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Regional Solid Waste Management Plan

Special Waste Chapter

December 1990

METRO

SPECIAL WASTE CHAPTER

METROPOLITAN SERVICE DISTRICT
PLANNING AND DEVELOPMENT DEPARTMENT

PORTLAND, OREGON

Reviewed and Approved by:

Metro Solid Waste Staff	- September 12, 1990
Facilities Subcommittee	- September 14, 1990
Technical Committee	- September 28, 1990
Policy Committee	- October 12, 1990
Council Solid Waste Committee	- November 20, 1990
Metro Council	- November 29, 1990

EXHIBIT "A" to Ordinance No. 90-368

Certified A True Copy of the Original Thereof
Gwen Ware-Barrett
Clerk of the Council

BEFORE THE COUNCIL OF THE
METROPOLITAN SERVICE DISTRICT

FOR THE PURPOSE OF AMENDING ORDINANCE NO. 88-266b ADOPTING THE REGIONAL SOLID WASTE MANAGEMENT PLAN TO INCORPORATE THE SPECIAL WASTE CHAPTER	)))))	ORDINANCE NO. 90-368 Introduced by: Rena Cusma Executive Officer

WHEREAS, Metropolitan Service District Ordinance No. 88-266B adopted the Regional Solid Waste Management Plan as a functional plan; and

WHEREAS, There is a need to develop solutions for Special Wastes as a component of the Regional Solid Waste Management Plan; now therefore,

THE COUNCIL OF THE METROPOLITAN SERVICE DISTRICT HEREBY ORDAINS:

That the Regional Solid Waste Management Plan is amended to correct Policies 3.0, 3.1 and 3.2 on special waste and to include the expanded Chapter 3, Special Waste, shown as Exhibit A to this Ordinance.

ADOPTED by the Council of the Metropolitan Service District this 29th day of November, 1990.

Tanya Collier, Presiding Officer

ATTEST:

Gwen Ware-Barrett
Clerk of the Council

I certify that this ordinance was not vetoed by the Executive Officer.

Gwen Ware-Barrett

CHAPTER 3 - Special Waste

POLICIES

3.0 Solutions to special waste management shall be developed as a component of the solid waste management plan.

3.1 An integrated system for managing special waste shall be developed which is based upon management techniques resulting from waste substream assessment.

3.2 Metro shall ensure that there is adequate capacity for disposal of special wastes. Special waste facilities shall be planned and located so that they are compatible with other elements of the solid waste disposal system.

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SECTION I PURPOSE

The purpose of the Special Waste Chapter is to establish a system for the long-term management of problem waste streams consistent with the priorities of the state hierarchy and the operational needs of the Metro solid waste system.

Problem Waste Streams

Special wastes present unique problems and opportunities. The special waste management concerns posed by these waste streams arise from their unique characteristics such as bulk, liquids content, potential for harmful air emissions, and odor. The need for developing management options for special waste substreams is due to the rapidly changing operational needs of the solid waste system, and the increasing potential for recycling these materials. The characteristics of special wastes require that management options be developed toward segregation of the waste stream.

Solid Waste System in Transition

With the eventual closure of the St. John's Landfill, and the long haul transfer of waste to the Columbia Ridge Landfill, the solid waste system will experience increased difficulty in managing special wastes. Due to their unique characteristics many of these materials are not conducive to processing and compaction at regional transfer stations. Since the primary solid waste system is not designed to handle these materials it is necessary to develop specific management options for each special waste substream. Without a proactive program to manage special wastes, generators may attempt co-disposal with MSW or illegal disposal resulting in increased risk to the solid waste system and lost recycling opportunities.

Oregon State Hierarchy

The Regional Solid Waste Management Plan is premised upon ORS Chapter 459.015 (2) which establishes a hierarchy for methods of managing solid waste in order to conserve energy and natural resources. After consideration of technical and economic feasibility, the priority in methods of managing solid waste is as follows: reduce, reuse, recycle, recover and landfill. A focus of the special waste chapter has been to investigate waste reduction and recovery technologies where feasible.

Special Waste Substreams Analyzed

The following special waste substreams were chosen for analysis because they all have a potential to create a major impact to the Metro solid waste system with respect to cost and environmental degradation if not handled properly:

- Construction and Demolition Debris
- Land Clearing Debris
- Non-Hazardous Industrial Waste Sludges
- Non-Hazardous Industrial Waste Dusts
- Non-Hazardous Industrial Waste Ash
- Sewage Grit and Screenings
- Non-Hazardous Petroleum Sludge
- Soils Contaminated with Petroleum Products
- Asbestos Wastes

Special Waste Substreams not Analyzed

Not all special waste substreams were examined by this study due to either a lack of immediate need or the material was being dealt with separately. Those special waste substreams not examined are:

- Tires
- White Goods
- Infectious Medical Waste
- Animal Carcasses
- Used Oil
- Batteries

It is recognized that some of these materials may also need to be evaluated for special management options in the near future. Further, as solid waste management continues to move in the direction of segregating out each waste stream for separate management, additional special wastes may be identified for study.

SECTION II. SUMMARY

The following summary is a brief overview of the conclusions of this study. These conclusions are explained in detail in Section VI of this chapter. It should be noted that additional factors or new information not considered in this study may have a significant bearing as to the best management practice for identified waste streams. An example may include the development of new technologies and markets.

Special Waste Management Programs

- Special Waste Permit Program

With the closure of the St. Johns Landfill special wastes will be handled by a variety of treatment, recycling and disposal facilities. Metro will continue to require that special wastes generated within the Metro region obtain a special waste permit prior to disposal. The continuation of the special waste permit program will provide consistency for special waste generators, allow Metro to ensure that material handled is non-hazardous and put to its highest use, and provides a mechanism for directing special waste haulers to appropriate facilities.

- Load Checking Program

To prevent the acceptance of unacceptable waste at disposal facilities a load checking program will need to be established. A successful load checking program should be designed to identify and remove from the municipal waste stream all hazardous and other prohibited wastes which may be delivered to regional solid waste facilities. A load checking program consists of four principle activities: generator notification, site surveillance, waste identification, and waste inspection.

- Waste Exchange

A major aspect of this chapter has been to recognize the material resources contained within special wastes. The reuse of industrial materials, which otherwise would be landfilled, should be promoted through an existing multi-state waste exchange.

- Technical Assistance

Many of the special waste materials are problem wastes due to the presence of hazardous substances. If hazardous substances in waste materials could be identified and eliminated, then recycling, incineration, or landfilling would be safer. A technical assistance program should be established which focuses on industry disposal practices of waste containing hazardous substances in order to assist in encouraging waste reduction.

Special Waste Management Options

- Construction/Demolition and Land-Clearing Debris
  (estimated 1990 generation - 259,500 tons)

A number of potential management options were explored for construction and demolition debris and land-clearing debris. From the options developed it is apparent that the processing and recovery of the waste stream is both economically and technically viable and is the preferred means to mange this material. A combination of three options are recommended; a salvageable building material demonstration project, a processing system, and continuation of in-region limited-purpose landfilling for residual and non-processable material.

- Non-Hazardous Industrial Sludges
  (estimated 1990 generation - 2,700 tons or 750,000 gallons)

With greater awareness of the problems caused by liquids in landfills and stricter land disposal regulations under Subtitle D of RCRA, there is a need to prevent the disposal of free liquids within the solid waste system. Long term options would involve encouraged recovery through a waste exchange and development of regional dewatering capability.

- Non-Hazardous Industrial Waste Dusts and Ash
  (estimated 1990 generation - 920 tons)

The dusts and ash are diverse and one of the smallest waste streams in terms of annual volume. These two factors taken together limit the choice of possible management options, while at the same time the diversity of the material denies a single approach to their management. Short term options are limited to current techniques (i.e., landfilling at the St. Johns Landfill) until alternatives can be developed. Long term options would involve encouraged recovery through a waste exchange and land disposal at a properly permitted limited purpose landfill.

- Sewage Grit and Screenings
  (estimated 1990 generation - 5,300 tons)

Management options for sewage grit and screenings include both a short and long-term solution. For the short-term the material is to be directly hauled to a permitted landfill by waste water treatment plant operators. For the long-term a further assessment of the feasibility of developing a reload facility to provide for consolidation of grit and screenings prior to transport to a land disposal facility needs to occur. This assessment will need to include determining the future increases in quantities of this material due to state policy to eliminate cesspools as a method of sewage disposal in urban areas.

- Non-Hazardous Petroleum Sludges
  (estimated 1990 generation - 550 tons)

The long term option would involve a solid waste system disposal ban to encourage recovery of the material. Currently petroleum sludge is processed within the region to recover hydrocarbons which are removed from the sludge through gassification and converted into alternative fuels.

- Soils Contaminated with Petroleum Products
  (estimated 1990 generation - 40,000 tons)

In the long term treatment facilities which remove and destroy the hydrocarbons contained in the soil should be developed.

- Asbestos Wastes
  (estimated 1990 generation - 1,600 tons)

The only options that were viewed as feasible for managing asbestos involve landfilling. Landfilling is well-suited for asbestos because the asbestos fibers are immobile when buried and this method is the best overall at limiting human exposure to the material. Long term options include asbestos clean-up contractors to direct haul to land disposal sites. This practice will prevent the unnecessary rehandling of asbestos waste.

SECTION III. EXISTING SPECIAL WASTE FACILITIES

The following section provides background information on the current system to manage special wastes. Both historically and currently, special waste management has been principally based on land-disposal. Although recovery options have been available, processing and recovery largely has not been pursued due to the low-cost and proximity of land-disposal facilities. The principle facilities which currently provide for the management of special wastes within the region are as follows: the St. John's Landfill, the Hillsboro Landfill, the Lakeside Reclamation Landfill, East County Recycling, and Grimm's Fuel Company. The Columbia Ridge Landfill is identified but does not currently provide for the disposal of special wastes generated within the Metro region.

Wastech's Oregon Processing and Recovery Center (OPRC) has received approval from the DEQ and Metro to expand its current facility in order to process a minimum of 100,000 tons per year of select mixed waste. This new processing capacity will result in the recovery of approximately 70% of the incoming waste and will include the production of fuel from paper and wood debris. The Metro franchise allows Wastech to contract with commercial haulers to guarantee the delivery to OPRC of 100,000 tons per year of select mixed waste which includes high grade construction and demolition debris. OPRC has expressed interest in processing 15,000 tons of mixed construction and demolition debris.

A. St. John's Landfill

Currently, the St. John's Landfill is the only operating general-purpose landfill in the tri-county area. Located in Portland at 9363 North Columbia Boulevard, the facility serves as the principal disposal facility for special wastes excluding construction and demolition debris and land-clearing debris.

The St. John's Landfill has been in operation since 1932 under the ownership of the City of Portland. The facility is currently operated by Metro. Approximately 2000 tons of MSW is received daily, of which approximately 200 tons or 10% is special wastes. Since 1981, special waste generators have been required to obtain a special waste permit prior to disposal. The permits require generators to submit material descriptions along with possible lab tests to ensure that all material accepted is non-hazardous. Material of a questionable nature is referred to the DEQ for disposal authorization. Currently the St. John's Landfill is the principal means to manage special wastes. With the closure of the facility in February 1991, few local options remain for handling the material.

Historically disposal fees at the St. John's Landfill have been relatively low. As a result little incentive, until very recently, has existed to encourage waste generators to develop waste recovery alternatives for special wastes.

B. Hillsboro Landfill

The Hillsboro Landfill, a limited purpose landfill, is located near Hillsboro at 8205 S.E. Minter Bridge Road and has been operational since the early 1960's. A privately owned and operated facility, it currently is permitted to dispose of building demolition and construction debris, land-clearing debris, and similar nonputrescible materials. Other wastes, such as non-hazardous industrial waste dusts, sludges, ash, sewage grit and screenings and petroleum contaminated soils, are approved by the DEQ on a case-by-case evaluation of the waste analysis. The disposal site is open to the general public and to private waste haulers.

Delivery tonnages to the Hillsboro Landfill have risen dramatically since the closure of the Killingsworth Fast Disposal Landfill in early 1989. In calendar year 1988, the Hillsboro Landfill received 66,438 tons of material, in contrast to 101,622 tons in 1989 and the expected delivery of 145,800 tons in 1990.

The long-term conceptual plan for the Hillsboro Landfill consists of a series of independent modular units to extend the disposal area south of the present boundary onto floodplain adjacent to the Tualatin River for the next 20 years. Each modular unit of this long-term expansion program would last approximately four or five years and would be designed to accommodate closure of the entire disposal facility if necessary. Each modular expansion unit would need to include mitigation measures as required by the U.S. Army Corps of Engineers for removing wetlands from the river floodplain. The Department of Environmental Quality intends to treat each phase of the total expansion as a separate project, and will require the Hillsboro Landfill to submit a new permit application for each expansion phase. Each application would permit the Department of Environmental Quality to receive public testimony prior to granting approval for the next expansion phase.

By September 1990, the Hillsboro Landfill is expected to begin disposal operations within the phase-two unit. The phase-two unit is expected to operate, at current volumes, for a minimum of 5 years or early 1996. The U.S Army Corps of Engineers has granted a 404 permit for the additional wetland area that will be included in the phase-three landfill expansion. A DEQ amendment to the Hillsboro Landfill solid waste permit is necessary before the phase-three unit can begin to receive waste material. Should the phase-three landfill expansion be approved, an additional five years capacity up to 2001 will be available at current volumes.

Washington County has approved disposal rates for 1991-92 which include $245,000 for waste reduction activities.

C. Lakeside Reclamation Landfill

The Lakeside Reclamation Landfill located near the intersection of Scholls Ferry Road and Vandermost Road in Washington County, is privately owned and operated. The site is limited to construction and demolition materials, and land-clearing debris received from commercial haulers only. Since the Lakeside Reclamation Landfill only contains a soil liner the facility can not be used for most materials requiring a special waste permit.

Delivery tonnages to the Lakeside Reclamation Landfill have also risen sharply as a result of the closure of the Killingsworth Fast Disposal Landfill in early 1989. In calendar year 1988, the Lakeside Reclamation Landfill received 49,919 tons of material, in contrast to 67,622 tons in 1989 and the expected delivery of 68,500 tons in 1990. It is expected that the site can remain open under current flows until 1998. Metro currently has an agreement with the Lakeside Reclamation Landfill permitting the facility to receive waste from within the Metro boundary.

The Lakeside Reclamation Landfill may propose a permit modification for operational changes from its current procedures. As part of the operational changes the facility will develop a compacted clay liner and a blanket leachate collection system. With the protection system proposed the facility will be permitted to principally accept construction and demolition debris, and land-clearing debris, although asbestos could be received should the operator desire to do so. Should the facility's operational changes be approved the expected life of the facility at current volumes is in excess of 20 years.

In addition to land disposal services the Lakeside Reclamation Landfill uses a waste wood recycler and shaker screens to process wood waste and yard debris. Currently, the facility processes approximately 20,000 tons of wood which is principally stumps. Washington County approved disposal rates in 1990-91 and 1991-92 which authorized a total of $500,000 for the purchase of recycling equipment.

D. East County Recycling Center

East County Recycling is a privately owned and operated materials recovery facility for non-putrescibles, located at 12409 N.E. San Rafael in the Cully/Parkrose district of Portland. The site contains ten acres dominated by an old gravel pit in the central portion of the lot. A paved landing on the southwestern portion of the site serves as the recycling center, which contains 40 cubic yard dumpsters for recyclables.

The facility principally receives construction and demolition debris, and land-clearing debris and manually removes newspaper, metal, tires, glass, cardboard, motor oil, wood, and yard debris for processing or resale. Inert material is disposed in the old quarry, non-inert and non-recyclable material is hauled to the Braun Landfill in Wasco County.

Currently the facility franchise limits the facility to 100,000 cubic yards per year or 12,500 tons. Delivery tonnages to East County Recycling has risen sharply as a result of the closure of the Killingsworth Fast Disposal Landfill in early 1989. In calendar year 1988, East County Recycling received 5,700 tons of material, in contrast to 20,900 tons in 1989. Material recovered in 1989 represented 37% of incoming or 7,800 tons.

E. Grimm's Fuel Company

Grimm's Fuel Company is a privately owned and operated yard debris processing facility located in Tualatin at the intersection of Cipole Road and Highway 99W. Since 1982 Grimm's Fuel Company has been processing yard debris into various compost products and smaller amounts of wood waste into hog fuel and compost. In 1989 the facility processed 22,500 tons of yard debris and 5,500 tons of wood waste. The facility is located on 46 acres of which only 12 acres are currently used.

Presently the facility can only process wood waste up to 150 pounds in weight. The existing facility is currently being modified to handle larger volumes. The upgrade includes modifications to the trommel screen and return conveyor, an additional hammer mill for processing larger sections of wood debris, and two more additional magnets. Construction and demolition debris and land-clearing debris which possibly could be handled by the upgrade are principally wood waste.

F. Columbia Ridge Landfill

On April 11, 1988 Metro signed a long-term agreement with Oregon Waste Systems, Inc., for waste disposal services to be provided at the Columbia Ridge Landfill. The facility is a general-purpose landfill located near the City of Arlington, Oregon, approximately 140 miles east of Portland.

The Metro contract with Oregon Waste Systems, Inc., is a twenty year agreement which provides disposal capacity for up to a maximum of 16,923,000 tons over the life of the contract. Transport to the Columbia Ridge Landfill is provided by Jack Gray Transport, Inc., to transport solid waste in sealed containers from transfer stations to the landfill. The Columbia Ridge Landfill has a total capacity of approximately 60 million tons of MSW. The facility currently does not receive any special wastes from the Metro solid waste system.

SECTION IV. POLICY DISCUSSION AND ANALYSIS

The following section identifies the Federal, and Regional solid waste management statutes, regulations and policies which have provided direction in developing the special waste chapter.

Federal Statutes and Regulations

Resource Conservation and Recovery Act, Subtitle C, and D

The Resource Conservation and Recovery Act, mandated by Congress and developed by the Environmental Protection Agency, addresses a problem of how to safely dispose of municipal and industrial solid waste generated nationwide. The Act established as law the following goals:

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

Subtitles C and D lay out the framework for the two principle programs that make up RCRA: the hazardous waste management program and the solid waste program, respectively. Both programs impact the development of the special waste chapter.

- Subtitle C of RCRA

Under Subtitle C of RCRA, a new rule recently released by EPA, the Toxicity Characteristic rule, adds 25 organic chemicals to the eight metals and six pesticides on the existing list of substances regulated by their toxicity characteristics. The new rule also establishes regulatory levels for the newly listed chemicals and substitutes a new leaching procedure (TCLP) to determine toxicity characteristics. Large quantity generators must comply with the new rule by September 25, 1990, and small quantity generators must comply with the new rule by March 29, 1991.

The effect of the new rule will be to list more industrial wastes as a hazardous waste. EPA estimates that some 1.8 million tons of industrial wastes, principally chemical sludges, may now be subject to federal hazardous waste management standards. Within the Metro region it is estimated that 1,100 tons of chemical sludges are land disposed annually with MSW (41 percent of the non-hazardous industrial waste sludge category).

• Subtitle D of RCRA

The primary goal of the Subtitle D program is to encourage solid waste management practices that are environmentally sound, maximize the reuse of recoverable materials, and encourage resource conservation. In so doing the program establishes mandatory minimum federal technical standards for disposal facilities, and a program under which states may develop and implement solid waste management plans.

The minimum technical standards for solid waste disposal facilities or the Subtitle D Criteria ensure that the operations of disposal facilities are protective of human health and the environment. EPA has proposed revisions to the Criteria which include location restrictions, facility design and operating criteria, and groundwater monitoring requirements. Most significantly, the proposed operating criteria will require that bulk or non-containerized liquid waste (i.e. industrial sludges) not be accepted for disposal, and that procedures be put in place to exclude the receipt of hazardous waste.

In general the effect of the proposed revisions to the Criteria will be to restrict the development of new land disposal facilities and increase the cost of operations of existing facilities. In addition, landfill operators will move to reduce the long term liability of the site by screening incoming wastes and rejecting untreated materials which may contribute to landfill leachate (i.e. industrial sludges). With groundwater monitoring aimed at detecting smaller and smaller amounts of contaminants, every attempt will be made by land disposal operators to restrict the delivery of materials of a questionable nature. The proposed revisions to the Criteria will continue the trend in solid waste management toward the segregation of the waste stream, one of the principle objectives of the special waste chapter.

Clean Air Act (CAA)

The Clean Air Act defines hazardous air pollutants, and banned uncontrolled burning. The Clean Air Act is relevant to the management of special wastes in that all combustion facilities must meet source performance standards that limit emissions of individual pollutants to the air. With the increased abatement of air pollutants, more pollutants are concentrated in the remaining ash. Although EPA has issued guidance on pollution controls for incinerators it has yet to propose regulations concerning ash management and reuse until Congress clarifies whether or not ash is to be managed as a hazardous waste. The absence of national standards creates uncertainty in how ash should be managed. Due to the potential liability from improper disposal should ash be classified as a hazardous waste, it would be prudent to ensure that all ash is tested prior to disposal and monofilled in dedicated sections of land disposal facilities.

Comprehensive Environmental Response Compensation, and Liability Act (Superfund)

Superfund creates a billion dollar fund to finance governmental responses to actual and threatened releases of hazardous substances and dangerous pollutants or contaminants. A substantial number of the sites currently listed as Superfund sites are landfills. Inadequate management of special wastes creates the potential for long-term liability under Superfund for current and past disposal practices. Careful planning and management of special wastes can minimize this risk by ensuring stringent handling, disposal, and operating requirements for receiving solid waste facilities.

Clean Water Act (CWA)

This statute controls the quality of the nation's navigable waters. The CWA affects special waste management should disposal practices result in the creation of landfill leachate. EPA considers industrial wastes disposed to be the most significant source of contamination, followed by sewage sludge and household hazardous waste. Management strategies for special wastes should be developed which minimize the release of potentially toxic substances from landfills into ground or surface waters. Finally, the CWA requires any facility developed within a wetlands to obtain a Section 404 permit.

Regional Solid Waste Management Plan Policies

Waste Reduction Policy 1.0: The solid waste management system shall achieve, in an environmentally safe manner, the maximum feasible reduction of solid waste being landfilled, in accord with the state hierarchy under ORS 459.015, and through the cooperative efforts of Metro, the cities, and counties, and the communities.

Discussion - The regional solid waste management plan dictates that the maximum feasible reduction of waste being landfilled will be achieved. Special wastes present numerous management opportunities for waste reduction and recycling. Technologies for recycling and reuse of special wastes are currently available and should be encouraged.

Waste Reduction Policy 1.3: Metro shall support a higher system cost for waste reduction techniques over landfilling based on the state hierarchy in order to accomplish the maximum feasible reduction of waste to the extent it is determined to be environmentally safe, technically and economically feasible.

Discussion - In some instances, recommended management options may cost equal to or more than landfilling. However, if materials can be recovered and overall risk to the environment reduced, the chapter emphasizes waste reduction and recovery options.

Special Waste Policy 3.1: An integrated system for managing special waste shall be developed which is based upon management techniques resulting from waste substream assessment.

Discussion - The special waste chapter emphasizes a materials management approach in developing management options. This approach has two aspects. First, the generator when producing a waste product must be aware of the operational limitations of the regional solid waste system (e.g. ensuring that industrial sludges are dewatered). Second, by analyzing special wastes on a material-by-material basis, discarded materials are directed to the most appropriate management method based on the ability to recover or dispose each material in an environmentally safe manner. A materials management approach is also the most flexible, so that management options can be premised on the basis of local need, and changes in these conditions over time.

Special Waste Policy 3.2: Metro shall ensure that there is adequate capacity for disposing of special wastes. Special waste facilities shall be planned and located so that they are compatible with other elements of the solid waste disposal system.

Discussion - A key factor in developing special waste management options has been to collect and develop region-specific data on quantities and composition of waste in order to appropriately identify necessary capacity for managing the materials long-term (through till 2010). Because the special waste chapter emphasizes the recovery of specific waste materials which currently are landfilled, the impact to existing recovery facilities is minimized or potentially enhanced. Conversely, the development of a system to manage these materials that emphasizes recovery over landfilling may impact existing land disposal facilities.

Facilities Policy 5.0: The solid waste system shall be an integrated system of facilities designed to accommodate the management of waste based on the state hierarchy.

Discussion - Currently, management of special wastes within the region is reliant upon land disposal. A focus of the special waste chapter has been to investigate waste reduction and recovery technologies where feasible. From a regional perspective, integrated waste management is a positive approach given its ability to conserve landfill capacity, potentially reduce waste management costs, and reduce risk to human health and the environment.

Facilities Policy 5.4: Those technologies and programs which increase regional solid waste management efficiency or reduce the dependence on landfilling shall be employed whenever feasible.

Discussion - Efficiency is commonly measured as a comparison of production with cost. Finding the most efficient solid waste system for managing special wastes is achieved by identifying the option which implements the goals of the state hierarchy at least-cost.

The special waste chapter identified the least-cost option by expressing costs, where possible, as a levelized cost. Cost levelization provides a cost per ton which is comparable for facilities with different operational life-spans and benefits. Facilities or programs which best implement the goals of the state hierarchy and have been determined to have processing costs equivalent with that of landfilling can be considered the most efficient and are therefore emphasized by the special waste chapter.

System Design Considerations Policy 8.0: The solid waste system design shall consider the potential adverse environmental, economic and land use impacts and the need for adequate mitigation.

Discussion - The special waste chapter where possible emphasizes the development of a recovery system for special wastes over landfilling. Recycling takes precedence over landfilling because it can contribute to energy and material conservation. In addition, it is assumed that facilities dedicated to processing and recovery of materials present far fewer negative environmental impacts than landfills.

Franchising, Contracting, Licensing Policy for Solid Waste Facilities 9.0: The solid waste management plan shall include methods for regulatory control of solid waste facilities. Such regulatory methods may include a system of franchising, contracting and/or licensing to ensure that needed disposal facilities are provided and are operated in an acceptable manner.

Discussion - The special waste chapter identifies a need to develop both a recovery capability for special waste substreams and to ensure the availability of land disposal capacity for those materials which can not be recovered. With the diminishing availability of landfills and increasingly stringent operating requirements, many of the special waste substreams will be managed by waste specific facilities devoted to treatment and/or recovery. Facilities identified by the chapter as being necessary should be actively developed through franchising, contracting or licensing. In addition, Metro will need to expand the current special waste permit program to ensure the delivery of special wastes to appropriate facilities via its flow control authority.

Rate Structure Policy 11.0: The solid waste system shall be developed to achieve stable, equitable and predictable solid waste system costs and rates.

Discussion - The special waste chapter emphasizes the need to ensure flexibility, reliability, competition, and regulatory control of the special waste management system. By establishing these elements within the recommended management option for each waste stream, the region will achieve stable, equitable and predictable solid waste system costs and rates.

Facility Ownership Policy 13.0: Solid waste facilities may be publicly or privately owned, depending upon which best serves the public interest. A decision on ownership of a facility shall be made by Metro, case by case, and based upon established criteria.

Discussion - As the special waste system becomes more complex and market oriented, Metro may be reluctant to assume primary responsibility for operating relatively small and potentially numerous individual facilities. Conversely, the private sector has shown a willingness to accept the risks and costs associated with new management activities. Actual ownership of new facilities will be determined during the implementation process.

SECTION V. STUDY METHODOLOGY AND TECHNICAL ANALYSIS

Study Methodology

This study was conducted in a number of related but discrete tasks, including a determination of waste generation rates and composition, a market analysis of potentially recyclable materials, and an evaluation of numerous management options for each special waste stream. The major findings and the steps taken to accomplish each of these tasks are discussed below.

Waste Generation Estimates

Current waste generation estimates and future waste generation projections are shown in Appendix A. Appendix A shows current amounts as a four-year average of historical data (generally 1985 to 1988) or as 1988 estimates for some wastes. Four-year averages were used for many wastes to even out fluctuations in the waste streams.

The process of developing waste generation estimates involved finding the primary generators of each waste, determining current rates and projecting future trends.

• Primary Waste Generators

Primary waste generators are defined as those who generate a waste in significant quantities on a regular basis. These generators were of particular interest since they could provide information on current and future waste generation and they are the rate payers most affected by changes in disposal methods. Various approaches were explored to identify these generators, including disposal permit files, phone book surveys, and research sources which track companies by SIC code. A listing of the primary generators appears in part A of the background document.

• Current Waste Quantities

The current amount of waste generated was derived from Metro transaction and permit files, phone surveys, landfill receiving records, DEQ permits and files, and previous Metro waste composition studies. Data from Metro permit files provided information on seven of the wastes, although this data had to be adjusted to account for differences in permitted amounts versus the amounts that were actually disposed. This procedure is described in greater detail in Part H of the Background Document.

• Future Waste Quantities

Estimates of future waste quantities for most of the waste streams were based on projected population or employment figures.

Estimates for some of the wastes, such as construction and demolition wastes, soil contaminated with petroleum products and asbestos, are based on factors specific to the waste stream. Estimates of annual waste quantities were developed for each year through 1995 and then every five years from 1995 to 2010. These estimates are explained in greater detail in the discussion of each waste stream.

Waste Composition

A summary of the composition of the special waste streams is shown in Appendix B. One of the more important considerations for a management option is the effectiveness with which it deals with the entire waste stream. A variety of different management options may be necessary to adequately handle a waste stream because of the variety of types included in that waste stream.

As with the efforts to determine waste quantity, determination of waste composition involved a number of tasks and the evaluation of a number of possible approaches. The attempted approaches include a literature survey, an examination of Metro permit files, analysis of previous waste composition studies and surveys of generators.

• Literature Survey

An extensive literature searches were conducted to find information on waste composition and generation data from other studies. Unfortunately, most of the studies that were discovered through this search provided inconsistent information and/or did not apply to the Portland area for a variety of reasons.

• Special Waste Permit Files

A review of the Metropolitan Service District's files of disposal permits for special wastes was conducted. These files generally extend back to 1981 and contain information on the composition and quantity of seven of the special waste streams. This activity produced the best data for many of the wastes.

• Analysis of Raw Data from Previous Waste Composition Studies

Raw data from previous waste composition studies proved useful in determining the composition of construction and demolition waste. This data also assisted in determining the composition of land clearing waste and the number of relatively pure loads (one or two materials only per load) that were delivered to the landfills.

• Surveys of Generators

Generators of the special wastes were surveyed in an attempt to get information from them on waste composition. This approach did not prove to be very useful. Although the generators are knowledgeable of the waste streams that they are generating, in too many cases they lacked hard data on the waste composition.

Market Analysis

In undertaking an analysis of markets for material recoverable from special wastes, a decision was made to focus on those waste streams that contain recoverable and saleable supplies of materials that can be used effectively in other applications. Construction and demolition debris and land-clearing debris substreams offer the greatest potential for recovery and marketing of material as well as the greatest opportunity for waste stream volume reduction.

End users, processors and handlers of the materials were contacted to obtain information on: how they manage supplies of these materials, their value, and factors that relate to the future strength and functioning of the demand for materials recovered. A markets evaluation matrix is shown in Appendix C which summarizes markets, end-users, prices, barriers and requirements of commodities derived from construction and demolition debris and land-clearing debris.

Evaluation of Management Options

A number of potential management methods were explored for each of the waste streams. Information on potential management options was obtained from federal and state sources, voluntary submissions by facility owners and operators, and published literature. Each of the management options were then analyzed according to a number of criteria. These criteria fell into four broad categories; administrative considerations, technical feasibility, economic feasibility and political considerations. Definitions for the criteria are given below. Options explored and evaluation results are contained within the Special Waste Technical Report.

Administrative Considerations

Authority: This criterion assessed whether the Metropolitan Service District has sufficient authority and personnel to implement the option.

Legality: This criterion addresses whether there are federal, state or local regulations that impact on the ability to implement the option.

Technical Feasibility

Effectiveness: This criterion addresses the degree to which the management option provides a solution and meets the solid waste management goals currently being pursued by Metro. It also addresses whether industry incentives are necessary to encourage participation.

Reliability: This criterion examines whether the management option has being operated successfully in other areas on a large scale and over long periods of time. It also examined the ability of the management option to operate year round with little to no down time.

Adaptability/Flexibility: This criterion examines the ability of the management option to adapt to varying external conditions (i.e. changes in the markets, changes in the composition of the waste stream or in the environmental regulations).

Compatibility: This criterion addresses the degree to which the option is compatible with other existing or proposed solid waste facilities, programs and businesses.

Environmental Safety: This criterion addresses the ability of the proposed option to operate in an environmentally safe manner given the potential human and environmental risks to surface/ground water, air and land.

Economic Feasibility

Direct Costs: This criterion shows the direct cost of a management option, determined from the current actual cost for the activity (or similar activity) or from an estimate of the levelized cost per ton of the management option. The levelized cost is the average cost per ton which can be charged for the duration of the management option and will exactly cover the cost of that system (or facility).

Avoided Costs: The avoided cost is the cost per ton for disposing of the waste in the absence of any new management options. For most wastes, the avoided cost is the cost of transportation and disposal of the waste to the Columbia Ridge Landfill.

Political Considerations

Equity: This criterion examines who bears the burden of the proposed management system costs, specifically looking at whether the people (households, businesses and other organizations) creating the waste or benefitting from its disposal pay the cost.

Political Acceptability: This criterion addresses the expected acceptance of a specific management option by government officials and their constituents.

Responsiveness: This criterion examines whether the management option will be responsive to the needs of the system users.

Technical Analysis

This section identifies in detail the technical information developed for each substreams analyzed; its composition and contamination, primary generators, current generation, future generation, and potential markets. Special waste streams analyzed are as follows:

Construction and Demolition Debris and Land-Clearing Debris

Description

Construction/demolition debris is produced primarily by urban development; by the construction, rehabilitation, and demolition of structures such as buildings, roads, and bridges, as well as site clearance. Construction debris results from the construction, remodeling, or repair of houses, buildings, pavement and other structures and are similar in composition to demolition wastes. Demolition debris is largely inert and results from the demolition or razing of buildings, roads and other man-made structures. Remodeling and rehabilitation generates both types of material, often mixed together.

Land-clearing debris is generated as a result of site clearance. Material consists of dirt, rock, stumps, brush, and similar materials.

Composition and Contamination of Substream

Composition: The construction/demolition debris substream is made up of similar material from two distinct but related activities. Demolition debris typically consists of concrete, brick, bituminous concrete, wood and masonry, composition roofing and roofing paper, steel and minor amounts of other metals including aluminum and copper. Construction debris is similar, although the material it contains may be cleaner due to the fact that they have not been previously used and therefore have not been painted or combined with other materials. The composition of the demolition and construction debris substream was determined from the Metro Waste Characterization Study, 1989-90 Final Report. The waste sort indicates that construction and demolition debris consisted mostly of construction wood (27%), and miscellaneous organic (15%) and inorganic waste (32%). See Table 1 for the full breakdown of the composition of this waste substream.

The land-clearing substream consists of 63 percent stumps, brush and yard waste, 31 percent dirt and rock, and 5 percent contamination by miscellaneous materials. See Table 2 for the full breakdown of the composition of this waste substream.

Contamination: The construction/demolition debris substream can include materials that are contaminated with asbestos, lead (from paint or solder), preservatives (such as pentachlorophenol), PCB's (from light fixtures and other electrical equipment) and many other organic and inorganic contaminants.

Land-clearing debris is sometimes contaminated by demolition debris and other waste materials that may be present on the site that is cleared.

COMPOSITION OF CONSTRUCTION AND DEMOLITION DEBRIS

MATERIAL	PERCENT	1990 TONS	2000 TONS	2010 TONS
Paper	**7.77**	**15,773**	**18,850**	**22,978**
Food Container	0.04	81	97	118
Corrugated	5.39	10,942	13,077	15,940
Newspaper	0.64	1,299	1,552	1,892
Office	0.51	1,035	1,237	1,508
Magazine	0.03	61	73	89
Book	0.16	325	388	473
Other	1.00	2,030	2,426	2,958
Plastic	**2.85**	**5,785**	**6,914**	**8,428**
Durable	0.79	1,604	1,917	2,337
Film	1.01	2,050	2,450	2,986
Styrofoam	0.40	812	970	1,183
Other Food Cont.	0.03	61	73	89
Other	0.62	1,259	1,505	1,834
Yard Debris	**4.43**	**8,993**	**10,747**	**13,101**
Prunings	2.63	5,339	6,381	7,778
Bulky	0.61	1,238	1,480	1,804
Leaf	1.19	2,416	2,887	3,519
Wood	**26.88**	**54,566**	**65,211**	**79,492**
Construction	23.06	46,812	55,944	68,196
Packaging	3.82	7,755	9,268	11,297
Textile	**4.85**	**9,845**	**11,766**	**14,342**
Food	**0.26**	**528**	**631**	**769**
Misc. Organic	**14.85**	**30,145**	**36,027**	**43,916**
Glass	**0.40**	**812**	**970**	**1,183**
Beverage	0.08	162	193	237
Food Container	0.04	81	97	118
Other	0.28	568	679	827
Aluminum	**0.16**	**325**	**388**	**473**
Ferrous Metal	**2.91**	**5,907**	**7,060**	**8,606**
Non-Ferrous Metal	**1.81**	**3,674**	**4,391**	**5,353**
Misc. Inorganic	**32.27**	**65,508**	**78,288**	**95,433**
Appliance	**0.20**	**406**	**485**	**591**
Furniture	**0.21**	**426**	**509**	**621**
Hazardous Waste	**0.16**	**325**	**388**	**473**
Medical Waste	**0.01**	**20**	**24**	**30**
Other Material	**0.01**	**20**	**24**	**30**
TOTAL	**100**	**203,000**	**242,700**	**295,800**

NOTES: 1990 MSW generaton equal to 1,194,100 tons, construction and demolition debris is 17% of total or 203,000 tons.

Source; Metro Waste Characterization Study, 1989-90, Final Report

TABLE 2

LAND CLEARING WASTE

MATERIAL	CURRENT COMPOSITION[1]		PROJECTED AMOUNTS[2]		2010, %
	Total Tons	Percent	2000 Tons	2010 Tons	
Vegetative Materials	11,700	63	13,900	15,800	71.3
Bulky Wood	8,400	45	9,900	11,300	51.0
Yard Waste	3,300	18	4,000	4,500	20.3
Soil and Inerts	5,880	31.4	4,550	5,050	22.8
Soil	5,800	31	4,500	5,000	22.6
Rocks	80	0.44	50	50	0.2
Contamination	900	5	1,100	1,300	5.8
TOTAL TONS[3]	18,600		19,600	2,000	

[1]Composition is percent by weight. Total tons are annual figures estimated from phone survey (1989 figure).

[2]Based on projected employment in new construction, minus increased efforts to reduce the amount of soil taken off-site.

[3]Columns may not add up exactly due to rounding.

Primary Generators

The primary generators of construction/demolition debris and land-clearing debris are construction contractors, including excavators and general contractors. Homeowners also generate small amounts of this type of waste, but the amount generated by them is not significant compared to commercial generators. See Part A of the Background Document for a list of contractors who regularly generate this type of waste.

Current Generation of Construction and Demolition Debris

<u>Background</u>: The Metro Waste Characterization Study, 1989-90 Final Report, provided the best information on the quantity of material currently being disposed within the tri-county region. Sampling was conducted at three facilities: Hillsboro Landfill, St. Johns Landfill, and Metro South Station. Sorts were conducted during the winter, spring, summer, and fall seasons. Hauler interviews were conducted to identify the origin and type of waste being delivered.

<u>Results</u>: Data from the 1989-90 Waste Sort indicates that of the 1,132,165 tons delivered to all regional facilities during the 12 month period of April 1989 to March 1990, 192,468 tons (17%) are estimated to be construction and demolition debris.

Current Generation of Land-Clearing Debris

<u>Background</u>: Information on current generation of this material is lacking due in part to the fact that it is largely unregulated. Because of this, no data is available through permit or related files. The most successful method of determining the amount of land clearing debris currently generated was through a phone survey. Fifty generators were contacted and asked a series of questions about generation levels and disposal habits. Of the fifty companies contacted, information was provided by nineteen firms. Other firms stated that they did not generate this type of waste.

<u>Results</u>: Of the nineteen firms who responded to the phone survey, only five were able to estimate their current generation rates. From this data and a number of assumptions, the current rate is estimated to be 18,400 tons. The assumptions that have been made are that the five companies who provided estimates are representative of the firms that generate this waste, that there are a total number of 32 firms that generate land clearing debris and that land clearing debris has a density of about one ton per cubic yard.

Future Generation of Construction and Demolition Debris

Background: After examining historical data, a rate of increase of 2 percent annually was determined to be the best figure for projecting future waste quantities. This rate assumes that the actual historical increase is less than one-half of the apparent amount, and that future economic conditions will be similar to present conditions. The actual rate will depend on a number of things, including economic conditions, population changes and the number of major construction and demolition projects. Projected construction/demolition debris quantities are:

1990	203,000 tons per year
1991	207,060
1992	211,201
1993	215,425
1994	219,733
1995	224,128
2000	247,455
2005	273,211
2010	301,647

The composition of this waste stream is not expected to change significantly in the future. However, should no changes take place within the current system and it continues to rely on land-disposal, it is expected that more contractors will keep materials separate so that pure loads can be diverted to other facilities, such as delivering yard debris to composting facilities at a lower disposal cost.

Future Generation of Land Clearing Debris

Background: Projected employment in new construction was chosen as the best indicator for future amounts of land clearing debris. The expected change in the employee generation rate is that waste reduction efforts will decrease the amount of soils that are taken off-site for disposal. The incentive for generators to separate out this material and leave it on the site will increase as tipping fees increase. Data on projected employment in new construction is shown in Part I of the Background Document.

Results: The estimated amounts of land clearing debris that will be generated are shown below and in Table 2. As indicated in Table 2, the composition of this material is expected to change in the future. This is based on the idea that construction and excavation contractors will have greater incentive to reduce the amount of waste they produce by eliminating soils from this waste, and so the percentage of vegetative materials in this waste will increase. For the next five years, this reduction effort will roughly balance with an increase in land clearing activities. In 1995 and beyond, a slight increase will occur as reduction efforts fail to keep up with increased generation. The expected quantities of land-clearing debris are:

1990	18,500 tons per year
1991	18,500
1992	18,600
1993	18,600
1994	18,700
1995	18,800
2000	19,600
2005	21,000
2010	22,000

Markets for Recoverable Materials

The list of recoverable materials included within construction and demolition debris are paper, plastic, lumber, textiles, glass, metals, yard wastes, concrete, asphalt, reusable goods (sinks, toilets, bathtubs, etc.), drywall/sheetrock, roofing materials, and inert fill material (dirt). Of these, the materials that could most likely be recovered are those that are present in a relatively clean form, sufficient quantity or that have substantial value. These include wood, cardboard, yard waste, metals, miscellaneous inert materials (such as concrete, sheetrock and brick), asphalt and reusable goods. Other materials, such as glass and plastics, are not recoverable because they are not present in sufficient quantity or purity.

The markets for materials contained in land-clearing debris are quite simply related to the two main components of this substream; vegetative materials and inert materials. Vegetative materials include prunings, leaves, grass, and stumps and other bulky wood. Inert materials include soils, rocks and related materials. These two fractions are already segregated to some extent due to the value of clean soils, but greater segregation will be necessary in the future to increase the recovery of this waste substream.

The following summarizes the conclusions of the market analysis, the full report can be found in Part B of the Background Document.

Conclusions of the Market Analysis

- The potential exists to expand recovery and recycling of several major waste stream components, including construction/demolition wood, asphalt, soil and concrete. However, contamination problems and lack economic motivation will have to be overcome.

- Lack of publicly available information about existing stockpiles limits reuse for many items. This is likely true for bricks and fill.

- Contamination of construction/demolition wood may be difficult to overcome in seeking hogfuel markets. However, demand and price are increasing throughout the Northwest. Logging industry slowdowns could increase price locally. Tree stumps and bulk wood from land clearing are not currently marketed, but hogfuel markets are possible.

- Further study should be done to identify a list of outlets for inert fill. Crushed concrete, soil and rock could be utilized in greater quantities.

- Established commodity markets are generating high recovery levels for metals. More could be recovered from the waste stream if processing costs are reduced or subsidized.

- It appears unlikely that more waste paper could be recovered, due to the difficulty of separating it at work sites or at IPCs.

- No local or regional markets exist for non-container glass or sheetrock.

- Markets exist currently for increased recovery of certain plastics, primarily PVC, but these markets are very new. Other plastics from construction/demolition debris are typically too contaminated to sell.

- Export and local reuse of large timbers accounts for about one-third of local availability. The potential exists to increase these markets.

- There is no compost or barkdust market for materials from the special waste streams.

- Small and highly problematical markets exist for a portion of waste wood through use as fuel pellets, artificial firelogs, particleboard and firewood. Alternative feedstocks of greater purity are plentiful.

- Technologies for recycling asphalt could reduce costs and disposal problems for Metro area road crews.

- A lack of dependable supply was identified as a reason why some wood, concrete and other recovery operations have not been developed here in the past. Requiring disposers of certain waste substreams to utilize processing and recovery centers, could result in future investments for these capabilities.

Non-Hazardous Industrial Waste Sludges

Description

The non-hazardous industrial sludges are a very diverse group of materials made up of semi-liquid wastes from various industrial processes or manufacturing operations. This type of waste is usually stored in tanks or basins prior to being transported to a disposal facility. With greater awareness of the problems caused by free liquids in landfills and stricter regulations, this practice will need to be changed. Proposed rule additions to RCRA subtitle D criteria for municipal solid waste landfills will not allow for the disposal of free liquids.

Composition of Substream

Composition: The sludges that make up this waste substream are primarily sodium aluminate/aluminum oxides, material from sumps, and sludges that contain urea formaldehyde. Smaller amounts of various other sludges are also classified in this category. See Table 3 for the complete composition of this substream. The data shown in Table 3 is from Metro's permit files and represents an average for the years 1982 to 1989.

Contamination: The various sludges that make up this waste substream are contaminated with small amounts of many different compounds, including oils, soaps, and various off-specification products.

Primary Generators

The primary generators of this waste substream are a diverse group of manufacturers, service companies and others. This group includes companies who perform truck and car maintenance (thus producing sump materials), manufacturers of wood products who use urea formaldehyde resins, tank cleaning companies, industries who perform plating and casting, and many other companies. The companies who currently have permits for disposal of non-hazardous industrial waste sludges are shown in Part A of the Background Document.

Current Generation

Background: Information on the amount of sludge currently generated was derived from Metro's permit files. This data was adjusted to account for the difference between the amount that was permitted versus the amount that was actually disposed. Due to the significant variation in the annual generation rate of the sludges that comprise this substream, so it was determined that the best available figure for waste generation is an average of the last four years.

TABLE 3
NON-HAZARDOUS INDUSTRIAL WASTE SLUDGES

MATERIAL	CURRENT COMPOSITION[1]		PROJECTED AMOUNTS[2]	
	Total Tons	Percent	2000	2010
Chemical Sludges[3]	1,100	41	1,100	1,100
Sump Material	890	33	890	890
Urea Formaldehyde	540	20	540	540
Grease from Food-Handling	20	0.6	20	20
Laundry Wastewater	10	0.4	10	10
Mixed (Grease, Paint, Oil, Asbestos)	40	1.3	40	40
Other	110	4.2	110	110
TOTAL TONS[4]	2,700		2,700	2,700

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[1]Tonnage figures shown are annual generation rates. Percentages are figures by weight. Composition is derived from Metro permit files (four-year average).

[2]Based on the future level of industrial employment, which is projected to remain relatively constant over the next twenty years.

[3]Chemical sludges includes sodium sulfate, sodium aluminate, aluminum oxide, magnesium chloride, zinc oxide and others.

[4]Columns may not add up exactly due to rounding.

Results: As shown in Table 3, the current amount of industrial waste sludges being generated is approximately 2,700 tons per year.

Future Generation

Background: After examining the components and nature of this substream, it was concluded that industrial employment levels would be the best method for projecting future quantities.

Results: Using industrial employment as the basis for projecting quantities of industrial waste sludges leads to very few changes in the total quantity generated. Industrial employment is projected to be stable in the Portland area for the next twenty years (see Part I of the Background Document).

Markets for Recoverable Materials

Chemical sludges are amenable to recovery. This is likely already occurring to the extent feasible, but should disposal fees increase substantially then it may become economically possible to recover a greater amount.

Non-Hazardous Industrial Waste Dust and Ash

Description

Dusts - The non-hazardous finely-divided particles produced by an industrial process or associated air pollution control equipment.

Ash - The solid residue left when combustible material is thoroughly burned or is oxidized by chemical means. The ashes must not exhibit hazardous waste characteristics as defined by ORS 466.005.

Composition of Non-Hazardous Industrial Dusts

Composition: Material consists primarily of sandblasting and casting sands, lime hydrates and Bakelite dust. There are also lesser amounts of abrasives, bag house and other dusts. In the past this waste substream has also included wood dust from planar mills and steel fines. See Table 4 for further details.

Contamination: The various dusts that make up this waste substream are generated through different processes and so will contain different types of contaminants. Detailed information is not available on the contaminants present in these wastes, but based on knowledge of their generation methods and on knowledge of similar wastes, some assumptions can be made as to the contaminants likely to be present. For instance, it is likely that the sandblasting and abrasive dusts are contaminated with paint and metallic compounds such as rust. The bag house dusts may contain high amounts of inorganic compounds that are easily leached due to the very high surface area (small particle size). The only problem with the lime hydrates may be their alkaline nature, which can be irritating to skin.

Composition of Non-Hazardous Industrial Ash

Composition: Material composed primarily of boiler ash, with lesser amounts of ash/slag mixture. See Table 5 for further details.

Contamination: Data is lacking on the contaminants that may be present in this waste substream. Although incinerator ashes are frequently contaminated with trace amounts of a variety of metals and organic compounds.

TABLE 4

NON-HAZARDOUS INDUSTRIAL DUSTS

MATERIAL	CURRENT COMPOSITION[1]		PROJECTED AMOUNTS[2]	
	Total Tons	Percent	2000	2010
Lime Hydrates	210	23.5	210	210
Sandblasting and Casting Sands	590	65.1	590	·590
Abrasives	4	0.4	4	4
Bag House	1	0.1	1	1
Bakelite	90	10.3	90	90
Other	6	0.7	6	6
TOTAL TONS[3]	900		900	900

TABLE 5

WASTE COMPOSITION OF NON-HAZARDOUS ASH

MATERIAL	CURRENT COMPOSITION		PROJECTED AMOUNTS	
	Total Tons	Percent	2000	2010
Boiler Ash	4.8	88.8	4.8	88.8
Ash and Slag	0.6	11.1	0.6	11.1
TOTAL TONS	5.4		5.4	5.4

[1]Tonnage figures shown are annual generation rates. Percentages are figures by weight. Composition is derived from Metro permit files (four-year averge).

[2]Based on projected levels of industrial employment.

[3]Columns may not add up exactly due to rounding.

Primary Generators of Non-Hazardous Industrial Dusts

The primary generators of this waste substream are companies who perform sandblasting or treat paper, cement kilns, companies using bag houses as air pollution control equipment, and various other industries. See Part A of the Background Document for a list of primary generators of waste dust.

Primary Generators of Non-Hazardous Industrial Ash

The primary generator of this waste substream is Jantzen Incorporated (boiler ash). Further detail is shown in Part A of the Background Document.

Current Generation of Non-Hazardous Industrial Dusts

Background: Information on the amount of dusts currently generated was derived from Metro's permit files. This data was adjusted to account for the difference between the amount that was permitted versus the amount that was actually disposed. The permit records showed a significant variation in the annual generation rate of the various dusts that comprise this substream, so it was decided that the best available figure for waste generation is an average of the last four years of available data (1985 through 1988).

Results: As shown in Table 4, the current amount of non-hazardous industrial waste dusts being generated is 900 tons per year.

Current Generation of Non-Hazardous Industrial Ash:

Background: Information on the amount of ash currently generated was derived from Metro's permit files. This data was adjusted to account for the difference between the amount that was permitted versus the amount that was actually disposed. Metro's permit records show a significant variation in the annual generation rate of the various ashes that comprise this substream, so it was decided that the best available figure for waste generation is an average of the last four years of available data (1985 through 1988).

Results: As shown in Table 5, the current amount of non-hazardous ash being generated is 5 tons per year.

Future Generation

Background: After examining the components and nature of both dusts and ash, it was concluded that industrial employment levels would be the best method for projecting future quantities.

Results: Using industrial employment as the basis for projecting quantities of industrial waste dusts and ash leads to no significant change in the annual amount generated through the year 2010. This result is due to the stable level of industrial employment that is projected for the Portland area. The results are shown in Table 1 and are summarized in Tables 5 and 6.

Markets for Recoverable Materials

Non-Hazardous Dusts: No recyclable materials were identified as present in significant quantities in this waste substream. It should be noted, however, that in the future it may be possible to recover sand or lime for certain applications. These technologies are still in the developmental stages, but as disposal fees increase it may become more attractive to attempt to do this on a local level. It may also be possible to find a beneficial use for some of the waste dusts through a waste exchange.

Non Hazardous Ash: No recyclable materials were identified as being present in significant quantities in this waste substream, although some possibilities may develop in the future. It may be possible to use boiler ashes or ash/slag mixtures in road construction. None of these possibilities were currently sufficiently viable to be pursued as part of the market analysis, but could be pursued through waste exchange or similar activities in the future.

Sewage Grit and Screenings

Description

Grit and screenings is a material removed from wastewater because it is not biodegradable and causes problems in the operation of the treatment plant.

Grit is collected at the front end of the wastewater treatment plant and mechanically dewatered. The grit is made up of sand, rocks and other heavy debris. Screenings are also collected by mechanical means at the front end of the plant and contains rags, plastics, and other objects. The grit and screenings are inorganic in nature and cannot be treated by the wastewater treatment plant biological processes.

Digester sludges are typically combined in this category. Digester sludge differs from sewage sludge in having a higher solids content such as hair and plastics that are difficult or impossible to degrade biologically. Digester sludge is produced only sporadically, while sewage sludges are produced on a very regular basis.

Septage is the liquid material pumped out of septic tanks. It has a high organic content, although compared to raw sewage it may contain relatively higher amounts of organics that are slow to degrade. Wastes that are classified as oil and grease are often the result of cleaning traps and sumps.

Composition of Substream

Composition: This waste substream is composed primarily of grit with lesser amounts of screenings. Some septage and oil/grease wastes are also included in this waste substream. Although more sewage sludge than grit and screenings is generated at waste water treatment plants, very little of the sludge actually enters the waste disposal system due to alternative management methods. The sludge that has been brought to landfills in recent years is mostly digester sludge that is hard to handle through other means. Table 7 gives greater detail on the composition of this waste substream.

Contamination: This waste substream is contaminated by trace amounts of heavy metals and other potentially toxic materials that enter the sewage system. Increased control of industrial discharges plus decreased use of toxic materials by homes and businesses has reduced this contamination in recent years. The presence of pathogenic organisms are still a concern, however, and this predicates cautious handling of these wastes.

TABLE 6

SEWAGE GRIT AND SCREENINGS

MATERIAL	CURRENT COMPOSITION[1]		PROJECTED AMOUNTS[2]	
	Total Tons	Percent	2000	2010
Grit	4,030	78.8	4,730	5,200
Digester Sludge	1,050	20.6	1,240	1,360
Oil and Grease	26	0.5	30	33
Septage	5	0.1	6	7
TOTAL TONS[3]	5,120		6,000	6,600

[1]Tonnage figures shown are annual generation rates. Percentages are figures by weight. Composition is derived from Metro permit files (four-year average).

[2]Based on the future level of industrial employment, which is projected to remain relatively constant over the next twenty years.

[3]Columns may not add up exactly due to rounding.

Primary Generators

The primary generators of this waste substream are sewage treatment plants, septic tank owner and collection companies, agencies that clean sewers, and companies with sumps. Part A of the Background Document shows the primary generators of this waste substream.

Current Generation

Background: Information on the amount of sewage grit and screenings currently generated was derived from Metro's disposal permit files. This data was adjusted to account for the difference between the amount that was permitted versus the amount that was actually disposed.

Results: As shown in Table 6, the current amount of sewage grit and screenings generated is 5,120 tons per year.

Future Generation

Background: The nature of this substream leads to regional population figures being the best basis for projecting future quantities.

Results: Using population figures as the basis for projecting quantities of sewage grit and screenings leads to an annual increase of about 2 percent. The results are shown in Appendix A and are summarized in Table 6.

Markets for Recoverable Materials

No recoverable material was identified in this waste substream

Non-Hazardous Petroleum Sludges

Description

This waste substream is composed of a variety of types of petroleum wastes. Tank bottoms are the sludge (petroleum and solids) from the bottom of petroleum tanks and sumps. Clean-up materials are the result of spills and consist primarily of petroleum-soaked absorbents. These wastes result from the storage or spillage of both new and used petroleum products, and must not exhibit hazardous waste characteristics as defined by ORS 466.005.

Other wastes included in this substream are API sludge, sand/oil mixtures, oil/water mixtures and waste grease. API sludge results from the use of an API separator for removing water from oil. Mixtures of sand and oil are generally the result of spills. Oil and water mixtures are also usually the result of accidents or mishaps. Waste grease is typically grease that has been used and no longer meets specifications.

Composition of Substream

Composition: Tank bottoms and clean-up materials each represent about one-third (by weight) of this waste substream. Sludges from API separators, at about 20 percent, are also a significant portion of this substream. Present in lesser quantities are sand/oil mixtures, oil/water mixtures and waste grease. See Table 7 for further details.

Contamination: Contaminants that may be present in the wastes that make up this substream include PCBs, heavy metals (lead and others), volatile and nonvolatile organic compounds, and halogenated organic compounds.

Primary Generators

The primary generators of this waste substream are petroleum storage facilities, transportation companies, clean-up contractors, repair and general contractors, and large institutions and retailers. See Part A of the Background Document for further details.

TABLE 7

NON-HAZARDOUS PETROLEUM SLUDGES

MATERIAL	CURRENT COMPOSITION[1]		PROJECTED AMOUNTS[2]	
	Total Tons	Percent	2000	2010
Tank Bottoms	145	33.7	170	190
Clean-up Materials	140	32.3	160	180
API Sludge	90	20.6	110	120
Sand/Oil Mixture	28	6.5	33	36
Oil Contaminated with Water	27	6.3	32	35
Waste Grease	3	0.6	3	3
TOTAL TONS[3]	430		510	560

[1]Tonnage figures shown are annual generation rates. Percentages are figures by weight. Composition is derived from Metro permit files (four-year average).

[2]Based on the future level of industrial employment.

[3]Columns may not add up exactly due to rounding.

Current Generation

<u>Background</u>: Information on the amount of petroleum sludges currently generated was derived from Metro's permit files. This data was adjusted to account for the difference between the amount that was permitted versus the amount that was actually disposed. The permit records show a significant variation in the annual generation rates for most of the different sludges that comprise this substream, so it was determined that the best available figure for waste generation is an average of the last four years.

<u>Results</u>: As shown in Table 7, the current amount of petroleum sludges being generated is approximately 430 tons per year.

Future Generation

<u>Background</u>: Examination of this substream led to the conclusion that population would be a good indicator of future levels of waste generation. Although it is impossible to accurately predict the occurrence of accidents such as petroleum spills, it appears to be a fair assumption that the amount of petroleum usage is related to population, and that the amount of usage will have a proportionate impact on the amount of tank bottoms generated and the number of spills that occur. One interesting variation in waste generation that is indicated by Metro's permit files is the apparent two-year cycle in the generation of tank bottoms. This is possibly the result of a maintenance program that is on a two-year schedule.

<u>Results</u>: Using population as the basis for projecting quantities of petroleum sludges leads to a nominal increase in this waste substream over the next 20 years. These results are shown in Appendix A and are summarized in Table 7. As shown in Appendix A, the two-year cycle for tank bottoms has been retained through 1994.

Markets for Recoverable Materials

Petroleum sludges are currently processed within the Portland metropolitan region in order to recover hydrocarbons. The hydrocarbons are removed from the sludge through gassification and made into alternative fuels. Cost for this process is between $1.00 to $2.50 a gallon.

Soil Contaminated with Petroleum Products

Description

This waste substream consists of soils in which there has been a release of a petroleum product. Petroleum products are defined as crude oil and refined petroleum fractions, including gasoline, crude oil, fuel oil, diesel fuel, lubricating oil, oil sludge and oil refuse. The soils that are included in this substream are generated as a result of spills or slow leaks from storage tanks. Only those soils that are removed from the site for treatment or disposal are measured as part of this waste substream. Those soils that are treated in situ (in place) are not included in the following discussion.

Composition of Substream

Composition: This waste substream consists of soil contaminated with a variety of petroleum products. The wastes are primarily soil, with usually only a small percentage of petroleum product present. The largest individual waste is soil contaminated with "petroleum products" (no specific product identified). The next two largest, soils contaminated with gasoline and diesel fuel/fuel oil, are indicative of the amount of these products that are stored and consumed. Greater detail on the composition of this substream is shown in Table 8. This data has been derived from Metro's permit files for wastes generated in 1988 and 1989 and from DEQ records. Only the most recent data has been used due to the significant changes that this waste substream have undergone with the implementation of new rules on underground storage tanks.

Contamination: In this case, the waste stream is generated as a result of soil contamination, further contamination is not an issue except in the case of leaded gasoline and PCB's in waste oils. Where contaminated soil is generated as a result of a leaking underground storage tank that previously contained leaded gasoline, lead may be present in the soils in significant concentrations. The presence of lead in large quantities could complicate the disposal of this waste. Where a spill of used lubricating oil has occurred, it is possible that PCB's are present and this would prevent disposal of this waste through certain management options. Soils contaminated with lead and PCBs may require handling as a hazardous waste depending on the concentration present.

Primary Generators

The primary generators of this substream are petroleum storage facilities, especially gas stations, and transporters of petroleum products. For further details, see Part A of the Background Document.

TABLE 8

SOIL CONTAMINATED WITH PETROLEUM PRODUCTS

MATERIAL	CURRENT COMPOSITION[1]		PROJECTED AMOUNTS[2]	
	Total Tons	Percent	2000	2010
Soil Contaminated with:				
Gasoline	12,400	31.0	4,650	3,100
Diesel Fuel & Fuel Oil	8,680	21.7	3,255	2,170
Oil	1,640	4.1	615	410
Petroleum Products[3]	14,840	37.1	5,565	3,710
Mixed	2,440	6.1	915	610
TOTAL TONS[4]	40,000		15,000	10,000

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[1]Tonnage figures shown are annual generation rates. Percentages are figures by weight. Composition is derived from Metro permit files (four-year average).

[2]Based on the future level of industrial employment, which is projected to remain relatively constant over the next twenty years.

[3]No information available on the exact type of petrolem product.

[4]Columns may not add up exactly due to rounding.

Current Generation

Background: DEQ personnel from the Underground Storage Tank Cleanup Section provided information on the amount of petroleum-contaminated soil from the tri-county area that has been delivered to disposal facilities. During 1989 approximately 300 leaking UST sites were reported in the tri-county area. Typical sites involve approximately 75 to 100 cubic yards of contaminated soil. It is assumed that contaminated soil has a density of 1.3 tons per cubic yard, this would result in approximately 40,000 tons of contaminated soil generated in 1989. DEQ Northwest Regional Office records indicate that this rate of generation has continued into 1990.

Results: Current generation has been estimated at 40,000 tons per year.

Future Generation

Background: As discussed above, activity in the area of leaking underground storage tanks is the major factor in the quantities of this waste that is generated. This activity is expected to continue for the next few years as more people become aware of the new requirements and more tanks are examined for problems with leakage.

Results: Due to activity in addressing leaking underground storage tanks, this waste substream is expected to remain constant through till 1992 at 40,000 tons per year, and then decreasing after that until stabilizing around 2005 at 10,000 tons per year (see Appendix A for further details). Barring increased regulation that would increase the amount of contaminated soil, it should be noted that any option which takes a few years to implement will miss the peak of waste generation for this waste substream.

Markets for Recoverable Materials

No recyclable materials were identified as being present in this substream.

Asbestos Waste

Description

Asbestos is a group of naturally occurring minerals that have a fibrous structure. A fibrous structure and heat-resistant properties allows asbestos to be made into useful products. But asbestos may also break down into microscopic fibers that can become airborne. Asbestos is a known carcinogen. When inhaled, asbestos fibers become lodged in the lungs and chest cavity and cause cancer and asbestosis. Ingested asbestos fibers may cause gastrointestinal cancers.

Asbestos includes minerals commonly known as chrysotile, amosite, crocidolite, anthophyllite, tremolite and actinolite (EPA). Depending on its physical state, asbestos can be classified as friable or non-friable. Friable asbestos easily forms airborne particles and so presents a much greater risk to human health, while non-friable asbestos has less of a tendency to break apart.

Composition of Substream

Composition: The greatest single waste that comprises this waste substream is insulation and associated materials (see Table 10). Associated materials includes pipe and other materials that the asbestos was originally placed upon and was removed with the asbestos, and wastes such as plastic sheeting from the removal of the asbestos. Other asbestos-containing wastes include brake linings (from maintenance and removal programs), bags made of asbestos, boards made with asbestos (for a variety of insulation, electronics and other applications), siding and shingles. Very few of these products are pure asbestos; most range from two to 40% asbestos content. Evidence of the versatility of asbestos is presented by the variety of products that have been disposed, such as floor tile, fireproofed filing cabinets, gaskets, gloves and ceiling panels.

Contamination: Some of the materials classified as asbestos wastes are actually mixtures of various wastes. Some of these waste mixtures have included brines or paints. In general, however, the asbestos is the only hazardous material present.

Primary Generators

The generators of this waste substream include a variety of manufacturers, removal and demolition contractors, service industries (such as those who repair and replace brakes), homeowners and institutions such as schools, theaters and churches. Part A of the Background Document identifies the names of the primary generators of asbestos wastes.

TABLE 9

ASBESTOS WASTES

MATERIAL	CURRENT COMPOSITION[1]		PROJECTED AMOUNTS[2]	
	Total Tons	Percent	2000	2010
Insulation & Related Wastes	1,290	96.3	2,410	3,470
Brake Linings	30	2.1	50	80
Bags	10	0.9	20	30
Boards	5	0.4	10	14
Siding	4	0.3	8	10
Shingle	1	0.1	3	4
TOTAL TONS[3]	1,340		2,500	3,600

[1]Tonnage figures shown are annual generation rates. Percentages are figures by weight. Composition is derived from DEQ permit files (four-year average).

[2]Based on the future level of industrial employment.

[3]Columns may not add up exactly due to rounding.

Current Generation

Background: An attempt was made to determine current and future generation of asbestos based on the number of permits issued for different categories of removal projects. This analysis is shown in Part G of the Background Document. While this approach showed some promise, there is difficulty in correlating permitted volume figures and actual disposal figures by weight. Also, this analysis did not yield a reliable method for projecting future quantities.

Information on the amount of asbestos wastes currently generated was derived from Metro's permit files. This data was adjusted to account for the difference between the amount that was permitted versus the amount that was actually disposed. The permit records show a significant variation in the annual generation rates for the different wastes that comprise this substream, so it was concluded that the best available figure for waste generation is an average of the last four years (1985 to 1988) of disposal data.

Results: As shown in Table 9, the current amount of asbestos waste being disposed is 1,340 tons per year.

Future Generation

Background: Examination of this substream led to the conclusion that the annual generation rate could be expected to increase for the next 20 years. Despite the prohibitions on many of the previous uses of this material and current efforts to control exposure to asbestos, the number of asbestos removal projects are expected to continue and even to increase for the foreseeable future. This is due to the fact that removal projects, which generate the majority of this waste substream, are removing material that was put in place many years ago, and because many of the current efforts involve encapsulation in place and are not actually removing the asbestos. Encapsulation often turns out to be a temporary solution, and the asbestos must eventually be removed when the building is remodeled or demolished years later.

Results: Based on the relative amount of asbestos removed versus the amount still in place and expected to be removed over the next 20 years, the amount of asbestos wastes has been projected to increase to 3,600 tons in 2010. This increase is shown in Appendix A, where a four percent annual increase was assumed. Actual growth will depend on regulatory efforts, public concern, availability of funding for removal from schools and other public buildings, demolition activity, and other economic factors.

Markets for Recoverable Materials

No recyclable materials were identified as present in this substream.

SECTION VI. SPECIAL WASTE MANAGEMENT SYSTEM CONCLUSIONS

Roles and Responsibilities

The current special waste management system includes a range of private and public entities that generate, recycle, dispose, and regulate. The purpose of this section is to define the roles and responsibilities of the State, Metro, local governments and the private sector (waste generators) in order to bring about an institutional framework for the management of special waste substreams.

1. **Metro, DEQ and waste generators shall coordinate special waste management activities.**

   - DEQ shall establish appropriate criteria and guidelines for the handling, treatment, and disposal of identified special wastes.

   - Metro's role is to manage the proper disposal of special wastes and coordinate the special waste program. Achieving close coordination among all parties helps ensure that an effective special waste management program is established.

   - Waste generators must strengthen their efforts to source reduce and recycle their waste products. Efforts must be taken to reduce overall waste volumes, minimize handling problems (i.e. dewatering, sanitizing etc.) and reduce the level of potentially hazardous constituents within waste products.

2. **DEQ's role is to develop specific treatment standards and disposal criteria for each special waste substream.**

   - RCRA Subtitle D disposal criteria will further restrict the acceptance of special waste at disposal facilities. DEQ should fulfill their responsibility for developing treatment standards which will permit waste materials to be accepted at solid waste facilities. In addition, DEQ should take responsibility for conducting research on treatment technologies which minimize risk posed by special waste and characterize their effectiveness.

   - The special waste management program addresses several different types of facilities and waste materials. Different waste materials pose different levels of risk between solid waste facilities. Therefore, facility specific regulations commensurate with the risks posed by each waste material should be developed.

3. **DEQ's role is to integrate regulatory programs and their disposal needs.**

- Passage of new regulatory programs has resulted in the generation of large volumes of waste material requiring land disposal. For example, corrective actions to mitigate leaking underground storage tanks as required under RCRA Subtitle I has increased the amount of petroleum-contaminated soil handled by the solid waste system. This has resulted in the delivery of tens of thousands of tons of contaminated soil to over-burdened disposal facilities within the region. Therefore, prior to implementation DEQ must identify the expected impacts of new regulatory programs on the solid waste system and take the lead role in ensuring necessary capacity. Where possible DEQ should strongly encourage or require the use of alternative management options which do not rely on land disposal.

4. **Metro shall expand the scope of its current testing, permitting and enforcement program for special waste.**

- In order to effectively manage all special waste generated within the region, Metro should establish a program to test material for possible hazardous constituents prior to disposal.

- Spot checks at disposal facilities should be conducted to ensure that permitted material is comparable to tested material. Such a procedure will prevent the disposal of unwanted material at solid waste facilities.

- Metro should evaluate the need for additional regulation of special waste facilities servicing the Metro area to ensure the proper management and disposal of these wastes.

5. **Metro shall use an integrated waste management approach in handling special waste.**

- Activities that promote source reduction, recycling, energy recovery, and environmentally sound land disposal of special waste should be put in place.

- To date, the use of source reduction and recycling has been minimal and should be expanded. Metro should provide technical assistance to waste generators to both reduce the volume and minimize toxicity of the waste stream.

- Alternative technologies such as gassification and pyrolysis show increasing promise as an environmentally sound and cost effective means to manage certain special waste substreams. Metro should encourage their development.

6. <u>Local governments shall regulate and implement the collection, transportation and, where appropriate, the disposal of solid waste.</u>

- Local governments shall assure that the collection of special waste is conducted in a cost efficient and reliable manner in full compliance of Metro Policy 6.0 of the Regional Solid Waste Management Plan.

- Local governments, where applicable based on authority, will provide spot checks at disposal facilities to ensure that permitted material is comparable to tested material.

- Local governments shall evaluate the need for additional regulation of special waste collection and, where applicable based on authority, disposal to ensure proper management.

- Local governments shall be involved in the promotion of source reduction, recycling, energy recovery and environmentally sound land disposal of special waste.

- Local governments should assist Metro in providing technical assistance to waste generators to both reduce the volume and minimize toxicity of the waste stream.

7. <u>Special waste generators must comply with waste acceptance standards and policies developed by Metro</u>.

- It is the responsibility of waste generators to comply with the more stringent RCRA Subtitle D disposal criteria and restrictive waste acceptance standards at solid waste facilities. Failure to do so will result in fines or the classification of a waste material as a hazardous waste.

- Efforts to reduce the volume, minimize the toxicity, and prepare special wastes for proper and safe handling for receipt to the solid waste system is the responsibility of waste generators.

- Waste generators have the responsibility to understand the regulatory structure and comply with regulations.

- Industrial waste generators should find the materials necessary for its operation by looking first to the by-products of other manufacturing processes. Each industry also should take responsibility for the eventual conversion of its by-products into either a physical or energy resource.

Special Waste Management Programs and Facilities

The following management strategies are based on the evaluation of the management options as conducted in this study. It should be noted that additional factors or new information not considered in this study may have a significant bearing on the final decision as to the best management practice for identified waste streams. An example may include the development of new technologies and markets.

Special Waste Management Programs

The following programs should be implemented by Metro to encourage the prevention, reuse, recycling, and proper disposal of all special waste materials.

Special Waste Permit Program

Special waste delivered to the Metro solid waste system may require special handling, pretreatment, or may be banned for operational or safety reasons. As the agency responsible for management of the solid waste system, Metro must be able to verify the source and characteristics of all industrial special waste (excluding construction and demolition debris and land-clearing debris) prior to its acceptance at any regional facility or its transport to an out of region facility. In order to facilitate these day to day operational decisions, Metro has developed a special waste testing and permit program.

• Permit Information

Currently a special waste generator has the responsibility of contacting Metro for a special waste permit prior to disposal. Before a permit is issued Metro requires the following information:

- Generator name and address;
- description of material;
- physical, chemical, or manufacturing process from which material originated;
- disposal quantity and frequency;
- transporter;
- test procedure

Once the above information has been obtained, completed applications are reviewed by Metro and DEQ. If approved, a permit is issued and the special waste generator is directed to an appropriate facility. Appointments for delivery are scheduled through Metro; when arriving at the facility the transporter must inform site personnel and show a copy of the approved permit.

• Summary

With the closure of the St. Johns Landfill special wastes will be handled by a variety of treatment, recycling and disposal facilities. Metro will continue to require that special wastes generated within the Metro region obtain a special waste permit prior to disposal. The continuation of the special waste permit program will provide consistency for special waste generators, allow Metro to ensure that material handled is non-hazardous, and provides a mechanism for directing special waste haulers to appropriate facilities.

Load Checking Program

Draft revisions to RCRA Subtitle D cites specific requirements for a load checking program at solid waste landfills. The objective of such a program is to exclude the receipt of hazardous wastes at the landfill. Metro should expand the draft minimum requirements of RCRA and develop a load checking program at all Metro solid waste facilities.

Waste delivered to the Metro solid waste system may require special handling, pretreatment, or may be banned for operational or safety reasons. Historically, Metro has allowed disposal of special wastes at the St. Johns Landfill with a special waste permit. With the replacement of the St. Johns Landfill with the Metro East Station, and the subsequent processing, compaction, and transport of waste materials, most special wastes cannot be delivered to transfer facilities. To prevent the acceptance of prohibited waste, Metro needs to develop a load checking program. A successful load checking program should be designed to identify and remove from the municipal waste stream all hazardous and other prohibited wastes which may be delivered to Metro solid waste facilities.

Load checking consists of four principal activities: generator notification, site surveillance, waste identification, and waste inspection. The following activities should be considered in designing an effective load checking program:

• Generator and Hauler Notification

Generators and haulers must be notified that certain special wastes are unacceptable for disposal at Metro facilities and it is their responsibility to ensure only acceptable wastes are delivered. Haulers are to be notified that they retain responsibility for any prohibited waste detected in their load. Generators and haulers are to be notified of these conditions through the use of notices, signs, and verbal communication. Notices of the specific operational standards and policies, are to be periodically distributed at the facility entrance and during load checking.

Operational standards and policies may also be printed on warning decals for distribution to haulers to be affixed to waste containers used by the collection companies. Signs should be posted at the site entrance clearly identifying prohibited wastes and their disposal alternatives. Another states that a periodic load checking program is in effect.

- Waste Identification and Site Surveillance

Waste identification must be practiced by all site personnel through training and observation. The determination of waste acceptance standards must be developed by Metro dependent upon the function, design, operating procedures, and existing regulations. The general procedure would involve questioning of haulers by gate personnel. It must be stressed that the waste generator and hauler is responsible for establishing that their waste is acceptable. The source of the load is determined and visually inspected. Any suspicious loads observed, site personnel will pull the vehicle out of line for closer inspection. In some instances additional assessment may be require analysis by a certified hazardous waste laboratory.

Site surveillance requires visual inspection of incoming loads. At the discharge location, a spotter will visually inspect the load for unusual color, odor, or texture and assure compliance with all delivery specifications. Any material suspected of being hazardous or otherwise prohibited will be rejected and removed from the site by the hauler.

- Waste Inspection

Waste inspections involve an actual examination of the waste delivered to the facility. A typical load checking program at a site will involve 5 to 10 loads per week, or more. The actual number will depend on the size of the site and the character of waste generated in the service area. The procedure for randomly inspecting a load begins by requesting the driver to discharge the load into a windrow. As the driver stands by, the windrow is carefully examined for the presence of prohibited wastes. Any known or suspected prohibited waste is returned to the hauler.

- Summary

A well designed and implemented load checking program can reduce the long term liability of the solid waste system. Unacceptable wastes screened from incoming wastes will be responsibly handled reducing risk to site personnel and impacts to the environment. In addition education and awareness are major elements of a load checking program. It is an opportunity to educate waste generators and haulers about the increased regulation and concern regarding unacceptable wastes within a rapidly changing solid waste system.

Waste Exchange Program

A major aspect of this report has been to recognize the material resources contained within special wastes. Metro should actively facilitate the reuse of industrial materials, which otherwise would be landfilled, by promoting an existing multi-state waste exchange. One approach may be to promote a waste exchange in the Portland metropolitan area by distributing exchange newsletters free of charge to waste generators identified through the special waste permit program.

Technical Assistance Program

Many special waste materials are problem wastes due to the presence of hazardous substances. If hazardous substances in waste materials could be identified and eliminated, then recycling, incineration, or landfilling would be safer.

As an initial goal both DEQ and Metro could identify waste materials most likely to contribute to the risks associated with MSW management. Waste materials identified would be targets for reduction efforts, this would involve joint efforts between Metro, DEQ, and waste generators to evaluate substitute materials.

Special Waste Management Options

The following management options should be implemented to bring about the necessary reuse, recycling and disposal of individual special waste substreams. Options are consistent the state hierarchy and reflect the roles and responsibilities stated above.

Construction/Demolition Debris and Land Clearing Debris (estimated 1990 generation - 221,500 tons)

Need for Developing Long-Term Management Strategies

At present, in-region landfilling is still the principal means to manage construction and demolition debris and land-clearing debris. However, landfilling is a diminishing option with the dwindling availability of long-term disposal capacity in the Metro region. Currently there is no guarantee of available in-region limited-purpose landfill space beyond 1996-1998, should no major efforts be made to reduce current flows.

In addition, expansion of the Hillsboro Landfill, the principle limited-purpose landfill in the tri-county region, is contingent upon EPA and Army Corps of Engineer approved 404 permits to allow the extension of the landfill onto adjacent wetlands. Recently, the Corps and the EPA signed a memorandum of agreement that suggests that obtaining permits to develop wetlands will be more difficult in the future than in the past, and that more wetland development permit applications will be denied.

Management Options for Construction and Demolition Debris and Land-Clearing Debris.

A number of potential management options were explored for construction and demolition debris and land-clearing debris. From the options developed, it is apparent that processing and recovery of the waste stream is an economically viable approach and is the preferred means to manage the material long-term. Developing a system to fully process construction and demolition debris, and land-clearing debris will provide for the following:

- energy and material conservation;
- fewer negative environmental impacts;
- conserve in-region land disposal capacity;
- long-term system stability;
- and economic efficiency.

The development of a processing system will require an integrated approach of three management options; a salvageable building material demonstration project, a processing system, and continuation of in-region limited-purpose landfilling for residual and non-processable material.

Salvageable Building Material Demonstration Depot

Reusable building materials are generated by demolition companies, construction contractors, and home remodelers. Waste composition studies indicate that reusable building materials landfilled represent approximately 4,000 tons per year or 2% of the construction/demolition debris waste stream. The material consists primarily of two types: high-value reusable building materials, and low-value reusable building materials. High-value reusable materials consist of crafted decorative items such as doorknobs, lighting fixtures, window and door trim, external "gingerbread", and entire window assemblies. Low-value reusable building materials consist of used bricks, scrap copper pipe, siding, and scrap lumber.

Currently, the Metro region has several restoration suppliers that work with demolition contractors and liquidators to recover high-value reusable building materials. Examples include Dan Obrist Demolition, Rejuvenation House Parts, Hippo Hardware and Robinson Recycled Building Materials. Typically such companies work directly with demolition contractors to remove high-value reusable items prior to major demolition activity. Due to the activities of these businesses, high-value reusable building materials are an insignificant portion of the waste stream. Conversely, low-value reusable building materials often do not compensate for the cost of removal and storage, and for the cost of delay to the conversion of the site to new uses. Because contractors do not have an economic incentive to manually dismantle buildings, in almost all cases a building is mechanically demolished with low-value materials intact. In addition, due to economics and competing supplies, it is typically more feasible to process low-value reusable building materials into marketable commodities such as hog fuel, scrap steel and inert fill.

Given the uncertainty of receiving significant volumes of reusable building materials from commercial sources it would not be practical to develop a series of permanent collection depots for this material given the necessary investment in and commitment to equipment, facilities, and programs by both Metro and the private sector. Moving forward with these efforts in the absence of dependable volumes and markets may result in failure.

However, Metro will conduct a demonstration project to test the usefulness of a salvageable building material depot for self-haul/residential material only at the St. John's Landfill. The demonstration project will consist of two (2) 15'x 40' cargo containers which will be modified to serve as material storage areas. Each container will have a series of collection bins and storage areas constructed for each type of material collected. The containers will be placed near the existing public drop-off area and will be used to collect source separated residential self-hauled salvageable building materials. Metro will compile data to determine the overall effectiveness of collecting residential salvageable building materials in this manner. A final report will be prepared regarding the viability of this concept. Should this initial effort demonstrate success, salvageable building material depots should be incorporated into the long-term facilities for construction and demolition debris.

Processing and Recovery System

The result of our research and analysis demonstrates that, under current conditions, processing and recovery of construction and demolition debris and land-clearing debris is economically viable and can provide the region with reliable long-term management of significant portions of the material.

In order to prove the effectiveness of processing the material a prototype of a construction and demolition debris processing center was modeled assuming a separate site equipped and staffed to handle 153,000 tons per year (approximately 600 tons per day), or about 70 percent of the waste material. The prototype could recover 80% of incoming material (121,000 tons recovered) with 20% as residual (32,000 tons landfilled). The prototype also allows for handling of land-clearing debris due to the addition of a shredder to process whole logs and heavy brush. Wood could be shredded and used for hog fuel or wood pellets. Concrete and asphalt could be recovered and crushed for aggregate, and ferrous metals and cardboard recovered and sold for recycling. Inert soils could be used for road fill, quarry reclamation, or other purposes. The estimated levelized cost per ton for this management option is $8.00 per ton.

Although this report fully analyzed three different configurations of a processing facility for the material, a processing system can take many forms which may outperform the facility described above. Examples include the co-location of processing facilities with landfills or the expansion and modification of existing facilities. In addition, facilities could be designed to accept larger volumes decreasing the overall amount requiring landfilling. Metro in developing a system to manage the material should consider all possibilities with the only stipulation that processing be emphasized to the greatest extent possible.

A Metro procurement process should be used to determine what type of a processing system for construction and demolition debris and land-clearing debris should be developed. Preference should not be given to a facility which most closely duplicates the prototype but rather to the most reliable facility(ies) providing the highest recovery possible at least cost.

Sub-Regional Processing Facilities

It is important to note that wood debris from construction demolition debris is but one component of the total wood debris waste stream. Other large sources of wood debris include commercial and industrial wastes (crates, boxes, and pallets), and manufacturing residue produced at secondary wood manufacturing plants, such as those producing furniture, millwork, and flooring. Wood debris landfilled in 1990 from all sources is estimated to be 143,300 tons or 12% of all regional waste. Construction and demolition debris is the largest component of wood debris, accounting for 38 percent, or approximately 54,600 tons.

The processing of source separated wood debris from non-construction/demolition debris sources will be encouraged by the Metro East Station, Oregon Processing and Recycling Facility (OPRC), Grimms Fuel Inc., East County Recycling, and Lakeside Reclamation Landfill (principally stumps). These facilities may also serve as interim facilities prior to the development of the primary processing system for construction and demolition debris and land-clearing debris.

In-Region Limited Purpose Landfill

Material that is contaminated by other wastes, or contains a high percentage of non-processable wastes (e.g., sheetrock), should be taken to a limited purpose landfill. A landfill in the region for these materials is the best option due to minimized transportation costs. It is estimated that a land disposal facility will be needed for approximately 234,000 tons in 1993, dropping to 105,000 tons in 1994 (see appendix D).

The preferred means to obtain needed limited purpose landfill space would be through the expansion of an existing or siting of a new in-region landfill. Currently there are two such limited purpose landfills in the Portland area, the Hillsboro and Lakeside Reclamation Landfill. The Hillsboro Landfill will begin accepting waste within the first of five planned expansion areas in September 1990. The first expansion area will provide disposal capacity for five years through till 1996. Twenty years of disposal space is available should all expansion areas be approved. The Lakeside Reclamation Landfill, received approximately 60,000 tons in 1989. The facility should remain open through to 1998. The Lakeside Reclamation Landfill may propose a permit modification for operational changes to its facility. Should the facility's operational changes be approved the expected life of the facility at current volumes is in excess of 20 years.

Once the primary processing system is developed, the region will have reduced volumes of construction and demolition debris and land-clearing debris requiring land disposal. The expected impact on existing limited-purpose landfills would be to extend their useful life beyond the dates identified above. However, major changes in flow may adversely affect the long-term economic viability of existing landfills. Metro must continually remain informed on available capacity and economic impacts in order to achieve stable, equitable and predictable solid waste system disposal rates and to obtain a new in-region limited purpose landfill should the need arise. A five year grace period would be the minimum amount of time necessary to establish a new facility. Reduced flows to existing limited-purpose landfills may be minimized by ensuring the delivery of all special wastes requiring disposal (see appendix D).

Non-Hazardous Industrial Sludges
(estimated 1990 generation - 2,700 tons or 750,000 gallons)

With greater awareness of the problems caused by liquids in landfills and stricter land disposal regulations proposed under Subtitle D of RCRA, Metro must move to prevent the disposal of free liquids within the solid waste system. Long term options would involve regional dewatering facilities developed by the private sector.

Waste Exchange

Some of the wastes in this waste stream may be amenable to reuse or recycling through a waste exchange. For instance, any one of the chemical sludges may be reused in other manufacturing processes. Some of the organic sludges included in this category may also be reused.

Technical Assistance

Technical assistance provided by Metro and DEQ would be directed at reducing the amount of waste generated, finding alternative uses for the sludges, and changing or improving disposal practices through on-site dewatering.

Dewatering Capability (2,700 tons)

The primary means of managing industrial sludges would involve dewatering on-site or at dewatering facilities followed by disposal of residual at a landfill. To the extent possible, existing or planned private sector facilities should be used for dewatering the sludges to the degree required by landfill operators and/or federal regulations. Currently the Columbia Ridge Landfill (Gilliam County) will require all waste materials to be a minimum 20% solids and must pass the paint filter test. Transport of residual to the landfill should be by the dewatering facility directly to an appropriate landfill. Metro transfer stations will not accept industrial waste sludges.

Non-Hazardous Industrial Waste Dusts and Ash
(estimated 1990 generation - 920 tons)

The non-hazardous industrial waste dusts and ash are not as diverse as the industrial sludges, but some variety is contained in this group of wastes. The dusts and ash are also one of the smallest waste streams in terms of annual volume. These two factors taken together limit the choice of possible management options, while at the same time the diversity of the material denies a single approach to their management. Short term options are limited to current techniques (i.e., landfilling at the St. Johns Landfill and the Hillsboro Landfill) until alternatives can be developed. Long term options would involve encouraged recovery through a waste exchange and land disposal at a properly permitted in-region limited purpose landfill.

Load Checking

Currently Metro permit files indicate that only 5 tons of ash is disposed annually at the St. John's Landfill. It is assumed by this report that far greater volumes are being generated within the Metro region and is arriving at the St. John's Landfill mixed with MSW without prior testing or permits. With the increasing abatement of air pollutants, more pollutants are concentrated in the remaining ash thus presenting a health risk to site personnel. This will become a greater concern with the replacement of the St. John's Landfill with the Metro East Station and the Metro Comporting Facility.

The first issue which needs to be resolved is identifying all generators of ash. Metro and the DEQ Air Quality Division should work jointly to contact all likely generators of incinerator ash. Once current generators have been identified they should be made aware of testing and permit requirements. All ash should require periodic testing and any ash that fails the TCLP test would then be managed as a hazardous waste.

The second issue which needs to be resolved is in regard to the practice of co-disposal. The chances of mobilizing metals from untreated ash will almost always be greater in co-disposal situations than in monofill situations. In addition, subjecting site personnel to direct contact with ash may present health risks. As a result, Metro should require that all ash and MSW be kept separate during collection and at the disposal facility.

Technical Assistance

Chemical treatment may lead to greater stabilization of ash and less leaching. One method involves passing ash through acidified water, with metals then extracted from the water. Ash can also be combined with sewage grit and screenings to help reduce leaching. Lab and field studies indicate that microbial activity can result in the formation of lead carbonate, lead sulfide, and other salts, thereby reducing the solubility of elements within the ash.

Waste Exchange (590 tons)

Two-thirds of the industrial dusts is made up of foundry sands which show high potential for recovery through a waste exchange. An option that has recently begun to develop for management of the foundry sands is processing and recovery by a local company. Should the recovery of foundry sands through either a local company or a waste exchange be successful, a large portion of this waste stream would be eliminated.

In-Region Limited Purpose Landfill (310 - 900 tons)

The primary method for managing waste dusts and ash which cannot be recovered should be through land disposal at a properly permitted in-region limited purpose landfill, ideally such as the one used for construction/demolition debris and land clearing debris. While there are many possible design and operating specifications for landfills, at a minimum a landfill receiving permitted dust and ash should contain a single liner, single leachate/collection system, and groundwater monitoring. In addition ash received should be monofilled in a dedicated section of the facility. Currently several existing permitted "nearby" landfills may be capable of disposing of dust and ash. The Hillsboro Landfill in Washington County is in the process of applying for expanded landfill disposal permits.

The disposal of dusts and ash carries the need for suppressing airborne emissions from accidental releases. Therefore this approach requires the need for precautionary provisions at the landfill to reduce risk.

Sewage Grit and Screenings
(estimated 1990 generation - 5,300 tons)

Metro should develop agreements with "nearby" permitted landfills to assure receipt of sewage grit and screenings from wastewater treatment plants in the Metro region. Metro should review the merits of developing agreements with more than one landfill to provide wastewater treatment plants the maximum amount of flexibility in deciding which facility to utilize. Metro should seek to establish a stable and predictable tip fee as part of a disposal contract with these landfills. Wastewater treatment plant operators shall develop plans for consolidating material from the individual treatment plants and haul the material to the Metro designated disposal facilities. Wastewater treatment plant operators shall receive and treat septage generated within their service areas.

Metro should commit to study the feasibility of developing a reload facility to provide for the efficient consolidation of sewage grit and screenings prior to transport to an out-of-region landfill. The reload facility could be sited either at an existing wastewater treatment plant or a separate site centrally located.

Non-Hazardous Petroleum Sludges
(estimated 1990 generation - 550 tons)

The long term option should involve a land disposal ban to encourage recovery.

Ban Petroleum Sludges from Metro Waste Disposal System

Currently petroleum sludge is processed within the region to recover hydrocarbons which are removed from the sludge through gassification and converted into alternative fuels. However, since the process may charge anywhere between $1.00 to $2.50 a gallon, many generators prefer to dispose of this material at the St. John's Landfill, which charges approximately $.25 a gallon. Since there are existing facilities which can effectively process this material, it is recommended that Metro ban the material from the solid waste system with the intent of encouraging recovery. Recovery of hydrocarbons from petroleum sludges would allow recycling of a valuable resource and should decrease future risks to the environment.

Soils Contaminated with Petroleum Products
(estimated 1990 generation - 40,000 tons)

Therefore, beginning immediately Metro should increase land disposal fees for petroleum contaminated soil in order to encourage the development of treatment options. In the long term, Metro and DEQ should encourage or require the development of treatment facilities which remove and destroy the hydrocarbons contained in the soil.

Treatment Facility in Metro Region

Joint efforts by Metro and DEQ should explore developing a treatment facility for petroleum contaminated soil. Recently DEQ formed an internal workgroup to examine various options for treating contaminated soils and streamlining the permitting process for treatment facilities. Should a treatment facility be developed Metro should work to encourage its use over land disposal through the use of rate incentives or flow control.

A treatment facility would remove and destroy the petroleum contaminants from the soil to the point where the soil could be used as clean fill. Treatment would be achieved by heating the soil to remove the petroleum product through volatilization. The volatilized product would have to be captured by emission control systems or sent through a furnace for combustion. It is possible that existing or planned gassification facilities could fulfill this function. However until the region can rely on such new technology land disposal will remain as the only viable option.

Landfill

Metro should develop agreements with "nearby" permitted landfills to assure receipt of petroleum contaminated soil from contractors within the Metro region. Metro should review the merits of developing agreements with more than one landfill to provide contractors the maximum amount of flexibility in deciding which facility to utilize. No special treatment is assumed, although the soils should be spread thinly at the disposal site to allow volitization prior to burial. While there are many specific design and operating specifications for landfills, at a minimum a landfill receiving permitted petroleum contaminated soil should contain a single liner, single leachate/collection system, and groundwater monitoring.

Asbestos Wastes
(estimated 1990 generation - 1,600 tons)

Landfilling is well-suited for asbestos because the asbestos fibers are immobile when buried and this method is the best overall at limiting human exposure. Long term options would involve Metro developing agreements with "nearby" permitted landfills to accept asbestos waste directly from asbestos clean-up contractors. Metro should encourage the direct haul of asbestos to disposal sites in order to prevent the rehandling of asbestos waste.

Landfill

Metro should develop agreements with nearby permitted landfills (in-region or out-of-region) to assure receipt of asbestos from contractors within the Metro region. Metro should review the merits of developing agreements with more than one landfill which can guarantee the disposal of asbestos waste in a safe and reliable manner and to provide contractors the maximum amount of flexibility in deciding which facility to utilize. Currently several existing permitted nearby landfills may be capable of disposing of asbestos waste. The River Bend Landfill in Yamhill County, and the

Hillsboro Landfill in Washington County are in the process of applying for expanded landfill disposal permits. The Lakeside Reclamation Landfill is in the process of receiving permission to make operational changes that will increase the expected life of the facility.

SECTION VII. RECYCLING FORECAST

Summary

The following section forecasts the expected increase in the regions recycling rate through to the year 2010 with the successful implementation of the Special Waste Chapter. Implementation will both remove special waste materials from the municipal waste stream and dramatically increase the regions total recycling rate.

This forecast assumes that 1) growth in the construction and demolition debris waste stream is 2% annually; 2) residential and non-residential waste streams will increase at 4% annually reflective of historical rates; 3) the construction and demolition debris and land-clearing debris processing system is fully operational by 1994 with 70% participation, of which 80% is recovered, resulting in 56% of total recovered; 4) current recovery activities are accounted for within the 28% regional recycling rate and remains constant; 5) waste exchange and technical assistance activities are not counted towards the recycling figure since materials will never enter into the waste stream.

The projected recovery rate with the implementation of the Special Waste Chapter is as follows:

Year	Regional Recovery Rate Increase
1991	0
1992	0
1993	0
1994	+9.5%
1995	+9.3%
2000	+8.4%
2005	+7.8%
2010	+7.3%

The Special Waste Chapter and its relation to the System Measurement Program

The System Measurement Program analyzed the composition of the waste stream in order to establish both programs for waste reduction and performance goals. The total estimated waste reduction goal was established at 52% of the waste generated in the region. Since the study did not include the processing and recovery of construction and demolition debris and land-clearing debris the implementation of the Special Waste Chapter will increase the estimated waste reduction performance goal by 9.5% in

1994. Both the Lumber Recovery Program and the Post Collection Material Recovery Program relate to the Special Waste Chapter as follows:

Lumber Recovery

The System Measurement Program identifies a need for a lumber recovery program. The program consists of a drop-off center for source separated wood waste from non-construction and demolition debris and non-land-clearing debris sources. The wood waste is to be salvaged for reuse or processed as hog fuel. Wood waste disposed from non-construction and demolition debris and non-land clearing debris sources is estimated to be approximately 88,700 tons in 1990. It is estimated that one-third of discarded wood waste from non-construction and demolition debris, or 29,271 tons, would be processed by a lumber recovery system.

The Special Waste Chapter identifies that 12% of the total MSW disposed is wood waste or 143,300 tons in 1990. Wood waste from construction and demolition debris is estimated to be 54,600 tons or 38% of the total wood waste disposed. With the implementation of the Special Waste Chapter it is estimated that 70% of the material will participate in a processing system with a recovery rate of 80%. Therefore, 56% or 30,576 tons of the wood waste contained within the material will be recovered or 21% of all wood waste disposed.

With the implementation of both the lumber recovery program and the construction and demolition debris processing system the region will recover approximately 60,000 tons of wood waste or 41% of the total disposed.

Post Collection Material Recovery

The System Measurement Program recommends the development of mixed waste processing facilities. The mixed waste processing system would extract recyclables from both the residential and non-residential waste stream prior to disposal. It is projected that 950,000 tons of this material, or 82% of the total MSW, will be disposed in 1990. With the development of a mixed waste processing system approximately 20% will be recovered or 16% of all waste disposed. The material and composition available to this program is impacted by the success of source separation and high-grade programs. It is assumed that construction and demolition debris and land-clearing debris would not be processed by this system.

The remaining 17% of the total waste stream is estimated to be composed of construction and demolition debris. The Special Waste Chapter identifies a need for the development of a processing system to recover significant volumes of this material. With an estimated 70% participation and an 80% recovery rate approximately

56% of the construction demolition debris waste stream will be recovered or 9.5% of all waste disposed.

Conclusion

With the implementation of the Special Waste Chapter the region will increase its waste reduction rate by 9.5% in 1994 dropping to 7.3% in 2010. With the successful implementation of both the Special Waste Chapter and the programs contained within the System Measurement Program the regions waste reduction rate will approximate 60%.

SECTION VIII. SPECIAL WASTE CHAPTER IMPLEMENTATION SCHEDULE

The following section identifies the specific actions and timeframes for implementing the special waste chapter.

Special Waste Permit Program

Description: Expand the Metro special waste permit program for all non-hazardous sludges, dust and ash, sewage grit and screenings, petroleum contaminated soil, petroleum sludge, and asbestos generated in the Metro region. Program will provide for testing and ensure compliance with the special waste chapter.

Timeframe: Upon adoption of special waste chapter.

Implementation: Metro and DEQ.

Load Checking Program

Description: Develop a comprehensive load checking program at all Metro solid waste facilities accepting regional waste. At a minimum, the load checking program should include: generator notification, site surveillance, waste identification and waste inspection.

Timeframe: July 1, 1991

Implementation: Metro.

Waste Exchange Program

Description: Promote the use of an existing multi-state waste exchange through the distribution of free exchange newsletters to waste generators identified by the special waste permit program.

Timeframe: Ongoing

Implementation: Metro.

Technical Assistance Program

Description: Provide special waste generators with up to date technical information relevant to recovery methods, treatment systems and waste minimization techniques.

Timeframe: Ongoing

Implementation: Metro.

Demonstration Depot

Description: Develop a demonstration depot to test the usefulness of a salvageable building material depot for self-haul/residential material only at the St. John's Landfill. A final report will be prepared regarding the viability of this concept and whether it should be incorporated into the long-term facilities for construction and demolition debris.

Timeframe:

July 1, 1990-January 1, 1991	Demonstration depot is operating
March 1991	Final Report developed.

Implementation: Metro.

Construction and Demolition Debris and Land-Clearing Debris Processing System

Description: Develop a processing and recovery system for all construction and demolition debris and land-clearing debris generated through a procurement process. Preference would be given to facilities which provide for the highest level of recovery at least cost.

Timeframe:

July 1991-January 1992	Procurement
July 1992	Start facility(ies) construction if new facilities needed.
January 1994	Processing and recovery system for construction and demolition debris is fully operational.

Implementation: Metro.

Special Waste Landfill Capacity

Description: Residual or material that contains a high percentage of non-recoverable material, or has no reuse or recycling value will require disposal in a properly permitted landfill. A landfill within the region for these waste materials is the best option due to minimized transportation costs. Metro should develop long term agreements (beyond 5 years) with landfills which can take specific types of special wastes or all special waste materials requiring disposal. Metro should seek to develop agreements with more than one landfill to ensure operational flexibility in managing special wastes. Some of the potential landfills include the St. John's Landfill, Hillsboro Landfill, the Lakeside Reclamation Landfill, the River Bend Landfill, and the Columbia Ridge Landfill.

It is estimated that land disposal capacity is needed for the following minimum tonnages of special wastes. Refer to Appendix D for specific tons per waste stream and the assumptions used to determine total tonnage.

1991	277,000 tons per year
1992	279,000
1993	278,000
1994	144,000
1995	136,000
2000	143,000
2005	151,000
2010	164,000

Timeframe: March 1, 1991 unless continued use of St. Johns Landfill allows for implementation concurrent with procurement for the construction and demolition debris and land-clearing debris processing system.

Implementation: Metro.

Dewatering Capability for Non-Hazardous Industrial Sludges

Description: Metro needs to prevent the disposal of free liquids within the solid waste system. In addition, Metro transfer stations and recovery facilities will not accept industrial waste sludges of any kind. To ensure the development of dewatering capability for non-hazardous industrial waste sludges Metro will develop agreements with private dewatering facilities.

Timeframe: January 1, 1992.

Implementation: Metro.

Regional Disposal Restrictions on Petroleum Sludge

Description: Metro should encourage the conversion of petroleum sludge into alternative fuels. It is recommended that Metro initially restrict the disposal of petroleum sludge generated within the region by increasing the charge for disposal to a level comparable to the cost for recovery. Periodically, Metro should review the performance and needs of existing petroleum sludge recovery facilities to determine whether they have the capacity to absorb the effects of a disposal ban.

Timeframe: January 1, 1991.

Implementation: Metro.

Treatment Capability for Petroleum Contaminated Soil

Description: Metro should encourage the treatment of petroleum contaminated soil by increasing the disposal charge for petroleum contaminated soil generated within the Metro region to a level comparable to the cost of treatment. Metro and DEQ should work closely to bring about treatment capability which remove and destroy the hydrocarbons contained within the soil.

Timeframe: January 1, 1991.

Implementation: Metro.

APPENDIX A

Current and Projected Waste Quantities (in tons) for the Portland Metro Area

WASTE STREAM	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*2000*	*2005*	*2010*
Construction and Demolition Debris[1]	203,000	207,060	211,201	215,425	219,733	224,128	247,455	273,211	301,647
Land Clearing Debris[2]	18,500	18,500	18,600	18,600	18,700	18,800	19,600	21,000	22,000
Industrial Sludges[3]	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
Industrial Dusts[3]	900	900	900	900	900	900	900	900	900
Industrial Ash$_3$	5	5	5	5	5	5	5	5	5
Sewage Grit & Screenings[4]	5,300	5,400	5,400	5,500	5,600	6,000	6,000	6,300	6,600
Petroleum Sludge[5]	550	300	550	300	550	480	510	530	560
Soil Contaminants with Petroleum Projects[6]	40,000	40,000	40,000	35,000	30,000	20,000	15,000	10,000	10,000
Asbestos[7]	1,600	1,700	1,800	1,900	2,000	2,100	2,500	3,000	3,600
TOTAL TONS[8]	**272,500**	**276,500**	**281,000**	**280,000**	**280,000**	**275,000**	**295,000**	**318,000**	**348,000**

NOTES:

[1]Assumes 1990 amount is 17% of total MSW (1,194,100 t.) nominal increase of 2% per year.

[2]Estimated from results of phone survey; future amounts based on projected increase in number of employees in new construction minus expected decreases from waste reduction efforts.

[3]Projections based on the future level of industrial employment, which is projected to remain relatively constant over next 20 years.

[4]Projections based on increase in total population.

[5]Based on historical data from permits which demonstrate a two-year cycle, plus population growth.

[6]Derived from DEQ Underground Storage Tank Cleanup Section records.

[7]Assumes nominal increase of 4% per year; asbestos removal expected to continue into the future since most of the current control methods are encapsulation.

[8]Columns may not add up exactly due to rounding.

APPENDIX B

SUMMARY OF MAJOR COMPONENTS OF SPECIAL WASTE SUBSTREAMS

Construction and Demolition Debris

• Paper	2%
• Plastic	3%
• Yard Debris	4%
• Wood	27%
• Misc. Organics	15%
• Glass	5%
• Ferrous	3%
• Misc. Inorganics	32%
• Textile	5%

Land-Clearing Debris

• Vegetative Materials	63%
• Soil and Inerts	31%
• Contamination	5%

Non-Hazardous Industrial Sludges

• Chemical Sludges	41%
• Sump Material	33%
• Urea Formaldehyte	20%

Non-Hazardous Industrial Dusts

• Lime Hydrates	24%
• Sandblasting and Casting Sands	65%
• Bakelite	10%

Non-Hazardous Industrial Ash

• Boiler Ash	89%
• Ash and Slag	11%

Sewage Grit and Screenings

• Grit	79%
• Digester Sludge	21%

Non-Hazardous Petroleum Sludges

• Tank Bottoms	34%
• Clean-up Materials	32%
• API Sludge	21%
• Sand/Oil Mixture	7%
• Oil/Water Mixture	6%

Soil Contaminated with Petroleum Products

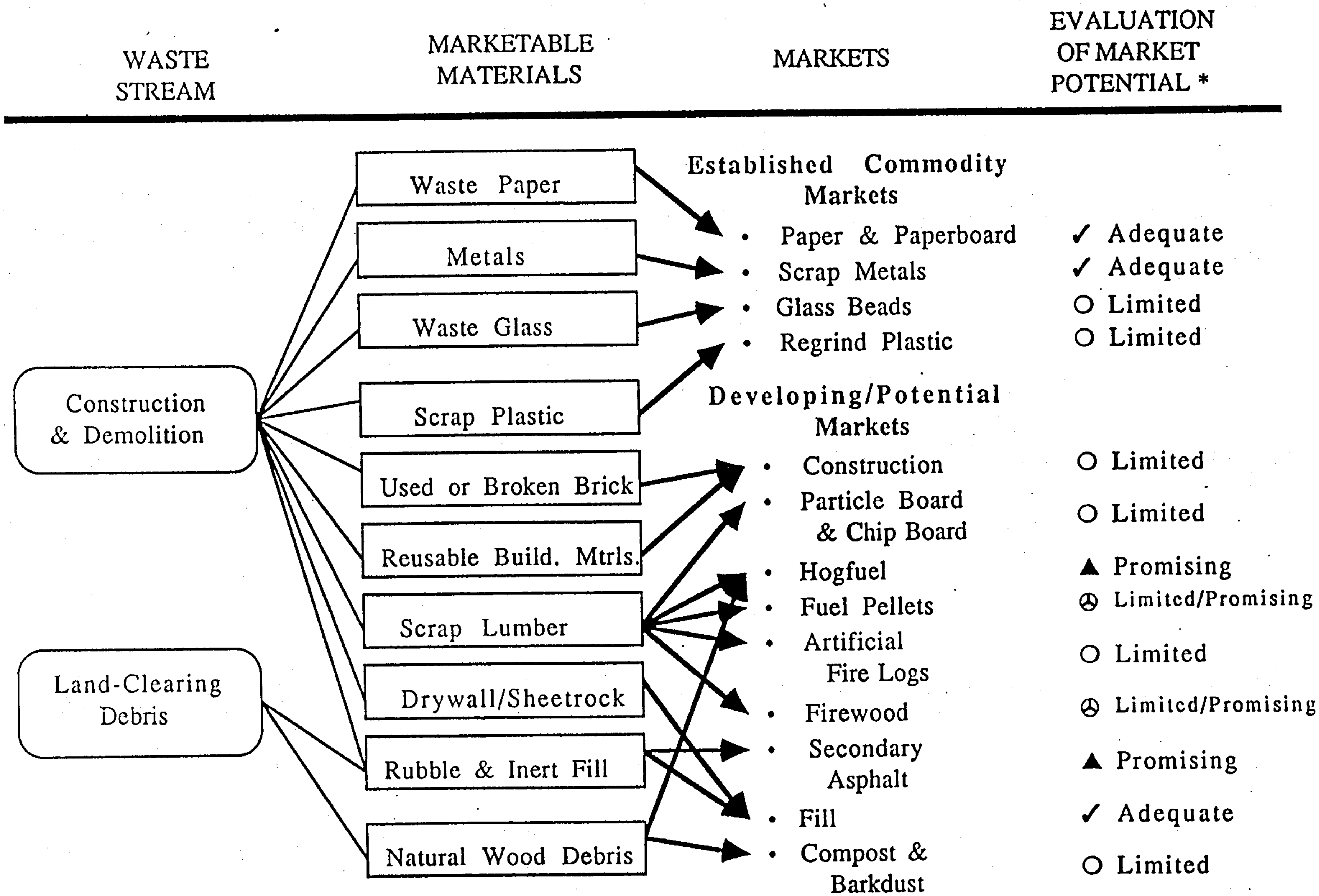
• Gasoline	
• Diesel Fuel and Fuel Oil	31%
• Oil	22%
• Mixed	4%
	6%

Asbestos Wastes

• Insulation	96%
• Brake Linings	2%
• Bags	1%

APPENDIX C

FRAMEWORK FOR MARKET EVALUATION



* *Evaluation is for the adequacy of local markets for materials meeting specifications - not for the likelihood of recovering materials from select waste streams.*

APPENDIX D

SPECIAL WASTE DISPOSAL QUANTITIES, 1991 - 2010

(Tons per year)

MATERIAL	1991	1992	1993	1994	1995	2000	2005	2010
Construction & Demolition Debris	207,060	211,201	215,425	104,911[1]	106,889	117,505	129,453	142,405
Land Clearing Debris	18,500	18,600	18,600					
Industrial Sludges	2,700	1,488[2]	1,488	1,488	1,488	1,488	1,488	1,488
Dust and Ash	905	315[3]	315	315	315	315	315	315
Grit and Screenings	5,400	5,400	5,500	5,600	5,600	6,000	6,300	6,600
Petroleum Sludge	300	-0-[4]	-0-	-0-	-0-	-0-	-0-	-0-
Petroleum Contaminated Soils	40,000	40,000	35,000	30,000	20,000	15,000	10,000	10,000
Asbestos	1,700	1,800	1,900	2,000	2,100	2,500	3,000	3,600
TOTAL	276,565	278,804	278,228	144,314	136,392	142,808	150,556	164,408

NOTES:

[1]Assumes the construction and demolition and land-clearing debris processing system is fully operational by 1994 with 70% participation of which 80% is recovered, resulting in 44% requiring land disposal.

[2]Remove chemical sludges (41% of total) as a result of TCLP test and waste exchange, remaining percentage is dewatered to remove 7% by weight.

[3]Remove 590 tons of casting sands through waste exchange efforts.

[4]Restrictions placed on the disposal of petroleum sludges.