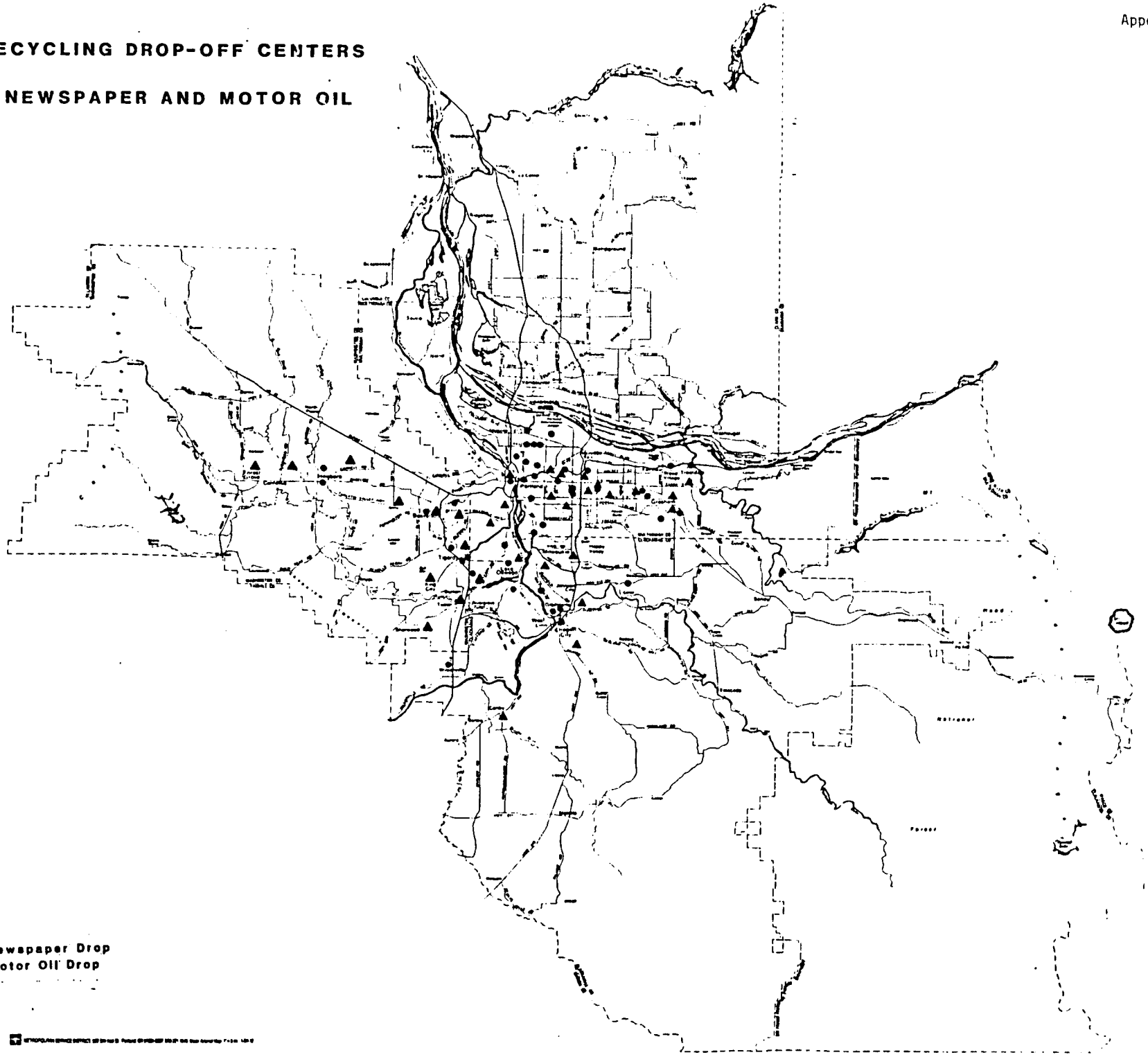
1,2OR 3 MATERIAL

AND MULTI-MATERIAL



RECYCLING DROP-OFF CENTERS

NEWSPAPER AND MOTOR OIL

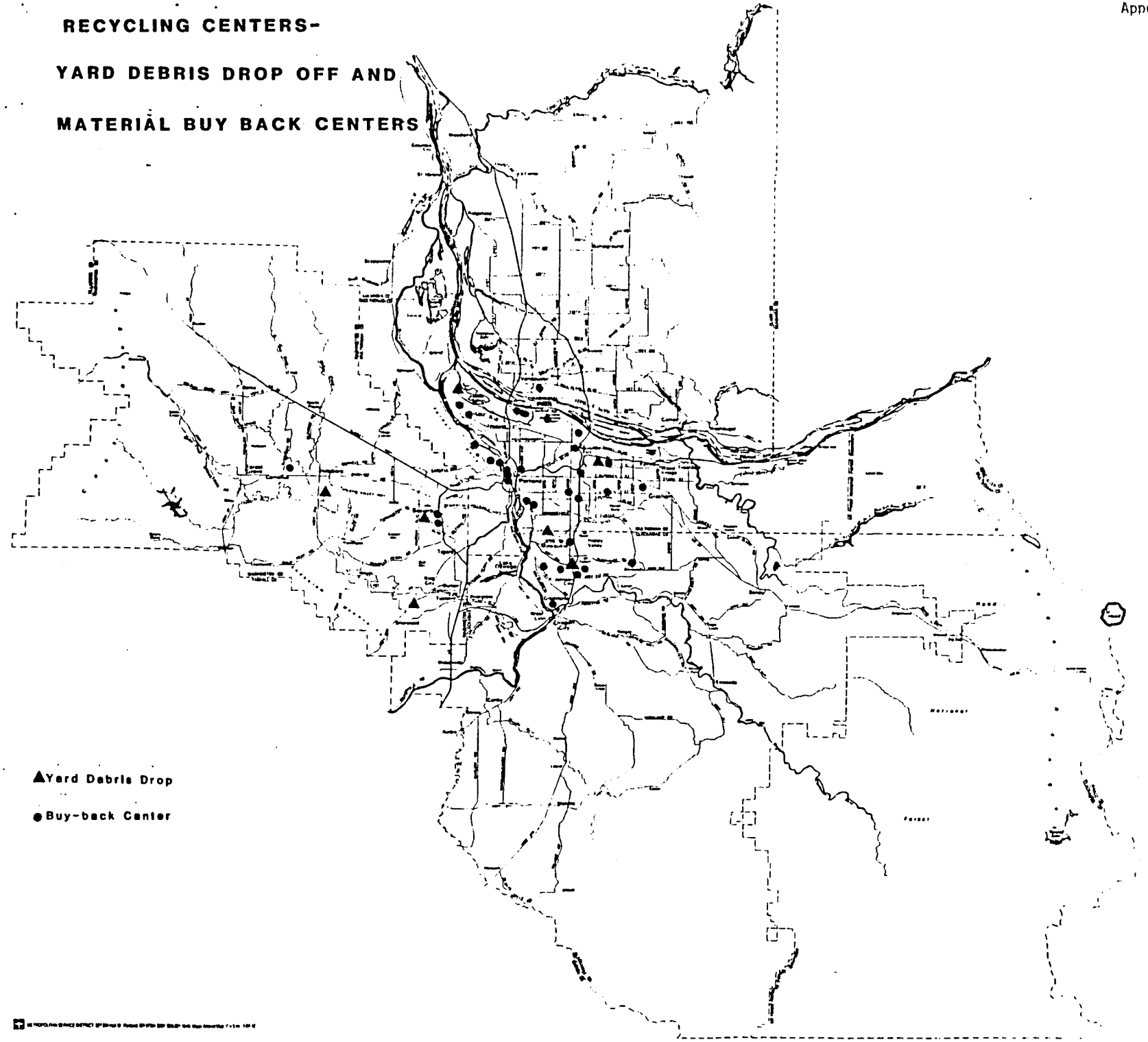


● Newspaper Drop
▲ Motor Oil Drop

RECYCLING CENTERS-

YARD DEBRIS DROP OFF AND

MATERIAL BUY BACK CENTERS



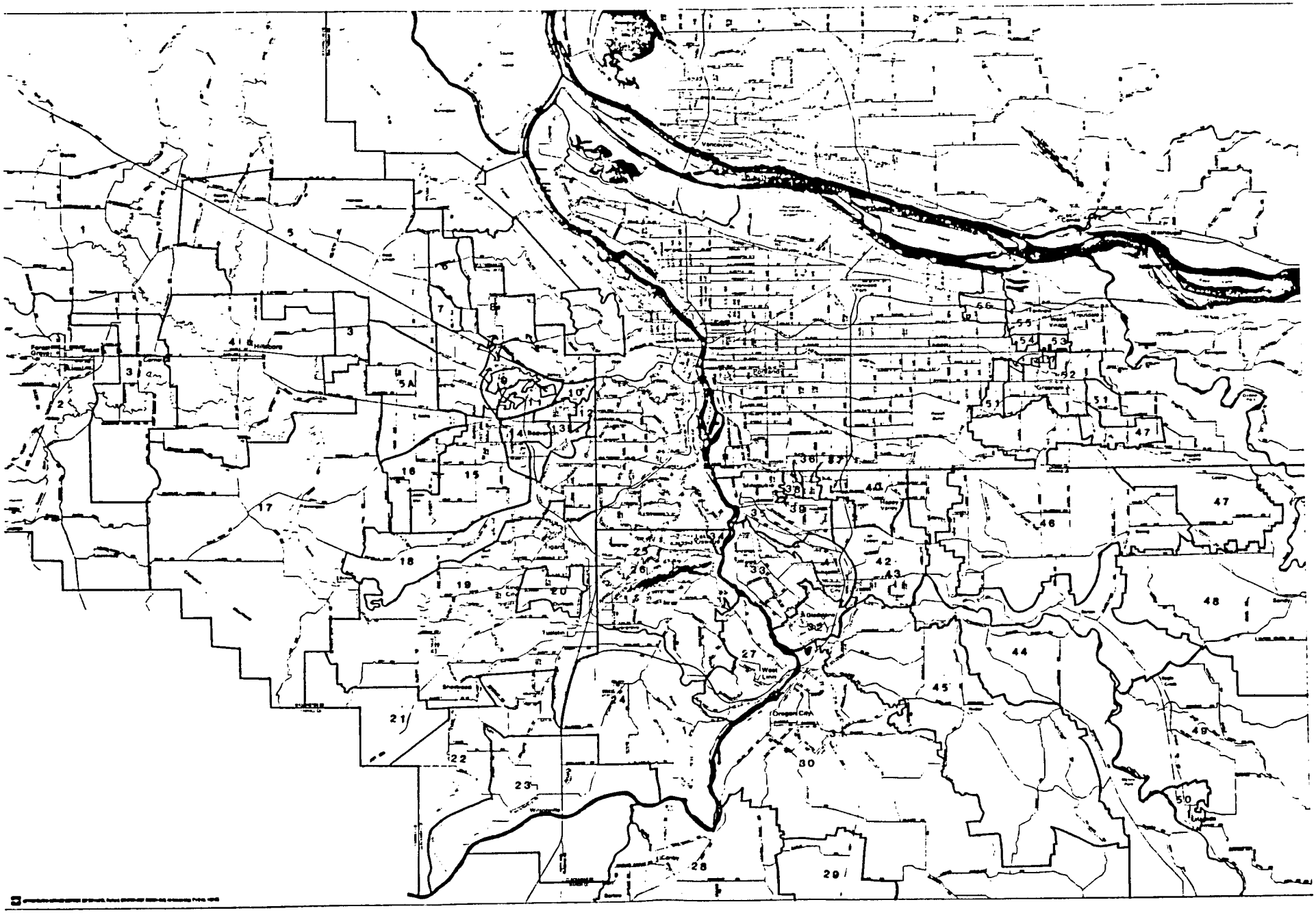
Franchise Map Legend

1. SWATCO Sanitary Service
2. Forest Grove Disposal Service
3. Cornelius Disposal
4. Hillsboro Garbage Disposal
5. Garbarino Disposal Service, Inc.

5A. Aloha Garbage Company

6. Cedar Mill Disposal
7. Dee's Sanitary Service
8. Walker Garbage Service, Inc.
9. Sevier and Son
10. West Slope Garbage Service
11. Valley Garbage Service
12. Pacific Garbage Service
13. Public Sanitary Service
14. Beaverton Sanitary
15. West Beaverton Sanitary Service, Inc.
16. Don's Garbage Service
17. Valley West Refuse Disposal
18. Miller's Sanitary Service, Inc.
19. Pride Disposal, Inc.
20. Schmidt Sanitary Service, Inc.
21. Newberg Sanitary Service
22. Reliable Sanitary Service
23. United Disposal Service
24. Ruff's Sanitary Service, Inc.
25. Rosman's Sanitary Service
26. Keller Drop Box
27. West Linn Sanitary
28. Canby Disposal
29. Molalla Sanitary Service
30. Cherry Lane Mobile Park (services mobile park only)
31. Oregon City Garbage
32. Gladstone Disposal
33. Oak Grove Disposal
34. Dunthorpe Sanitary
35. Waste Management, Inc.
36. P. Deines Sanitary
37. Deines Brothers
38. Mel Deines Sanitary
39. Wichita Sanitary Service
40. Sunset Garbage Collection
41. Clackamas Garbage Company
42. Lehl, John P. Company
43. Oak Acres Mobile Home Park
44. Waste-Go Services
45. Redland Disposal
46. B & J Garbage
47. Rosegate Sanitary
48. Mt. Hood Refuse
49. American Sanitary
50. Dan Walker
51. Rakwood
52. Gresham Sanitary
53. EGE
54. 12 Mile
55. Columbia Sanitary
56. Metro Disposal

CITY AND COUNTY FRANCHISED COLLECTION AREAS



City and County Franchise Information

City/County	Number of Franchises	Term of Franchise	Expiration Date	Boundary	Amendments
Clackamas County	26	From issue to...	1990	see map	as needed at SW commission meeting
Canby	1	5 yrs	1991	city limits	mutual agreement, anytime
Gladstone	1	10 yrs	1994	city limits	anytime
Happy Valley		franchised	through	county	
Johnson City	1	rolling with yearly review	N/A	city limits	at yearly review
Lake Oswego	1	10 yrs	1988	city limits	by resolution
Milwaukie	5	20 yrs	1994	city limits	reviewed every 5 years, can be done then (1989)
Molalla	1	10 yrs	1990	city limits	mutual agreement
Oregon City	1	10 yrs	1990	city limits	by resolution
Rivergrove	1	none	--	city limits	revise ordinance
West Linn	1	10 yrs	1994	city limits	anytime
Wilsonville	1	indeterminate	/ 3 yr notice		resolution
Multnomah County	Haulers are not franchised in Multnomah County, they are permitted through the City of Portland				
Fairview	3				
* Gresham	13	review every 5 years	1989	see map	at review or renewal time
Maywood Park	N/A	N/A	N/A	N/A	permitted through the City of Portland
Troutdale	1	automatically renewed every 5 years	1990	city limits	yearly review
*Wood Village	1	5 yrs	1988	city limits	as needed
Washington County	25	no time limit	N/A	see map	anytime
Beaverton	4	5 yrs	1990	city limits	anytime through council
Cornelius	1	10 yrs	1995	city limits	mutual agreement
Durham	1	N/A	N/A	city limits	reviewed yearly
Forest Grove	1	rolling	N/A	city limits	yearly review
Hillsboro	5	5 yrs	1991	city limits	anytime
King City	1	5 yrs	1992	city limits	as needed

*Licensed not franchised

City and County Franchise Information

City/County	Number of Franchises	Term of Franchise	Expiration Date	Boundary	Amendments
Sherwood	1	10 yrs	1989	city limits	as needed
Tigard	3	until cancelled		city limits	anytime
Tualatin	2	5 yrs	1991	city limits	by ordinance amendment