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FLORIDA WASTE EXCHANGE STUDY

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SUMMARY

SUMMARY

The exchange of wastes between firms is being investigated as part of the effort to deal with the growing solid waste disposal problem presently experienced by industrial nations, including the United States. The management of hazardous wastes is a particularly important component of the overall solid waste problem. Legislative action at both the federal and state level has encouraged development of alternative solid waste disposal practices, such as waste exchanges. These laws include the 1976 Federal Resource Conservation and Recovery Act (RCRA) and the 1980 Florida Resource Recovery and Management Act. This study explores the feasibility of establishing a Florida Waste Exchange as one option for management of a portion of Florida's solid and hazardous waste.

Several variations on the basic waste exchange concept are in operation throughout the world. These variations can be broadly classified into two groups: information exchanges (clearinghouses) and materials exchanges. These two categories are based on the degree of involvement the exchange accepts between waste generators and waste users.

Waste exchanges were first organized in Europe where depletion of readily available natural resources and limited land disposal areas forced manufacturers to find alternative sources of raw materials. The earliest exchange was started in England during World War II, and the idea has since spread to Scandinavia, France, Germany, Austria, Italy, Belgium as well as other countries. Exchanges have also been organized in Canada, Israel and Australia. All of these foreign exchanges are information clearinghouses and most of them are operated by trade organizations, primarily in the chemical industry.

Several exchanges were started in the United States in the mid 1970s. The Midwest Industrial Waste Exchange was started in 1975 and is the oldest, continuously operating exchange in the U.S. Most of these U.S. exchanges are

information clearinghouses. Materials exchanges are the major innovation in the waste exchange concept to be developed in the United States. These exchanges are for the most part privately run, profit-oriented enterprises that act as agents for an industrial company in return for a commission on successful waste transfers.

Even though the waste exchange concept is a good one in theory, practical application of the process is subject to many constraints. One of these constraints is the chemical and/or physical properties of the various materials in question. These properties often determine if a transfer will take place. Sometimes materials can be transferred "as is." However, most materials with this capability already have established recycling markets (for example, aluminum and newsprint). It is much more common to encounter wastes that require some degree of reprocessing before the material would be reused.

Existing waste exchanges typically handle a wide range of materials of both hazardous and non-hazardous nature. Within these two general areas, materials can be classified into more specific categories. For example, eight categories of hazardous wastes were outlined in the Florida Hazardous Waste Survey (1977).

These categories are:

- heavy metal solutions and sludges,
- organic solvents and oils,
- caustic and acid solutions,
- inorganic chemical solutions and sludges,
- organic chemical solutions and sludges,
- pesticide and fungicide wastes,
- paint and ink wastes, and
- explosive wastes.

These waste categories were developed based on the physical and chemical characteristics of waste materials.

In addition to hazardous wastes, most waste exchanges handle materials that are not classified as hazardous. Some of these materials have existing recycling markets. These would include glass, rubber tires, and waste paper (other than newsprint). Non-hazardous materials more commonly listed with waste exchanges include wooden pallets, plastic packaging materials and containers, textiles, leather, and surplus equipment

Some classes of waste materials have historically had more transfer success than other classes. The most complete data on transfer successes were compiled by the United Kingdom Materials Exchange for 1974 to 1979. Categories of materials successfully transferred by the U.K. Materials Exchange, in descending order of replacement value, were:

- acids and alkalis
- organic chemicals and solvents
- rubber and plastics
- inorganic chemicals
- minerals
- catalysts
- oils and waxes
- paper and board
- textiles and leather
- metals

Data from the Canadian Waste Exchange indicate a similar hierarchy of transfer success.

Historically, recorded transfers arranged through waste exchanges have been most frequent in the following situations:

- Transfers from large firms using continuous production processes to smaller companies using batch processes.
- Transfers from basic chemical manufacturers to specific chemical product formulators.
- Transfers from industries with high purity requirements to those with less stringent requirements.

An important component of this study was a workshop conducted in December 1980 to provide information to Florida industry on the waste exchange concept

and to receive input from industry on the most appropriate organization and operation of a proposed waste exchange in Florida. Workshop participants included representatives of the U.S. Environmental Protection Agency and the Florida Department of Environmental Regulation, many members from Florida industry, the director of an existing waste exchange and representatives of both state and local chambers of commerce.

Concerning sponsorship of an exchange, the overwhelming majority of participants supported a private sector organization, such as a chamber of commerce or a major trade association. Most participants felt the waste exchange should facilitate and encourage new markets for wastes and that the exchange should publish a catalog of listings on a quarterly basis. It was felt that the exchange should accept all types of listings (not just hazardous wastes) for materials generated in Florida and that lister confidentiality should be strictly maintained.

The predominant opinion among the participants was that the workshop was successful in both gathering and providing information. A Florida waste exchange was strongly recommended as a valuable option within the total Florida waste management program.

An additional task in the current study was to conduct a survey to assess the feasibility of hazardous waste transfer in Florida. This survey was conducted in February, 1981 and was designed to evaluate the response of Florida industry to the waste exchange concept in terms of potential use of the exchange, sponsorship preferences, and perceived operating problems.

A model of hazardous waste supply and demand was constructed to show the factors affecting the amount of waste that would actually be exchanged in Florida. In addition, forecasts indicate that a lower limit of about 5 percent of all hazardous waste produced in Florida is "potentially transferable". This would

amount to nearly 7,000 metric tons in 1980. The model also indicates an increase in both the supply and demand of hazardous wastes in the future.

The survey found that Florida manufacturers contribute 13.0 percent of the Gross State Product (ranking 4th among all sectors). Growth in this sector is forecast at an annual rate of 3.3 percent over the 1980s. It was found that 6.3 percent of Florida manufacturing employment is within hazardous waste generating industries. These industries are not evenly distributed throughout the state. Manufacturing activity is clustered in four areas: Hillsborough/Pinellas county, Dade/Broward/Palm Beach counties, Brevard/Orange counties, and Duval County.

Since transportation costs are a major factor in making waste exchange decisions, the proximity of industrial clusters, relative to out-of-state disposal sites, enhances the feasibility of exchange. These clusters should be considered during organization of an exchange in Florida.

Survey responses regarding waste types that would be listed or supplied showed the following distribution: solvents, 24.6%; waste oils, 18.7%; acids, 11.9%; heavy metals sludges, 9.7%; alkalis, 9.0%; catalysts, 4.5%; and other, 21.6%. The "other" category includes non-hazardous wastes and hazardous wastes that were difficult to categorize. Respondents indicated waste types only; information on quantities by category was determined too sensitive to request.

As a lower bound, it is expected that 40-50 companies would initially to with a waste exchange. It is assumed that a portion of the non-respondents would list with the exchange, as well as some of the companies not surveyed.

Based strictly on supply-oriented survey data, the waste exchange concept has substantial industry support and appears to be recognized as an economic alternative to out-of-state disposal of hazardous wastes by Florida manufacturers.

The survey also investigated potential users of hazardous wastes in Florida. This portion of the survey revealed that industries with a potential demand for

waste materials constitute over 50 percent of the total manufacturing employment in Florida. Most of the companies were classified as small to medium in size. These companies were found to be located in the same clusters as those of Florida manufacturing in general and with waste generators in particular. Substantial growth in the hazardous waste reclaiming industry is anticipated during the 1980s.

In general, the survey results showed the reaction to a proposed Florida Waste Exchange to be very positive. These results showed that 74 percent of the responding industries would support a waste exchange. Only four percent specifically indicated they would not support a waste exchange. Ninety-two percent favored sponsorship of the exchange by a chamber of commerce or a trade organization. Maintaining confidentiality was cited as the main reason for this. Eighty-four percent of the responding industries said they would actively participate in a waste exchange, either by offering wastes or requesting wastes.

The report makes recommendations concerning how a waste exchange may help waste transfer and reuse in addition to simply publishing listings. The exchange can actively promote its existence, functions, and successes, although the actual participating firms would remain anonymous. Also, the exchange or its sponsor can lobby for legislation that would be favorable to and provide incentives for the waste transfer and reuse concept.

Private industry, which is strongly supportive of the waste exchange concept, will follow up this interest with active participation. Additionally, as successful transfers are made, other firms will be made aware of these successes. Furthermore, it was recommended that business in Florida begin to reexamine current supply sources and manufacturing processes in an effort to find opportunities for using compatible waste streams as a replacement for raw materials. The awareness of an opportunity for waste transfer should stimulate this kind of search.

Florida industry will become aware of the importance of looking for opportunities to demand waste materials as virgin material prices rise over time.

Several conclusions can be drawn from this report concerning various aspects of waste exchanges in general and the feasibility of establishing an exchange in Florida.

Economic factors are of paramount importance in determining the viability of a Florida exchange. In terms of waste exchange operation economics, initial promotion and subsequent support are the two major considerations. A modest initial capital outlay is necessary to make the exchange known and to attract listers and subscribers. A sponsor is required for this phase of development since no income from listing or subscription fees (should these be charged) would be expected for a period of time following initiation. Subsequent operations may also require sponsor funding if the exchange is not a self-supporting one. Examination of other exchanges reveals some difficulty in sustaining operations by listing and subscription fees alone. Cost for initial promotion and subsequent operation are generally low, however.

To keep costs at a minimum, most exchanges utilize an information clearing-house format where financial, managerial, and clerical assistance is provided by the supporting organization. The support organization is most frequently an industrial trade association or a chamber of commerce.

Another factor is the relative cost of wastes compared to virgin raw materials as industrial feedstock. Clearly, for wastes to be substituted, they must be less expensive than comparable raw materials. For waste generators, the cost of transferring the waste must be less than current disposal costs.

The industrial environment of Florida, in terms of types of industries and their geographical location, does not appear to present an obstacle to the establishment of a waste exchange.

In addition to economics, technical aspects of waste transfer must be considered. Technical considerations include the presence or absence of transportation and storage facilities, available reprocessing technology (if necessary), and process compatibility. Process compatibility includes the waste generator as well as the potential user and must be evaluated in terms of delivery timing, quantity, and quality. Again, the industrial composition of Florida does not appear to create a major problem for the operation of a waste exchange in this state.

As a result of the industrial survey, the workshop discussions and additional research, the following recommendations have been developed from this study:

- It is recommended that a waste exchange be organized in Florida to serve as an information clearinghouse for transfer of hazardous waste and other solid waste for Florida industry.
- It is recommended that a chamber of commerce type organization be the sponsoring agency for the waste exchange.
- It is recommended that legislation be introduced to assist in the development and operation of a waste exchange.

These recommendations are supported for the following major reasons:

- The waste exchange appears to be a cost effective alternative to disposal for a portion of the hazardous waste stream generated in Florida.
- The waste exchange is an environmentally attractive alternative to conventional disposal.
- The waste exchange encourages and facilitates resource recovery.
- There is strong interest among Florida industry to support and participate in a waste exchange.

PART ONE:
THE WASTE EXCHANGE CONCEPT

I. INTRODUCTION

A. Purposes and Justification

The problems of economical and safe disposal for solid wastes have grown increasingly complex as industry has developed more sophisticated manufacturing processes and provided a wider variety of products to the marketplace. Studies aimed at providing solutions to the disposal problem have generally agreed that a single, standard method of disposal is impractical for all types of wastes, particularly hazardous wastes. Waste transfer exchange between firms, as an alternative to the more well-known options of land disposal, incineration, and neutralization/detoxification, shows promise in regions which possess the proper industrial make-up and geographic concentration. It will not replace the need for other treatment and disposal operations but will provide a valuable option within the waste management picture.

The major objectives of this study are to: a) determine the feasibility of establishing an industrial waste exchange in Florida; and b) investigate existing and potential raw material sources and markets in Florida, particularly for hazardous wastes. Secondary purposes include an investigation of the level of industry support which might be expected for an industrial waste exchange in Florida and a careful review of the history and current status of waste exchange operations in the U.S. and abroad.

This investigation is primarily the result of tax provisions in the 1980 Florida Hazardous Waste (Resource Recovery and Management) Act that exempt "those transactions wherein hazardous wastes are treated and rendered non-hazardous at a facility certified by the Department of Environmental Regulation" This has been interpreted to include potential transactions carried out through a waste exchange operation. In addition, the Resource Conservation and Recovery Act of 1976 (Public Law 94-580; Subtitle H, Section 8001(a)) directs the U.S. Environ-

mental Protection Agency (EPA) to conduct and encourage research, surveys, and public education programs aimed at reduction in the amount of solid wastes through recycling, reuse and salvage. The concept of a waste exchange clearly fulfills these requirements. While final regulations promulgated pursuant to RCRA will not be final for some time yet, it is clear that the intent of the regulations is to confer an advantage to those firms engaged in reuse and recycling of hazardous materials. For example, Part 261.6 of the May 19, 1980 Hazardous Waste and Consolidated Permit Regulations discusses special requirements for used, reused, recycled or reclaimed hazardous wastes other than sludges containing certain listed wastes.¹ Part 261.33 also may facilitate the use of exchanges by specifying that certain chemical products, while in commerce and not going for disposal, are exempt from manifest requirements,² which may be quite extensive.

As a guide, the EPA suggests the following sequence of strategies in waste management:³

1. Minimize the quantity of waste generated by modifying the industrial process involved.
2. Concentrate the waste at the source (using evaporation, precipitation, etc.) to reduce handling and transport costs.
3. If possible, transfer the waste "as is," without reprocessing, to another facility that can use it as a feedstock.
4. When a transfer "as is" is not possible, reprocess the waste for material recovery.
5. When material recovery is not possible,
 - a. incinerate the waste for energy recovery and for destruction of hazardous components, or
 - b. if the waste cannot be incinerated, detoxify and neutralize it through chemical treatment.
6. Use carefully controlled land disposal only for what remains.

FIGURE I-1

STATES POTENTIALLY BENEFITTED BY A
WASTE INFORMATION EXCHANGE

<u>States that have a need for waste information exchanges</u>	<u>States that already have waste information exchanges</u>	<u>States that are suitable candidates for seminars and waste information exchanges</u>
Alabama		Alabama
California	California	
Florida		Florida
Georgia	Georgia	
Illinois		Illinois
		Iowa
Lousiana		Lousiana
Massachusetts	Massachusetts	
Michigan		Michigan
	Minnesota	
	Missouri	
	New Jersey	
New York	New York	
North Carolina	North Carolina	
Ohio	Ohio	
	Oregon	
Pennsylvania	Pennsylvania	
	Tennessee	
Texas	Texas	
Virginia		Virginia
	Washington	

SOURCE: EPA Report SW-887 (1980)

A 1980 EPA study,⁴ identified Florida as one of 11 states which, while not as diverse industrially as some other states, nevertheless contained large volumes of appropriate candidate wastes (Figure 1-1). The Tampa vicinity was selected as a particularly likely area for a regional waste exchange. Finally, a 1977 study⁵ commissioned by the Florida Department of Environmental Regulation identified recycling through waste exchanges as a desirable alternative for managing a portion of Florida's potentially hazardous waste.

Waste exchanges are defined as operations that arrange for transfer of either information concerning waste materials or the waste materials themselves. There are both similarities and differences between this concept and the traditional purchase or reuse of industrial by-products. In both cases, an industrial process generates, in addition to its principal products, some material that is not usable by the generating company. In cases where this material has some inherent, recognized value, it is known as a by-product, and is sold or reused if the value justifies the costs of transport, handling or recycling.⁶ If the material has no recognized value, it has in the past been termed a waste and is generally discarded. The waste exchange seeks to facilitate prospective transfers of these "wastes," the economics of which are dependent on availability of other raw materials, disposal costs, transport costs, and purity of the waste stream.

Transfers of by-products with recognized value have been an industry practice for some time.⁷ However, maximum success of the waste exchange concept involves a third party (or transfer agent) for centralized referrals, technical information and to maintain confidentiality if necessary. This is due to unrecognized potential uses of products; generators and potential users who are not familiar with each others' industries and generators who are reluctant to reveal process information.

Large companies with skilled chemical engineers are likely to find many recycling opportunities within their own manufacturing facilities. However, the utility of an exchange arises because even engineers in large national corporations are not likely to recognize all waste transfer opportunities outside of their own industry. Moreover, technical discoveries of new ways to find value in scrap or discarded materials do not occur in all companies simultaneously. Finally, medium-sized or small companies typically lack the time and expertise to find reuses for the majority of their wastes.

Part One of this report looks at the various types of waste exchanges and presents an overview of the history of the waste exchange concept in the U.S. and abroad. It also discusses the sources and potential markets for recycled materials in Florida and examines the physical and chemical characteristics of waste materials that make them amenable to reclamation. Results of a two day workshop held in December 1980 are presented to indicate the preferences of representatives from Florida industry concerning the initiation and mechanisms of a Florida Waste Exchange.

Part Two of the report presents the results and analysis of a mail survey to approximately over 500 selected manufacturing or reprocessing firms in Florida. In addition, it discusses in detail the existing market characteristics applicable to implementation of a waste exchange for hazardous wastes. Estimates are made concerning the potential for success of the hazardous waste component of waste materials exchange.

B. Types of Waste Exchanges

There are two basic types of operating waste exchanges: information exchanges (or clearinghouses) and material exchanges. Although there are some similarities in operation, the two types differ in the degree of involvement which the exchange has in interactions between waste generators and waste users. Examples of both types of exchanges are contained in Chapter III.

1. Information Exchange (Clearinghouse)

The clearinghouse, in most cases, takes a passive role in the exchange process. The function of the clearinghouse is to inform and bring together waste generators and waste users through a publication of some type. Once this referral is made and the contact between groups is established, the clearinghouse usually takes no further action. Figure 1-2 summarizes this relationship.

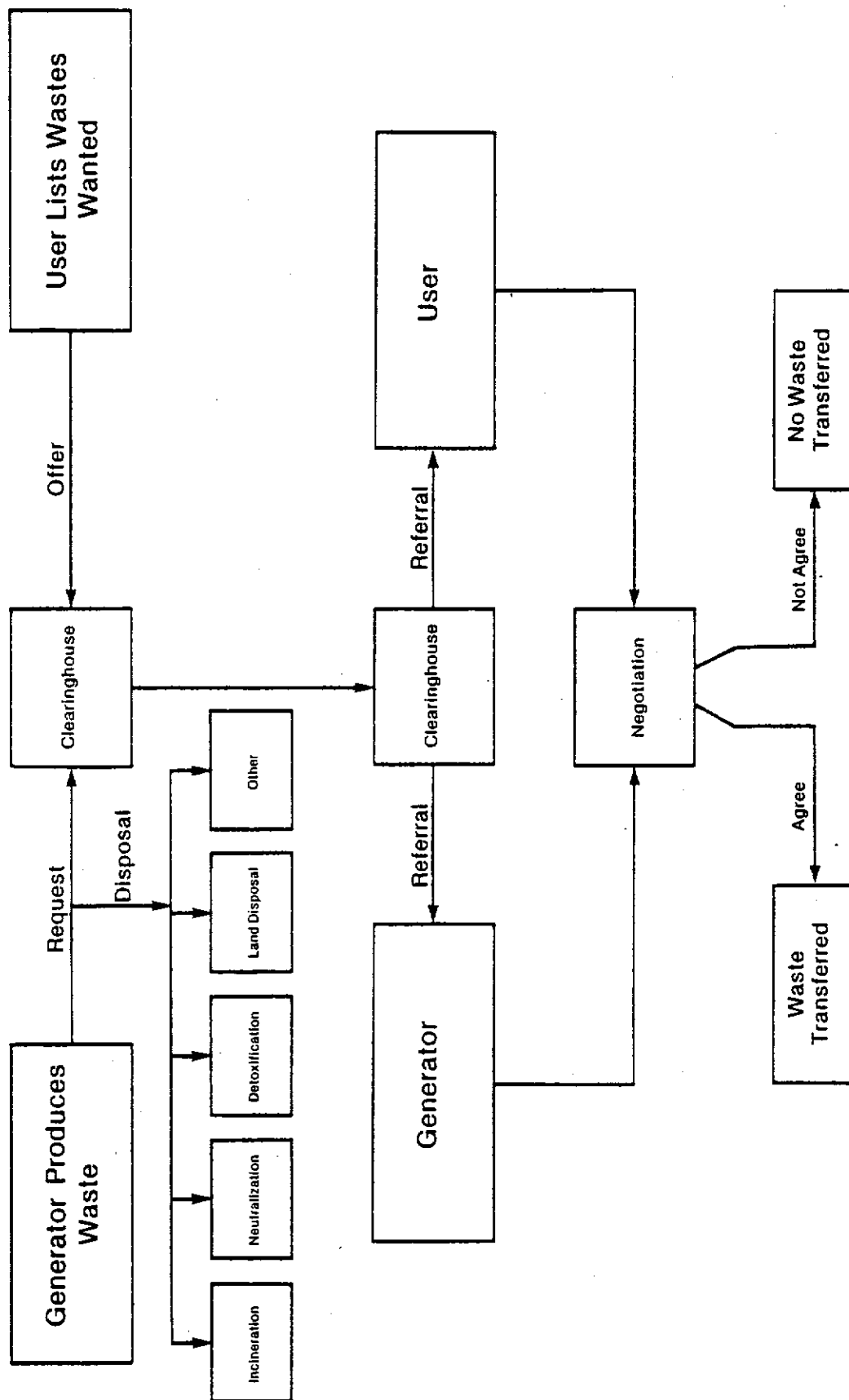
Referrals are initiated by publishing listings of wastes offered and wastes wanted. These listings are circulated in a variety of clearinghouse publication formats (see Appendix F). The clearinghouse handles inquiries about these listings and refers the inquirer to the listing company. All negotiations concerning details of the potential exchange are handled directly by the two companies. Materials commonly listed by information exchanges include solvents, oils, surplus chemicals, scrap metals, paper and wood, and rubber products.

Several areas of concern are common to information clearinghouse operations. One of the most important is maintenance of confidentiality for the listing organizations. Many companies are hesitant to identify themselves or release specific information about their waste streams. The reason is that, in many cases, details of manufacturing processes, problems, and production rates can be deduced from waste stream data. This information is potentially valuable to a firm's competitors or to governmental agencies interested in enforcement of regulations.

In order to protect the confidentiality of companies submitting listings, several coding systems have been devised. These codes provide general information about the type and amount of waste involved, the geographical location, and the frequency of the waste's availability. These coded details are usually sufficient to allow a potential buyer to decide whether to seek further information from the exchange. Examples of clearinghouse publications contained in Appendix A show varieties of these coding systems.

Figure 1-2

SAMPLE INFORMATION CLEARINGHOUSE OPERATION



Accumulation of listings with little or no market value is a second problem common to waste exchanges that have been in operation for some time. Many clearinghouses have found that the majority of successful waste transfers occur early in the history of the exchange. As markets for specific types of wastes develop through waste exchange referrals, the number of successful transfers is often reduced. This frequently leaves only two categories:

- listed materials that are difficult to dispose of, and
- episodic listings of new, potentially marketable waste materials.

Due to the passive nature of the information exchange, assessing the efficiency of its efforts is a third difficulty. Once a referral is made, the clearinghouse usually takes no further action in the exchange process. Therefore, it is difficult for an exchange to determine whether a referral was successful. Some clearinghouses send surveys to previous listers in order to determine the number of successful exchanges that have occurred. However, low response rates on most of these mail surveys result in incomplete data. One U.S. clearinghouse estimates ten to fifteen percent of their listings are successfully transferred.

It has been suggested that these three problems, and perhaps others inherent in the clearinghouse process, can be reduced by more direct personal interaction between the clearinghouse staff and participating industries--in short, an active rather than a passive information exchange. There are several benefits to active participation. For example, industry executives may have more confidence in the ability of a listing service to keep information secure if they know and trust the exchange staff and the person in charge. Once this confidence has been developed and a good reputation established, less resistance might be encountered in convincing industries to list their wastes. For the same reason, more cooperation in assessing the success of the clearinghouse should also be gained.

The individual who makes the personal contacts should be knowledgeable in industrial processes as well as waste transfer techniques. Many questions posed by potential listers could be quickly answered and some problems (such as accumulation of unmarketable listings) could be reduced or avoided by familiarity with the practices of the participating industries.

Clearinghouses receive financial support in one of two ways. The most common method is to be subsidized by a non-profit industrial trade association. In this situation, the clearinghouse becomes another service offered to members and is supported by membership dues or, in some cases, a surcharge is added to the dues of members using the service. Support through an existing trade association has the benefit of reducing operating costs in several ways:

- 1) managerial and clerical staff can operate the exchange as a part of their other duties,
- 2) additional office space is not necessary,
- 3) technical advisors are readily accessible and,
- 4) if the association publishes a periodical, printing facilities and distribution lists are already available.

A few information clearinghouses operate as self-supporting, profit-oriented entities. This is the second funding possibility. These are generally operated in a much more active manner than the non-profit exchanges. This type of operation requires more managerial time and talent to attract subscribers. Furthermore, staff time is consumed, and higher office costs are incurred. A commission is usually charged to recover these costs. Services of this type are rare at this time.

Very few government subsidized and operated information clearinghouses exist, although government funds have assisted in the initiation of some exchanges. This is largely due to the confidentiality problem. Many companies feel that public access to governmental agency information precludes confidentiality and security of information.

2. Materials Exchange

Materials exchanges differ from information exchanges in that they act as a brokerage service between waste generators and waste users (Figure 1-3). The degree of involvement in waste transactions varies widely among materials exchanges. Some act as an agent, actively seeking a buyer or seller for a particular material. Other materials exchanges take possession of the material and perform whatever functions are required to complete a transfer. Analysis, reprocessing, repackaging, or transport are sometimes subcontracted out to other companies.

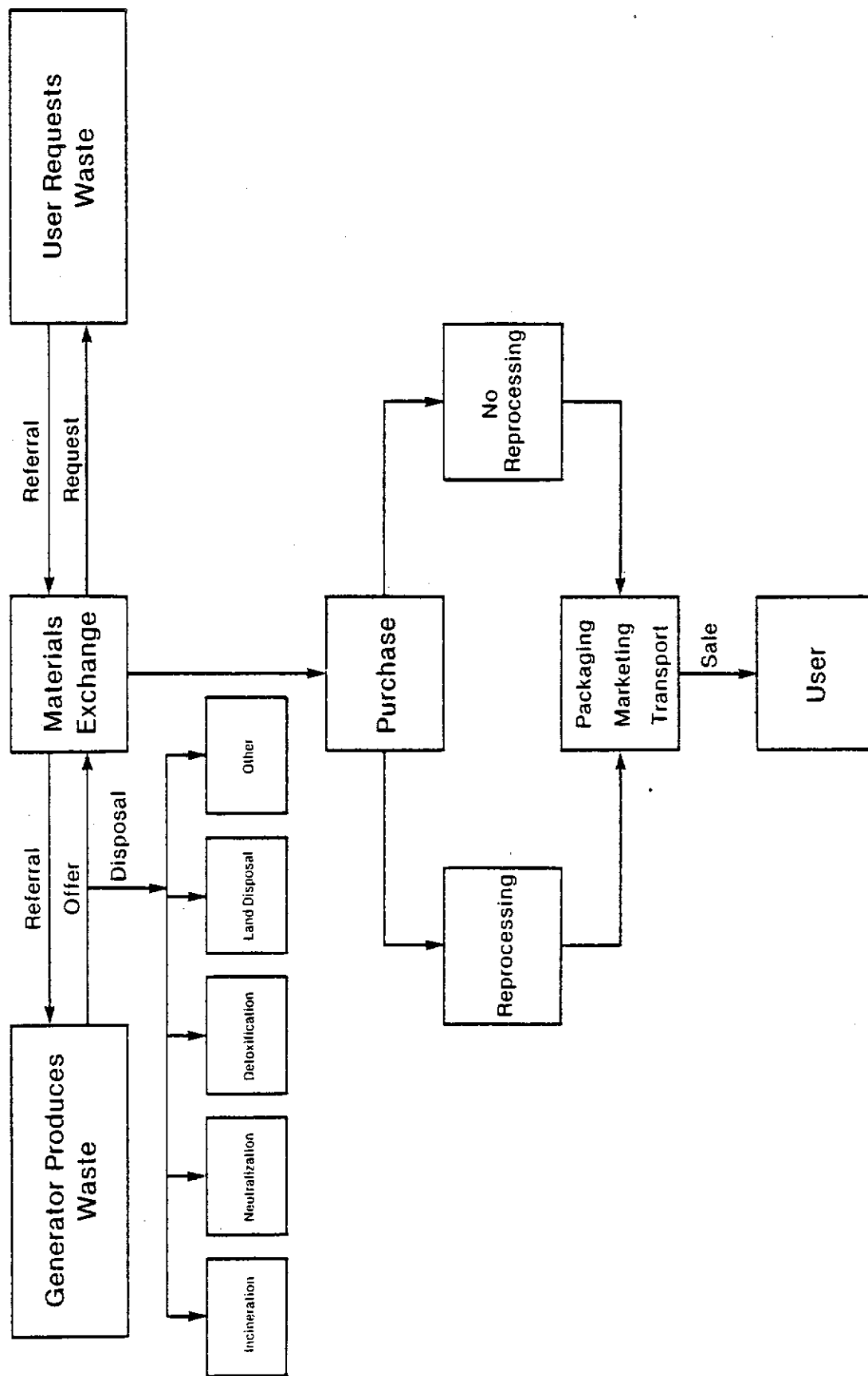
Existing materials exchanges tend to accept, list and transfer a more restricted range of wastes than information clearinghouses. The exchange must be able to identify wastes with sufficient value to cover costs and provide a profit. This judgment is critical to the survival of the exchange. The wrong decisions may cause a problem similar to that faced by information clearinghouses; that is, accumulation of non-transferable inventory. Unlike the information exchange, however, the materials exchange may incur substantial losses (due primarily to the time spent trying to move the material) on these accumulated untransferable wastes.

The fixed costs of operating a materials exchange are nearly always higher than those of a clearinghouse. A more comprehensive waste handling service is offered and, as a result, a greater number of people are required to manage the technical, legal, and business operations. Sometimes expensive waste handling equipment must be purchased and maintained.

There are only a few materials exchanges in operation at this time. All of these are located in the United States and are run as profit-making enterprises. All of these exchanges charge a commission based on the estimated value of a successful transfer.

Figure I-3

SAMPLE MATERIALS EXCHANGE OPERATION



As an intermediate possibility, there may be potential for dual-capability waste exchanges, which combine the advantages of both clearinghouses and materials exchanges. An operation of this kind would probably be run by a non-profit organization with a large information handling component and a limited material handling component. The prohibitive costs due to the logistics of taking physical control of wastes and waste processing would be mainly responsible for this organizational structure.

The materials handling component might consist of devising innovative ways of using or combining wastes and modifying manufacturing processes. This would require an experienced and creative staff of technical and business advisors. The information handling component could be expanded from making simple referrals to developing a broad base of reputable subcontractors that could be contacted when necessary. These subcontractors would be in such occupations as transportation, laboratory analysis, reprocessing, and other related fields.

A waste exchange organized in this way could examine listed wastes for new uses. Contacts could be made between generators and potential users and suggestions made for effecting the new use. When problems develop in the potential waste transfer, the exchange could be consulted for ways to solve the problem or for referrals to companies capable of performing certain tasks.

REFERENCES FOR CHAPTER I

- (1) Federal Register, Volume 45 (No. 98): 33120 states that:
 - (a) Except as otherwise provided in paragraph (b) of this section, a hazardous waste which meets either of the following criteria is not subject to regulation under Parts 262 through 265 or Parts 122 through 124 of this chapter and is not subject to the notification and requirements of Section 3010 of RCRA until such time as the Administrator promulgates regulations to the contrary:
 1. It is being beneficially used or reused or legitimately recycled or reclaimed.
 2. It is being accumulated, stored or physically, chemically or biologically treated prior to beneficial use or reuse or legitimate recycling or reclamation.
 - (b) A hazardous waste which is a sludge, or which is listed in Subpart D, or which contains one or more hazardous wastes listed in Subpart D; and which is transported or stored prior to being used, reused recycled or reclaimed is subject to the following requirements with respect to such transportation or storage:
 1. Notification requirements under Section 3010 RCRA.
 2. Part 262 of this chapter.
 3. Part 263 of this chapter.
 4. Subparts A, B, C, D and E of Part 264 of this chapter.
 5. Subparts A, B, C, D, E, G, H, I, J and L of Part 265 of this chapter.
 6. Parts 122 and 124 of this chapter, with respect to storage facilities.
- (2) Federal Register, Volume 45 (No. 98): 33120-33124.
- (3) Federal Register, Volume 41 (No. 161): 35050-35051.
- (4) Water Technology Corporation. Waste Exchanges: Background Information. Prepublication Copy, EPA Office of Water and Waste Management, Contract 68-01-5797. 1980.
- (5) Florida Department of Environmental Regulation, Hazardous Waste Survey for the State of Florida, Final Report, DER Contract SW-2, October, 1977.
- (6) Arthur D. Little, Inc. Waste Clearinghouse and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report, EPA Hazardous Waste Management Division, Contract 68-01-3241, 1976.
- (7) Ricci, L.J. 1976. Chemical Waste Swapping: Promising but no Panacea. Chemical Engineering, July, 1976.

II. HISTORICAL OVERVIEW OF WASTE EXCHANGES

The following discussion presents an overview of the chronological development of waste exchanges in foreign countries. A limited amount of specific information is included in order to highlight significant developments in foreign waste exchange operations. Comprehensive information on each of the exchanges mentioned can be found in Table II-1.^{1,2,3}

A. Foreign Exchanges

The first waste exchange was established in Britain in 1942. This exchange, the National Industrial Materials Recovery Association (NIMRA), was organized to conserve materials during World War II. It was run by the British government until 1956 when an industrial association assumed control. NIMRA currently operates on a non-confidential basis and mainly handles surplus or unused equipment.

In 1972, two new clearinghouses were formed. The Dutch exchange, VNCI, was established in April 1972 by the Association of Netherlands Chemical Industries. VNCI estimates 30 percent of all listings result in successful transfers. In November 1972, the Federation of Belgian Chemical Industries started a clearinghouse, the Federation des Industries Chimique de Belgique (FICB). This exchange emphasizes rapid notification of available wastes. FICB publishes listings three times per week. Both of these exchanges were organized to serve the chemical industry specifically.

Several information exchanges began operations in 1973. Among these are the German Association of Chemical Industries (VCI) exchange, the National Association of Chemical Industries (ANIC) exchange in Italy, and exchanges in Austria and Switzerland. All of these exchanges are sponsored and operated by industrial organizations.

TABLE II-1
CHARACTERISTICS OF EUROPEAN AND CANADIAN WASTE EXCHANGES
(Information Clearinghouses Only)

Foreign Exchange	Service	Initiation/ Termination	Govt. Funding	Profit	Listing Fee	Confidential	Sub- scription Fee	Operating Budget/ Year	Approximate Publication Circulation	Frequency of Publications
CWME (Canada)	International ¹	11/1977 ²	YES	NO	NO	YES	\$20/yr	\$50,000	5,700	Bimonthly
UKWME (U.K.)	National	1974-1980	NO ³	NO	NO	YES	\$45/yr	\$81,000	6,000	Quarterly
NIMRA (U.K.)	National	1942 ⁴	NO ⁵	NO	NO	NO	\$32/yr	--	2,000	Monthly
SWE (Switzerland)	National	2/1973	NO	NO	NO	YES	NO	\$5,000	600	Monthly
CIAE (Austria)	National	2/1973	NO	NO	NO	YES	NO	--	--	Monthly
FWE (Austria)	National	7/1974	--	--	--	NO	--	--	--	Monthly
NWE (Sweden)	International ⁶	11/1973	NO ⁵	NO	NO	YES	Annual Dues	\$46,000	--	Quarterly
TWME (Italy)	National	5/1978	NO	NO	NO	YES	NO	--	3,000	Quarterly
ANIC (Italy)	National	3/1973	NO	NO	NO	--	YES ⁷	--	--	Weekly
WEI (Israel)	National	9/1976	YES	NO	NO	YES	NO	\$20,000	--	Monthly
MWDA (Australia)	Regional	3/1977	YES	NO	\$5/item	YES	NO	--	--	Quarterly
IWES (Australia)	Regional	2/1978	YES	NO	NO	YES	NO	\$2,000	--	Quarterly
ANRED (France)	National ⁸	1976 ⁹	YES	NO	NO	YES	NO	\$10,000,000 ¹⁰	Over 25,000	Quarterly
VCI (Germany)	International ¹¹	1973	NO	NO	NO	YES	NO	\$3,000	--	Bimonthly
DIHT (Germany)	International ¹²	1974	NO	NO	NO	YES	YES ⁷	--	700,000 ¹³	Monthly
VNCI (Netherlands)	National	4/1972	NO	NO	NO	YES	NO	--	--	Monthly
FICB (Belgium)	National	11/1972	NO	NO	\$25 ¹⁴	YES	YES ¹⁴	\$7,500	1,000	Semi-weekly
OBEA (Belgium)	National	12/1978	YES ⁵	NO	NO	YES	NO	\$25,000	1,000	Bimonthly

SOURCES: Water Technology Corporation, 1980. Background Information on Waste Exchanges. Draft Report to U.S. EPA, Contract Number 68-01-5797.

A.D. Little, Inc., 1976. Waste Clearinghouses and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report to U.S. EPA, Contract Number 68-01-3241.

Ontario Research Foundation, 1977. The Methodology for the Operation of a Waste Materials Exchange in Canada. Report to Solid Waste Management Branch, Contract Number 0655-KE-204-6-EP13.

Direct correspondence with existing exchanges by mail, October, 1980-January, 1981.

NOTES FOR TABLE II-1

- (1) Includes some unsolicited listings from U.S.
- (2) The Canadian Exchange was initially organized by the Canadian Chemical Processing Magazine in 1973. In 1975, management of the exchange was assumed by the Ontario Ministry of Industry and Tourism. Ontario Research took control in 1977.
- (3) UKWME was supported by government until it was discontinued in January, 1980, after having failed to reach a goal of 70 percent self funding by 1980.
- (4) NIMRA became self-sufficient in 1956 when the British government removed support.
- (5) Originally received government funding.
- (6) Cooperative effort of Denmark, Finland, Norway, and Sweden.
- (7) Costs are included as part of membership dues.
- (8) Consists of six regional waste exchanges located throughout France.
- (9) Consists also of exchanges which were initiated in 1975 and later absorbed into ANRED operations.
- (10) Only a portion of this is used in support of waste exchange operations.
- (11) VCI publishes the trade journal, Chemical Industry, which carries listings from the Austrian, Belgian FIGB, German DIHT Italian, Dutch, Nordic, and Swiss waste exchanges.
- (12) Includes some listings from Austria, Luxembourg, Belgium and the Netherlands.
- (13) Includes entire membership of IHK, which is mandatory for German firms.
- (14) Cost of listing is included as part of Trade Association fee for members. Non-members pay \$25 for listing.

The Nordic Waste exchange was also established in 1973. This clearinghouse is a cooperative effort of the Federations of Industry in the four Scandinavian countries (Denmark, Norway, Finland and Sweden). Part of the funding during the early years of the Nordic Exchange came from the Nordic inter-governmental organization, Nordisk Industrifond. The Federations of Industry of the four countries now entirely subsidize the exchange.

With the exception of NIMRA, all of the above clearinghouses, including the German Deutscher Industrie-und Handelstag (DIHT) exchange established in 1974, publish listings in the German monthly trade journal, Chemical Industry. This assures a broad circulation beyond the members of the sponsoring trade organization. Most of these exchanges also publish their listings in a clearinghouse newsletter or bulletin that is sent to members only.

An information exchange was started in Canada in 1973. Three organizations have managed this exchange. It is currently operated by Ontario Research, a non-profit organization. The exchange has received some government sponsorship. This clearinghouse handles information on all types of wastes and equipment from all geographical areas in Canada. It is one of the few exchanges that actively pursues information on the success of its efforts. In two years of operation under Ontario Research, the Canadian exchange estimates 95,000 tons of waste per year have been successfully transferred. The estimated value of this annual transfer is approximately 3.7 million Canadian dollars. Organic compounds and metals were the materials most successfully transferred.

Three more clearinghouses were established in Europe in 1974. The West German exchange (DIHT) and the Austrian Federal Waste Exchange were begun by their respective national chambers of commerce. The third exchange was the United Kingdom Waste Exchange (UKWME). This exchange attempted an extensive computer data handling program under government funding. Attempts were made

to make the exchange self-sufficient. Failure of this endeavor resulted in removal of government subsidy in January 1980. The exchange may be revived by an industrial organization. UKWME compiled extensive data on successful waste transfers from 1974 to 1979. The results of this compilation are presented in Table II-2.

In late 1976, the Israeli Ministry of Industry, Commerce and Tourism started an information referral service for waste generators and users. It also provides analytical, reprocessing and other consulting services. Their published waste listings are distributed to all waste-producing facilities in the country.

The Metropolitan Waste Disposal Authority in New South Wales, Australia introduced a waste exchange in 1977. This exchange avoids listing equipment and materials with established markets. Confidentiality is maintained, but listing firms are required to notify the exchange of successful transfers.

A waste exchange was started in 1978 by the Turin, Italy Chamber of Commerce. The exchange publishes a bulletin (circulated free of charge to all Italian Chamber of Commerce members and all industrial unions) that has recently begun to include pertinent articles, announcements and legislative actions, as well as waste listings.

Three more exchanges began operation in 1978. The Office Belge de L'Economie et de L'Agriculture (OBEA) exchange in Belgium was started as a two-year experiment by the government. A second Australian exchange was started in the state of Victoria and is very similar to the New South Wales exchange. The third organization was begun in France. This operation is actually a governmental agency established as part of a 1975 law. The National Agency for the Recovery and Elimination of Waste (ANRED) was one of the results of this law and is responsible for setting up six regional waste exchanges. The directors of the agency are representatives of central and local governments, industry, and environmental and consumer groups.

TABLE II-2
REPLACEMENT VALUE OF TRANSFERRED MATERIALS
(United Kingdom 1974-1979)

	<u>Continuous Tonnes/Yr.</u>	<u>Total Replacement Value U.K.</u>	<u>U.K. Value/Tonnes</u>
Acids and Alkalis	102,350	3,010,000	29
Organic Chemicals and Solvents	10,180	1,333,000	131
Rubber and Plastics	8,503	1,020,000	120
Inorganic Chemicals	22,400	952,000	43
Minerals	2,110	500,000*	237
Catalysts	930	481,000	517
Oils and Waxes	2,710	389,000	144
Miscellaneous	3,400	339,000	100
Paper and Board	960	36,000	38
Food Processing	1,960	33,000	17
Textile and Leather	555	32,000	58
Metals	12	21,000	1,750

*One transaction was for 120,000 tonnes.

1 tonne = 2,205 pounds.

1 U.K. pound = \$2.24 U.S. dollars (July, 1979).

SOURCE: Water Technology Corporation, 1980. Background Information on Waste Exchange. Draft Report to U.S. EPA, Contract #68-01-5797.

B. United States Exchanges

The following section highlights the chronological development of waste exchanges in the United States. Available information on each exchange is presented in Table II-3. A short comparison of waste exchange development in the U.S. and abroad is presented immediately following this discussion.

The Union Carbide Corporation set up its Investment Recovery Department in 1964 to market surplus equipment and materials. This department was expanded in 1971 to include chemicals, metals and other wastes. The Department looks for transfers within the Union Carbide Corporation or, secondarily, sales outside the corporation. This operation is not strictly an exchange in that wastes from other organizations are not accepted for transfer. However, it does represent the introduction of the materials exchange concept and the marketing of wastes for profit.

In 1973, Zero Waste Systems of California was founded as a waste information exchange. ZWS was later reorganized into a materials exchange. The company takes possession of wastes (usually chemicals) and reprocesses or repackages them to meet specific market needs. Zero Waste Systems no longer operates an information exchange.

Another materials exchange, The Exchange, was started in 1975 in Boston. The Exchange is a profit-making enterprise but takes no possession of wastes. Markets are found for equipment surpluses as well as chemical wastes on a commission basis.

The first information clearinghouse in the United States was started in St. Louis in 1975 by the St. Louis Regional Commerce and Growth Association. In 1979 the Kansas City Chamber of Commerce joined in co-sponsorship and the name was changed to the Midwest Industrial Waste Exchange. The clearinghouse now receives some funding from the Environmental Protection Agency.

CHARACTERISTICS OF UNITED STATES WASTE EXCHANGES
(Clearinghouses, Brokerage Firms, Materials Transfer Firms)

United States Exchange	Service Area	Type of Service	Initiation/Termination	Govt. Funding	Profit	Listing Fee	Confidential	Subscription Fee	Approximate Publication Circulation	Frequency of Publications
MIWE (Midwest)	National	Information	1975	YES	NO	\$10	YES/NO	NO	1,650	Quarterly
IIWE (Iowa)	Regional	Information	1978	YES	NO	NO	YES	NO	--	Quarterly
ACE (Amer. Chem.)	National	Broker	1/1976	NO	YES	NO	YES ¹	YES ²	0	--
ERC (Enkam)	National	Broker/Information	3/1977	NO	YES	Commission	YES	NO	1,000	Monthly
ECHO	National	Consulting ²	--	NO	YES	NO	--	--	--	--
GWE (Georgia)	State	Information	1976	NO	NO	\$10/item	YES	\$25 ³	1,100	Quarterly
ICWE (WETA-Wash.)	State ⁴	Information	1978	NO	NO	NO	YES	NO ⁵	100	Bimonthly
MACI (Minn.)	State	Information Broker	1978	NO	NO	\$30/3 mos. \$60/12 mos.	YES	NO ⁶	--	--
TE (The Exchange)	International	Consulting	--	NO	YES	Commissions & consulting fees	YES	--	--	--
OIWE (Oregon)	State & Canada	Information	1978	NO ⁷	NO	NO	YES	NO	1,300	Bimonthly
TWS ⁸ (Tennessee)	State	Information	1981	NO ⁸	NO	\$25/item	YES	\$25/year	--	Quarterly
WASTE (World)	National	Information	1979	NO	NO	\$4-10/listing	YES	\$25 or \$150/yr.	--	--
ZWSI (Zero)	Regional ⁹	Broker ¹⁰	1973	NO	YES	No regular listings	YES	--	--	--
CWE (California)	State	Active Information	1977	YES	NO	NO	YES	NO	--	--
WMC (Ind.)	State	Information	1978	NO	NO	\$25/item	YES	NO	600	Quarterly
IWIE (Columbus)	Regional ¹¹	Information	1977	NO	NO	\$5/item	YES	NO	--	Quarterly
IWIE (Newark)	State ¹²	Information	1978	NO	--	\$5/item	YES	\$5/yr.	--	Approx. Quarterly
MCWE (Mecklenburg)	State	Information Broker	1978	YES	NO	NO	YES	NO	1,700	Quarter
UCC (Union Carb.)	National ¹³	Material	--	NO	YES	--	--	--	--	--
CRIP (Houston)	Regional	Information	1976	NO	NO	\$10/item	YES	\$15/yr.	100	Monthly
AARRI (Amer. All.)	State	Information	--	NO	--	NO	YES	NO	--	--
ORE (Ohio)	National	Broker & Information	1979	NO	YES	\$25/item	YES	NO	--	Semi-annual
PWIX (Pennsylvania)	State	Information	1980	NO	NO	\$50 or \$75/item	YES/NO	NO	2,500	Depends on volume
NWX (National)	National	Information	1981	NO	YES	\$75/item	YES/NO	NO	--	Quarterly

SOURCES: Water Technology Corporation, 1980. Background Information on Waste Exchanges. Draft Report to U.S. EPA, Contract Number 68-01-5797.

A.D. Little, Inc., 1976. Waste Clearinghouses and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report to U.S. EPA, Contract Number 68-01-3241.

Ontario Research Foundation, 1977. The Methodology for the Operation of a Waste Materials Exchange in Canada. Report to Solid Waste Management Branch, Contract Number 0655-KE-204-6-EP13).

Direct correspondence with existing exchanges by mail, October, 1980-June, 1981.

NOTES FOR TABLE II-3

- (1) \$250 charge to become member with variable commissions upon transfer.
- (2) Member of WASTE and provides similar services.
- (3) Charged to publication subscribers who do not list wastes.
- (4) Serves state of Washington primarily with some activity in Oregon, Idaho and western Canada. Plans to link with other exchanges.
- (5) Free to Western Environmental Trade Association of Washington members only.
- (6) Service included as part of membership in Minnesota Association of Commerce and Industry.
- (7) Originally received state funds but now supported by Western Environmental Trade Association.
- (8) Exchange was originally operated by the Tennessee Department of Public Health. The Tennessee Manufacturer's Association (TMA) assumed control in 1981.
- (9) Primary service area is San Francisco-Oakland.
- (10) Originally an information clearinghouse. Later reorganized into a brokerage.
- (11) Columbus, Ohio area.
- (12) Some listings from New York and Pennsylvania.
- (13) Service is for all Union Carbide companies.

Two information exchanges were started in 1976. One is operated by the Center for Industrial Research and Service of Iowa State University. The other is the Georgia Waste Exchange, which was initially organized by the Georgia Department of Natural Resources. It has since been taken over by the Georgia Business and Industry Association.

A materials exchange was also started in 1976 in Illinois. The American Chemical Exchange (ACE) is a profit-making enterprise primarily dealing in virgin materials. ACE also handles specific types of waste materials.

Four clearinghouses were started in 1977. The Houston Chamber of Commerce organized the Chemical Recycle Information Program to help conserve resources and reduce pollution. The program concentrates on chemical wastes. The Western Environmental Trade Organization of Washington (a private non-profit labor/business association) started the Information Center for Waste Exchange in Seattle. The Industrial Waste Information Exchange was founded by the Columbus, Ohio Industrial Association. The Columbus exchange is small due the limited number of industries and association members in the Columbus area. The fourth exchange was organized as a joint effort between the Minnesota Association of Commerce and Industry and Technotec (a technology exchange service of Control Data Corporation). Most of these clearinghouses accept all kinds of waste materials for listing and operate in the passive manner usually found in information exchanges.

The EnKarn Research Corporation of Albany, New York was also established in 1977. This is a materials exchange that also handles a limited information referral service. EnKarn acts as an agent for sellers of wastes and product or equipment surpluses.

In 1978, information clearinghouses were set up in New Jersey and Indiana. The New Jersey exchange is located in Newark and is sponsored and operated by

the State Chamber of Commerce. The Indiana exchange is operated by Environmental Quality Control, Inc., a non profit corporation based in Indianapolis.

In late 1978, the World Association for Solid Waste Transfer and Exchange (WASTE) began operation in San Francisco, California. This is a non-profit organization that provides a comprehensive waste information service. Computerized files of several types of waste and waste management information are maintained. It is anticipated that WASTE Search Centers will be established internationally.

The Process Industries Division of the American Alliance of Resources Recovery Interests, Inc. started an Industrial Waste Information Exchange in March, 1979. Assistance, but no funding, was provided by the New York State Department of Commerce. The exchange is supported by membership dues and listing fees.

A materials exchange, the Ohio Resource Exchange (ORE) of Cleveland, Ohio was founded in May, 1979. This is a profit-making organization that specializes in hazardous and potentially hazardous wastes.

C. Comparison of Development of U.S. and Foreign Exchanges

When comparing the existing waste exchange organizations in the United States with those of foreign countries, several features are evident. These features include many similarities and a few significant differences.

Most apparent is the longer history of European waste exchanges. The idea originated in Europe and was first applied on a wide scale there. This is probably the result of smaller reserves of raw materials and limited land disposal areas in most European countries compared to the available resources in the United States. It has only been within the last few years that the combined pressures of environmental protection and growing scarcity of raw materials have induced U.S. industries to seek alternative sources of materials for manufacturing processes. The waste exchange provides one alternative.

Many operational similarities are observed between European and American information clearinghouses. Nearly all information exchanges, whether American or European, have the same basic structure. They are generally operated in a passive manner, usually only making referrals, not participating in transfer negotiations. Most preserve the confidentiality of listing companies by coding published information and requiring written inquiries. The majority of clearinghouses are run by trade organizations or Chambers of Commerce.

The longer history, and, therefore, experience of European clearinghouses is probably a major factor in pioneering many innovations in the European operations. Such things as the use of computers, cooperation with exchanges in other countries, active pursuit of referral success, and frequent updating of listings were all started in Europe. These ideas have not been applied by all clearinghouses, however.

Probably the most significant difference in the waste exchange concept to be found in the United States is the materials exchange. These profit-making waste brokerages are totally absent in Europe. The fact that these companies seek profits for their services means that higher fees must be charged to customers. However, the profit motive also provides incentive to the exchange to actively seek new uses for wastes that would normally be discarded.

The next logical step in waste exchange development would seem to be a hybrid of the passive information clearinghouse and the active materials exchange. Organizations of this sort are just beginning to appear. Information exchanges that actively pursue waste listings and potential users will probably become important services as companies look for alternatives to waste disposal.

REFERENCES FOR CHAPTER II

- (1) Arthur D. Little, Inc., Waste Clearinghouse and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report, EPA Hazardous Waste Management Division, Contract 68-01-3241, 1976.
- (2) Water Technology Corporation, Waste Exchanges: Background Information. Prepublication Copy, EPA Office of Water and Waste Management, Contract 68-01-5797. 1980.
- (3) Ontario Research Foundation, 1977. The Methodology for the Operation of a Waste Exchange in Canada. Report to Solid Waste Management Branch, Contract Number 0655-KE-204-6-EP13.

III. CURRENTLY OPERATING U.S. EXCHANGES

This chapter provides a description of all waste information clearinghouses and materials exchanges in the United States. These descriptions deal mainly with administrative policy, degree of success (in terms of industry's use of the exchange), and other information valuable in developing a generalized picture of waste exchange operations.^{1,2,3}

I. California Waste Exchange

The California Waste Exchange was founded in mid-1977 by the Hazardous Materials Management Section of the California Department of Health Services. This is the only waste exchange in the United States that is operated by a governmental agency. Funding and personnel are provided by the California Department of Health Services although some EPA funding may be obtained in the future. The California exchange is not an information clearinghouse. There is currently no publication of listings. A publication is under consideration, however.

The California exchange was created as a part of the state legislative program for hazardous waste management. This program requires that a manifest accompany all hazardous materials. This manifest must contain the specific composition of the waste material.

These manifests are reviewed by the Hazardous Materials Management Section in an effort to find ways of recycling wastes that would otherwise be dumped. Companies disposing of potentially recyclable wastes are contacted by phone to determine what efforts have been made to recycle the material and what problems were encountered. The exchange provides technical advice on reprocessing and other problems. California law requires hazardous materials companies to cooperate with the exchange. The law also requires that the exchange protect trade secrets.

The most common materials handled by the exchange are solvents, acids and alkalis, oils and heavy metals. The exchange estimates successful transfers in 25 percent of the cases it pursues.

The exchange currently employs one person on a full-time basis. This person reviews manifests, makes phone contacts, and provides technical assistance. Three more full-time people will be hired in 1982. The exchange operating budget is currently approximately \$40,000 per year.

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2. Chemical Recycle Information Program

The Chemical Recycle Information Program (CRIP) was started by the Chamber of Commerce of Houston, Texas in late 1976. This program is an information clearinghouse set up by industrial engineers as a service to the chemical industry of the Houston area.

CRIP publishes listings of wastes offered and wastes wanted on a monthly basis. A fee of \$10 per listing per year is charged. All listings are coded to insure confidentiality. A non-confidential listing option may be offered at a later date. Listings are restricted to organic and inorganic chemicals and some metals.

Subscription to the listings (called the "Inventory List") is \$15 per year. Circulation of the Inventory List is primarily to chemical industries in the Houston area and numbers about 100 companies. Very little interest in the program has been shown by other industries in the Houston area. Inquiries about listings have been received from as far away as Canada, however. The Inventory is not shared with other waste exchanges at this time. The Chamber of Commerce has no objections to an exchange of listings if an arrangement can be worked out with another exchange.

CRIP is just one of many services offered to Houston Chamber of Commerce members. Control of the program is by a group of voluntary committees representing industry, environmental groups and various levels of government. Compilation of the Inventory List requires only about one day per month of office time. It is estimated that the program operates at a loss or may break even on expenses. No attempt has been made to evaluate the success of program in terms of amount of wastes recycled. Input from Chamber of Commerce members indicate that it is a worthwhile service.

Mr. Jack Westney
Chemical Recycle Information Program (CRIP)
Houston Chamber of Commerce
1100 Milam Bldg., 25th Floor
Houston, Texas 77002
(713) 651-1313

3. EnKarn Research Corporation

EnKarn Research Corporation is a profit seeking organization founded in 1977. EnKarn operates an information clearinghouse and a marketing service.

Many kinds of materials are listed by EnKarn. These include surplus industrial inventory, excess raw materials, recycled by-products, and hazardous wastes. Small volumes of material generally are not accepted due to the limited profit potential. Hazardous wastes are usually handled through other companies. These companies provide necessary clean-up or recovery operations, transportation, and analysis of the waste. The two major types of materials handled by EnKarn are textiles and industrial packaging material.

EnKarn publishes its listings in the Industrial Materials Bulletin. This bulletin is actually two separate publications: one listing textiles, the other listing packaging materials. The bulletin is distributed nationwide on a monthly basis. Subscription is free to qualified organizations. Listings are categorized as materials available or materials wanted. Confidentiality is maintained. Listings are accepted for one publication only, another application must be submitted for each bulletin. Listings are published free but a commission is charged on successful transactions. This commission is generally 5% but may be as much as 10%, depending on the arrangements and type of material transferred. Listings are not exchanged with other clearinghouses.

EnKarn also offers a marketing service. In this capacity, EnKarn acts as a representative for a particular company and actively seeks a buyer or seller for the material in question. A fee is charged for this service only upon completion of a successful transaction. The amount of the fee depends upon the type of material involved.

Mr. J.T. Engster
EnKarn Research Corporation
P.O. Box 590
Albany, N.Y. 12201
(518) 436-9684

4. Georgia Waste Exchange

The Georgia Waste Exchange (GWE) is a non-profit information clearinghouse organized in 1976 by the Environmental Protection Division of the Georgia Department of Natural Resources. Control was transferred to the Georgia Business and Industry Association (GBIA) in December 1977.

The clearinghouse publishes a quarterly report which lists wastes available and wastes wanted. "Wastes available" listings are accepted only for materials generated in the state of Georgia. The exchange lists all types of material, including stationary waste processing equipment. All listings are kept confidential. A \$10 fee is charged for publication of an item in one issue of the report. A one year listing and a subscription may be purchased for \$25. The subscription charge, without a listing, is also \$25 per year. The GWE Report is sent to other waste exchanges on an irregular basis.

In addition to the exchange service, GBIA maintains a recycling directory and a list of disposal sites. These lists were compiled by the Georgia Department of Natural Resources and are used to make referrals when requested.

The Georgia Waste Exchange encourages users to notify the exchange of successful transactions but no organized survey has been performed. A survey is planned for 1981, however. Rough estimates of the percentage of listings successfully transferred indicate a low turnover rate.

The GWE has no full-time employees and operates out of the GBIA office in Atlanta. The listing and subscription fees enable the exchange to break even on postage and printing costs but personnel time probably results in a net deficit in exchange operating costs.

Mr. Bert Fridlin
Georgia Waste Exchange
Georgia Business and Industry Association
181 Washington St. S.W.
Atlanta, GA 30303
(404) 659-4444

5. Industrial Waste Information Exchange - Columbus, Ohio

The Columbus Industrial Association started the Waste Information Exchange in June 1977 as a non-profit service to its members. The exchange has been dormant for the last two years because of a lack of interest on the part of member industries.

Any material without an established market was accepted for listing in the quarterly publication. A fee of \$5 per listing per year was charged. Confidentiality was maintained. In the two years of operation the only known successful transfer was a load of wooden pallets.

The Columbus Industrial Association offered to transfer operation of the exchange to the Environmental Committees of the State Chamber of Commerce and the State Manufacturer's Association. Neither group wanted to operate the exchange, citing lack of interest on the part of area industries. Ohio State University considered operating the exchange, in conjunction with the Ohio Environmental Protection Agency, but eventually turned it down.

Mr. Newton A. Brokaw
Industrial Waste Information Exchange
Columbus Industrial Association
1646 W. Rane Avenue
Columbus, Ohio 43221
(614) 486-6741

6. Iowa Industrial Waste Information Exchange

The Iowa Industrial Waste Information Exchange is a non-profit clearinghouse started in 1978 by the Center for Industrial Research and Service (CIRAS) of Iowa State University.

The exchange accepts most kinds of wastes for listing in the newsletter. This includes hazardous wastes but excludes surplus equipment. The quarterly newsletter publishes listings free of charge for one year or until the material is successfully transferred. Listings for wastes wanted or wastes available are published on a confidential basis. Subscription to the newsletter is free also. The exchange also maintains a list of Iowa firms in the scrap and salvage business.

CIRAS sends the newsletter to Iowa Industries and also to the Midwest Industrial Waste Exchange (MIWE). The Iowa exchange does not share listings with any other waste exchanges.

The Iowa exchange encourages listers to notify them of successful transactions but has not conducted a survey to determine the success of the exchange. Based on notifications, CIRAS estimates less than 10% of all listings are successful. There has been very little activity in the exchange recently.

Mr. Spicer
Iowa Industrial Waste Information Exchange
Center for Industrial Research and Service
201 Bldg. E
Iowa State University
Ames, Iowa 50011
(515) 294-3420

7. Mecklenburg County Waste Exchange

The Mecklenburg County Waste Exchange is a non-profit information clearinghouse founded in 1978 by the Mecklenburg County Engineering Department. Control of the exchange was recently turned over to the Urban Institute of the University of North Carolina at Charlotte. The Urban Institute refers to this clearinghouse as the Piedmont Waste Exchange. Control of the exchange may be turned over to the private sector in the future.

The Mecklenburg exchange handles all types of materials except hazardous wastes. No determination is made of a materials' toxicity before listing, however. Confidential and non-confidential options are offered for all listings.

Listings of wastes available and wastes wanted are published in a quarterly catalog. There is currently no listing fee but a \$5 per listing per year fee will soon be in effect. Subscription to the catalog is free. Circulation currently numbers about 1,700 industries. Mailing lists were originally compiled from state agency lists. No survey of transfer success has been performed. There is no interaction with other exchanges at this time.

Ms. Mary-Don Liston
Mecklenburg County Waste Exchange
Urban Institute
UNCC Station
Charlotte, N.C. 28223
(704) 597-2307

8. Midwest Industrial Waste Exchange

The Midwest Industrial Waste Exchange (MIWE) is a non-profit information clearinghouse established in 1975 by the St. Louis Regional Commerce and Growth Association. In 1979, the Chamber of Commerce of Greater Kansas City assumed co-sponsorship of the exchange. MIWE is recognized as the oldest waste exchange in the U.S.

MIWE is partially subsidized under a supplemental grant obtained by the East-West Gateway Coordinating Council as part of its contract under Section 208 of the Federal Clean Water Act of 1977.

Listings for "Items Available" and "Items Wanted" are published for a fee of \$10.00. This fee allows inclusion of the listing in three consecutive catalogue issues. The catalogue is published quarterly and subscription is free. Catalogue circulation is currently 1,650. Listers have the option of confidential or non-confidential listing. The non-confidential option allows direct contact between lister and inquirer, thereby making communication much faster. The catalogue includes pertinent news on waste management and recent legislation, listing forms, and sample letters of inquiry as well as the listings of available and offered wastes.

Transfer success surveys were conducted in 1979 and 1980. Success rate was determined to be between 10 percent and 12 percent.

Mr. Arthur Baebler
Midwest Industrial Waste Exchange
10 Broadway
St. Louis, MO 63102
(312) 231-5555

9. Minnesota Association of Commerce and Industry

The Minnesota Association of Commerce and Industry (MACI) operates an information clearinghouse in cooperation with Technotec, a division of the Control Data Corporation. The exchange was established in early 1978 but has not been active since early 1980 due to a low number of listings in both the "Materials Wanted" and "Materials Available" categories.

The exchange does not publish listings in a regular bulletin but maintains computerized files of "Wanted" and "Available" materials. However, a newsletter periodically advertises the operation of the exchange, which seeks to directly match entries in the two categories. The listing fee is \$10 per month (3 month minimum) or \$60 per year, with discounts for subsequent listings. After the initial match, negotiations are carried out between the producer and the potential user. Membership in MACI is not a requirement for participation in the exchange. Confidentiality is maintained.

The MACI is currently involved in negotiations with neighboring states to initiate a regional waste exchange. The information storage and retrieval format is expected to be similar to the current operation. It is anticipated that increasing the number of participating industries, by expanding the area of coverage, will decrease problems faced by the current single state approach.

The MACI is a 2800 member non-profit organization similar to a state chamber of commerce.

Mr. James T. Shields
Minnesota Association of Commerce and Industry
200 Hanover Bldg.
480 Cedar St.
St. Paul, Minn. 55101
(612) 221-1975

10. National Waste Exchange

The National Waste Exchange (NWX) is a profit-oriented information clearinghouse established in February 1981. NWX will publish listings of any type of waste material in their quarterly publication, the NWX Directory. The directory lists wastes available and wastes wanted. The directory also contains a section of advertisements from companies providing waste management services such as laboratory analysis and waste transport. A fee of \$75 per year for two listings is charged for inclusion in the directory. Additional listings are \$10 each. Confidential and non-confidential options are offered.

Listings are accepted from all parts of the United States. NWX advertises its services widely in an effort to develop broad participation in the exchange. NWX does not share listings with any other exchanges at this time. However, the idea has been discussed with several U.S. exchanges and the Canadian exchange. A survey of transfer success is anticipated for some time late in 1982.

Mr. Ron Schaible
National Waste Exchange (NWX)
P.O. Box 190
Silver Spring, Pennsylvania 17575
(717) 684-6045

11. New Jersey - Industrial Waste Information Exchange

The New Jersey Industrial Waste Information Exchange was founded in 1978 by the New Jersey State Chamber of Commerce. The exchange is a non-profit clearinghouse offered as a service to members of the Chamber.

The exchange publishes listings of materials available and materials wanted for \$5 per item per year. The listings are published four to six times per year depending upon the volume of listing applications. Subscription to the listings is \$5 per year.

The New Jersey exchange accepts all types of material for publication. Applications are separated into 16 different categories of waste materials. These categories cover a broad range of chemicals and metals. The exchange will accept listings from companies outside New Jersey. Confidentiality is maintained on all materials listed.

The New Jersey exchange plans to conduct a survey to determine the success of the operation in 1981. However, the large volume of inquiries about listings indicates a lot of interest in the exchange by area industries. The exchange does not publish listings from other information clearinghouses but it will make referrals if requested. A list of hazardous waste transporters may soon be compiled for referral purposes. Operating costs are not known and are difficult to estimate since the exchange is just one of many services offered to members of the New Jersey State Chamber of Commerce.

Mr. Paine
Industrial Waste Information Exchange
New Jersey State Chamber of Commerce
5 Commerce St.
Newark, N.J. 07102
(201) 623-7070

12. Ohio Resource Exchange

The Ohio Resource Exchange (ORE) describes itself as a "professional marketing organization." ORE, a profit oriented information clearinghouse and materials brokerage, was founded in early 1979.

The exchange publishes listings at approximately six month intervals, depending on volume. A listing fee of \$25 per item is charged. The publication lists both wastes wanted and wastes available. Subscription to the listings is free.

ORE is selective about items accepted for active marketing. Scrap metals, wastes with established markets, and small volumes of materials are generally not associated because of their low profit potential. After a waste is accepted, ORE places a limit on the amount of time it will spend trying to move the material. If this limit is exceeded, the listing is discontinued because it would probably not be profitable. Occasionally, listed materials are given away.

A commission of 20% of the net benefits to the listing company is charged upon completion of a successful transfer. The net benefit is defined by ORE as the sale price of the waste plus the cost of disposal (had the material be disposed of by conventional means). Confidentiality is maintained on all listings.

The exchange has not performed a survey to determine its success rate. ORE estimates that only a small percentage of all listings are transferred successfully. However, the exchange feels that this is a misleading figure in assessing the success of the operation. According to ORE, accurate assessment can only be made on a basis of the weight and type of material transferred.

Mr. Dick Immerman
Ohio Resource Exchange (ORE)
2415 Woodmere Dr.
Cleveland, Ohio 44106
(216) 371-4869

13. Oregon Industrial Waste Information Exchange

The Oregon Industrial Waste Information Exchange is a non-profit information clearinghouse operated by the Western Environmental Trade Association (WETA), which serves labor and industry. The Oregon exchange was originally started in 1978 by the Oregon Department of Environmental Quality (DEQ) using U.S. Environmental Protection Agency funds. WETA provided consulting services to the DEQ and assumed full control of the exchange in October 1979.

All types of materials are accepted for listing in WETA's bulletin. Listings are categorized into twelve classifications of chemicals, metals, and miscellaneous materials. The bimonthly bulletin includes waste available, wastes wanted, and a news section. Circulation is approximately 1,300. The circulation mailing list was initially established from WETA's membership and solicitation of area businesses and industries. There are no subscription or listing fees for the Oregon exchange. Confidentiality is maintained on all listings.

The Oregon exchange is the only U.S. clearinghouse to estimate the value of materials successfully transferred. Value was computed in both energy units and dollars. From October 1979 to September 1980 WETA transferred an estimated $5,540.29 \times 10^6$ BTU's (approximately equivalent to 955 barrels of oil) of material with a monetary value of \$33,425. These estimates were based on voluntary notification of successes by listers and not on an formal survey.

The Oregon exchange has shared listings with the Canadian Waste Exchange and anticipates exchange of listings with the Washington clearinghouse. The Oregon exchange maintains a referral list of waste transporters and recyclers.

Mr. David Clark
Oregon Industrial Waste Information Exchange
Western Environmental Trade Association (WETA)
333 S.W. 5th, Suite 618
Portland, Oregon 97204
(503) 221-0357

14. Pennsylvania Waste Information Exchange

The Pennsylvania Waste Information Exchange (PWIX) is a non-profit information clearinghouse founded in September 1980 by the Pennsylvania Chamber of Commerce. PWIX is a new exchange and, as of January 1981, has not published any listings. The first listings are anticipated in February 1981.

The Pennsylvania Exchange plans to include all types of material in the listings. Wastes will be classified into 22 different categories of chemicals, metals, and manufacturing scrap. Listings fees will be \$50 per listing for Chamber of Commerce members and \$75 per listings for non-members. Additional listings are \$10 each. These fees are good for two issues of the PWIX catalog. As of January 1981 only 50 listings had been filed. PWIX offers confidential and non-confidential options on all listings. Out-of-state listings will be accepted.

The catalog will be published a minimum of twice each year depending upon the volume and turnover of listings. The catalog will include the following sections: Items Available, Items Sought, Services Needed, News, and a Directory of General Services. Listing in the Directory of General Services is free. Subscription to the catalog is also free.

PWIX developed initial mailing lists from state governmental agencies and the Chamber of Commerce membership (currently about 2,500 members). The Pennsylvania exchange has discussed formation of a regional exchange with industry organizations in the neighboring states of New Jersey and Maryland.

PWIX estimates its annual operating costs at twelve to fifteen thousand dollars with initial outlay somewhat greater. This estimate includes approximately \$2,000 for mailing and printing and \$6,500 for a full-time coordinator for 6 months.

MS. Tammis McConkey, Coordinator
Pennsylvania Waste Information Exchange (PWIX)
222 North Third Street
Harrisburg, Pennsylvania 17101
(717) 255-3252

15. Tennessee Waste Exchange

The Tennessee Waste Exchange was originally operated by the Tennessee Department of Public Health under the name Tennessee Waste Swap. This effort was unsuccessful largely because industries were reluctant to reveal information to a regulatory agency. The Tennessee Manufacturers' Association assumed control of the exchange in mid-1980 and began operation in January 1981.

The Tennessee Waste Exchange lists primarily hazardous wastes from the large number of chemical industries located in the state. Listings of wastes available and wastes wanted are published quarterly in the Waste Exchange Report. The exchange does not list materials with established recycling patterns. A listing fee of \$25 per listing is charged. Subscription to the Waste Exchange Report is \$25 per year. Confidentiality is maintained on all listings.

There is no sharing of listings with other exchanges at this time although this may be developed later. The Tennessee Exchange is also considering a more active role in the waste exchange process. This would probably involve the use of chemical engineer for advice on technical problems and problems in purification or compatibility. The exchange expects to conduct a transfer success survey at the end of 1981.

Mr. Ernest C. Blankenship
Tennessee Manufacturers Association Waste Exchange
708 Fidelity Federal Building
Nashville, Tennessee 37219
(615) 256-5141

16. Washington Information Center for Waste Exchange

The Washington Waste Exchange is a non-profit information clearinghouse established in 1978 by the Western Environmental Trade Association (WETA) of Washington. This organization is not associated with Oregon's Western Environmental Trade Association.

The exchange publishes bimonthly listings of Wastes Available and Wastes Wanted. There is no listing or subscription fee since all costs are covered by WETA membership fees. WETA feels that free listings will encourage wider use of the exchange. Circulation currently numbers approximately 100 companies. All types of materials are accepted for listing and confidentiality is maintained. WETA also maintains a referral list of treatment and disposal facilities.

The exchange is governed by a committee. This committee will soon consider expanding the services the exchange offers. Ideas to be considered include efforts to broaden participation, cooperation with the Oregon waste exchange, offering a non-confidential listing option, and performing a transfer success survey.

Ms. Judy Henry
Washington Information Center for Waste Exchange
2112 3rd Avenue
Suite 303
Seattle, Washington 98121
(206) 623-5235

17. Waste Materials Clearinghouse

The Waste Materials Clearinghouse is a non-profit information exchange founded in the summer of 1978 by Environmental Quality Control, Inc. (EQC) of Indianapolis, Indiana. EQC is an industry supported organization whose function is similar to a chamber of commerce. Member industries are charged a variable membership fee based on the number of employees retained by the company.

The clearinghouse accepts almost all kinds of materials for publication in the quarterly catalog, including surplus equipment and hazardous wastes. Materials with established recycling patterns are not accepted. The catalog lists items available and items wanted. It also provides a sample letter of inquiry and a listing form. Confidentiality is maintained on all listings although a non-confidential option may be offered in the future. There is a \$25 per item fee for listing in two consecutive catalogs. Circulation currently numbers about 600 companies, 80% of which are in Indiana. Subscription to the catalog is free to encourage wide readership. EQC estimates that the clearinghouse is currently operating at a deficit.

EQC attempts to gather data on successful transactions by sending a question sheet and post-paid envelope to all companies using the exchange. Response to this effort has been poor but EQC estimates 20% of all listings result in successful transfers. The most frequent requests received by EQ are for pickle liquors offered by the steel industry and for solvents, oils, and acids.

The Waste Materials Clearinghouse currently does not exchange listings with any other clearinghouse, although there may soon be cooperation with the Midwest Industrial Waste Exchange (MIWE). The director of the Waste Materials Clearinghouse currently serves on the MIWE steering committee and has suggested a listing sharing arrangement.

Mr. Noble L. Beck
Waste Materials Clearinghouse, EQC, Inc.
1220 Waterway Blvd.
Indianapolis, Indiana 46202
(317) 634-2142

18. World Association for Solid Waste Transfer and Exchange (WASTE)

WASTE is a private non-profit organization established in 1979 to provide a wide range of information on waste management. WASTE is controlled by a board of directors made up of representatives from organizations with "Affiliate Member" status. Affiliate members are generally non-profit waste management groups who do not pay membership dues but contribute funds on a shared-cost basis with the other affiliate members.

Most of WASTE's funding comes from membership dues. The annual fee for individuals is \$25. Commercial organizations such as waste processors or transporters are charged \$150 per year for membership.

The WASTE information system is fully computerized and uses Control Data Corporation's Cybernet system. Information is organized into data files. Each file deals with a different type of waste management information. These files include Materials Available, Materials Wanted, hazardous materials transporters and disposers, consultant listings, new technology, and pertinent regulations. New data files are being considered.

All types of materials are accepted for inclusion in the data files. The listing fee ranges from \$10 per month to \$4 per month for each listing. The amount depends upon the number of items listed. Confidential and non-confidential options are offered.

No estimate of transfer success has been made for each of the data files. The regulations file has received the most attention, primarily by companies generating hazardous waste.

Mr. Marcel Verroneau
World Association for Solid Waste Transfer and Exchange (WASTE)
130 Freight St.
Waterbury, Conn. 06702
(203) 574-2463

19. Zero Waste Systems, Inc.

Zero Waste Systems (ZWS) is a profit-making materials brokerage and consulting firm. This organization was started as a waste information clearinghouse in 1973. ZWS was charged to a materials brokerage and consulting service after the termination of the clearinghouse.

ZWS handles only chemical wastes, many of which are considered hazardous. Most metals and commonly recycled chemicals are avoided. No listings are published since this organization is a materials brokerage exclusively. There is no interaction with any other exchange. The confidentiality of all companies utilizing ZWS services is strictly maintained.

Zero Waste Systems uses chemical engineering techniques to find ways to recover chemical resources that would otherwise be disposed of in landfills. All phases of waste management are handled by ZWS, including storage, analysis, and transportation as well as recovery. ZWS also provides consulting services to companies handling their own chemical recovery processes.

Several factors are considered before ZWS decides to handle a chemical recovery problem. First, the producers must have the attitude that their waste stream is not garbage. Next, the value of the main component of the waste is considered to determine its resale and profit potential. The technical problems of degree of contamination and type and availability of processing required are then evaluated.

ZWS is currently attempting to establish a chemical recycling research institute. The institute will endeavor to find new and effective ways of recovering industrial chemicals.

Dr. Paul Palmer
Zero Waste Systems, Inc.
2928 Poplar St.
Oakland, California 94608
(415) 893-8257

REFERENCES FOR CHAPTER III

- (1) Water Technology Corporation, Waste Exchanges: Background Information. Prepublication Copy, EPA Office of Water and Waste Management, Contract 68-01-5797. 1980.
- (2) Arthur D. Little, Inc., Waste Clearinghouse and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report, EPA Hazardous Waste Management Division, Contract 68-01-3241, 1976.
- (3) Information on the status of individual exchanges was obtained by direct written correspondence with the exchanges and follow-up telephone contacts to verify details and personally interview as many exchange representatives as possible.

IV. DESIRABLE WASTE CHARACTERISTICS

Recycling and reuse of waste materials is currently practiced by firms in varying degrees depending on the size, attitude and production requirements of the industry in question. A detailed discussion of industry economic characteristics and attitudes in Florida relating to a waste exchange are found in Part Two, both for generators and potential users of wastes. Technical considerations of the utility and viability of a waste exchange depend largely on the industries involved. These considerations may be illustrated by the historical listing categories in which exchange have shown the greatest success. In general, transfers have been most frequent:

- a. from large firms using continuous production processes, to smaller companies using batch processes;
- b. from basic chemical manufacturers to specific chemical product formulators;
- c. from industries with high purity requirements to those with less stringent requirements.

Further, transfers generally fall into one of two categories of readiness for reuse. First are those which are able to be used "as is," with little treatment or purification required. Examples might be scrap metals (e.g., aluminum, steel) which are relatively easily separated and processed, or chemical residues from large manufacturers which are valuable to smaller more specific production firms. This category has been recognized for many years by engineers and is a current practice for many industries. This recycling is most often carried out within a plant or between plants within similar industries. A subdivision of this reuse category would be spent or contaminated hydrocarbons which have value as fuel. While not strictly reusable, these materials do have a second value in addition to their original use.

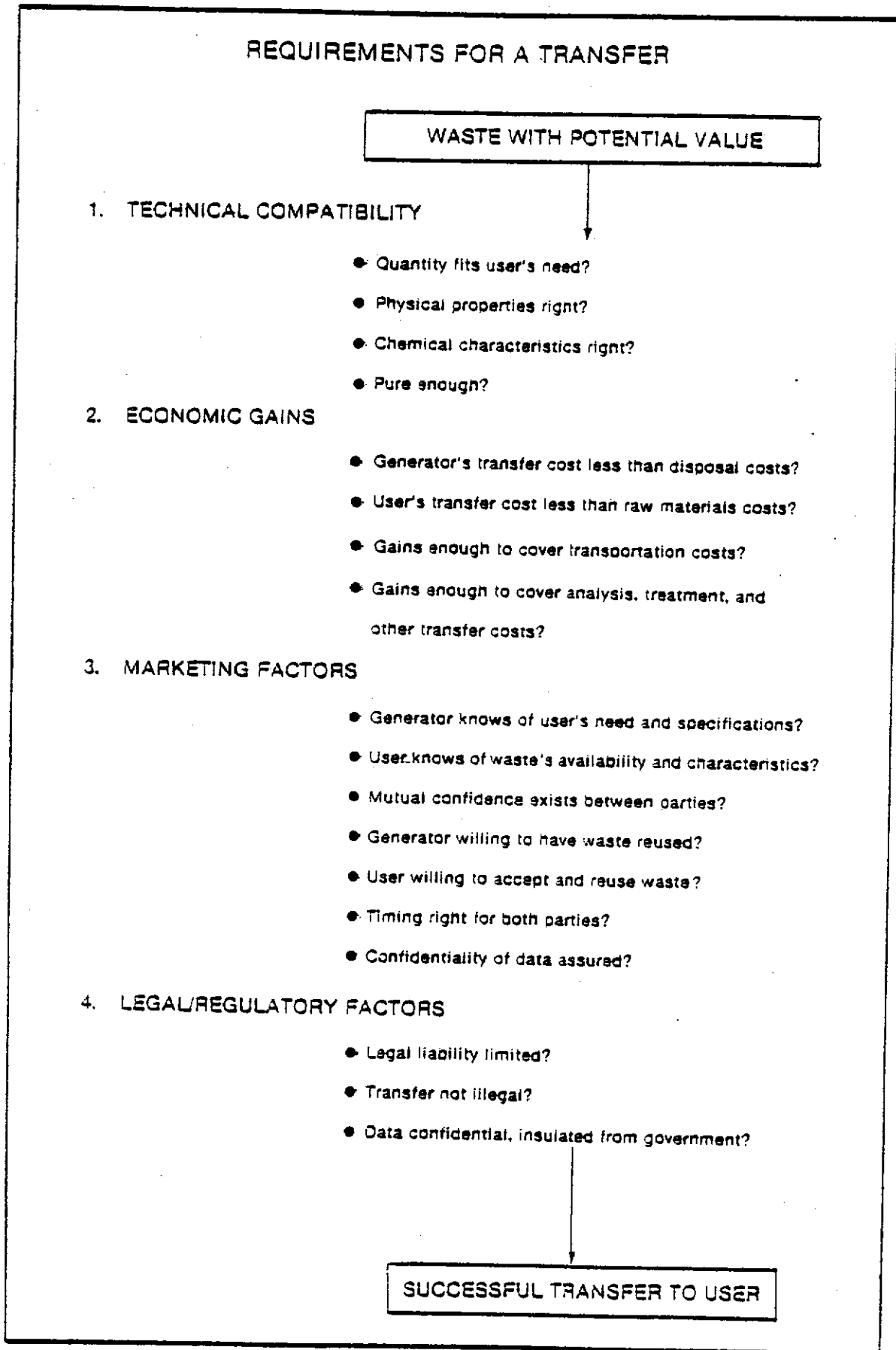
This second category consists of those wastes which have some value but require significant treatment before reuse is possible. One form of treatment might occur in industries such as electroplating where large quantities of heavy metal contaminated solutions and sludges require dewatering or other concentration methods before the metals may be economically reclaimed. Purification, such as might be performed by solvent reclaimers, is a second treatment process which renders a potential waste into a reusable raw material. Thermal treatment and reformation, often involving several steps, represents a third form of treatment required before reuse, and is a well established practice among the firms engaged in rubber manufacturing. Plastics, while they can be recycled for future use by compounding and reworking to make secondary grade materials (Category I), may also be used as an oil and hydrocarbon source for fuel through the processes of pyrolysis or destructive distillation.

In addition to purity or pretreatment requirements for materials involved in waste exchange transfers, a critical parameter influencing desirability of an item is the volume and regularity of the supply.² Most potential clients will demand relatively large amounts of regularly produced scrap wastes. However, there is some potential for transfer of smaller quantities of occasional wastes, such as spilled or ruined paint or chemical batches. Although a significant number of wastes of this type can be anticipated, their total impact on operation of an exchange is not likely to be large.

The subject of compatibility of wastes and its effect on feasibility of an exchange are discussed more fully in Part II. It is clear that as market factors increase the costs of raw materials, those materials with currently marginal value will become more likely to be transferable. In addition, as technologies for recovery processes advance, a larger percentage of materials now classified as "scrap" will acquire a marketable value. Finally, the legislation and regulations

discussed previously concerning waste disposal will act as additional economic incentives for materials reuse. Figure IV-1 summarizes the factors influencing the transfer of waste materials through a waste exchange.

Figure IV-1



REFERENCES FOR CHAPTER IV

- (1) Arthur D. Little, Inc., Waste Clearinghouses and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report, EPA Hazardous Waste Management Division, Contract 68-01-3241, 1976.
- (2) Water Technology Corporation, Waste Exchanges: Background Information. Prepublication Copy, EPA Office of Water and Waste Management, Contract 68-01-5797. 1980.

V. GENERATORS AND POTENTIAL USERS OF WASTES IN FLORIDA

A. Categories of Wastes Covered

Existing waste exchanges typically handle a wide range of both hazardous and non-hazardous materials. Within these two general areas, materials can be classified into more specific categories. For example, eight categories of hazardous wastes are outlined in the Florida Hazardous Waste Survey (1977).¹

These categories are:

- heavy metal solutions and sludges,
- organic solvents and oils,
- caustic and acid solutions,
- inorganic chemical solutions and sludges,
- organic chemical solutions and sludges,
- pesticide and fungicide wastes,
- paint and ink wastes, and
- explosive wastes.

These waste categories were developed based on the physical and chemical characteristics of waste materials. These characteristics determine the treatment and disposal procedures that must be used in handling different wastes.² Since waste materials transferred through a waste exchange often must be treated or reprocessed before they can be used, classification systems similar to the one above have been developed.

Increasing concern for environmentally acceptable disposal methods has emphasized the importance of waste exchanges as vehicles for dealing with hazardous wastes. However, while listings of available hazardous wastes have been quite numerous at most exchanges that accept them, it is not clear that percentages of transfer for these wastes exceed that for non-hazardous materials.

In addition to these hazardous wastes, most waste exchanges handle various materials that are not considered hazardous. Several categories of these non-hazardous wastes are described in a report prepared for the Florida Department of Environmental Regulation, The Marketing of Selected Secondary Raw Materials in Florida (1977).³ This report deals primarily with materials that already have well-established recycling channels. These materials include scrap ferrous metals, non-ferrous scrap (mainly aluminum), and newsprint. This report also mentions other categories of non-hazardous wastes for which established markets are minor or lacking. These include glass, rubber tires, and waste paper other than newsprint. Waste exchanges generally do not receive listings for materials with established recycling procedures, but instead are organized to help find markets for previously unusable waste. Examples of these types of non-hazardous substances are wooden pallets, plastic packaging materials and containers, textiles, leather and surplus equipment. This category of potentially recoverable and transferable non-hazardous materials accounts for 5-15% of currently discarded municipal waste.

The universe of wastes handled by individual waste exchanges varies considerably from very limited to essentially non-selective. Some exchanges, such as the Chemical Recycle Information program in Houston, Texas, accept listings of chemical wastes only. In contrast, operations like the Ohio Resource Exchange and the Iowa Industrial Waste Information Exchange list most categories of wastes but place an emphasis on transferring hazardous materials. Several exchanges do not accept municipal wastes such as glass and paper.

B. Types of Wastes Generated

Categorization of wastes is found in nearly all waste exchanges listings. Many exchanges have created their own classification systems by expanding the categories discussed above. For instance, the Pennsylvania Waste Information Clearinghouse (PWIX) has 22 classifications, the Washington Information Center for

Waste Exchange (ICWE) has 17, and the New Jersey Waste Exchange has 16. These expanded classification systems are the result of subdividing general categories into more specific classes of materials. Organic chemicals, for instance, are often divided into solvents, oils, fuel value hydrocarbons, chlorinated hydrocarbons, and spent catalysts. Examples of subcategories within inorganic chemicals might be sulfides, salts, and minerals.

Placing wastes in specific classifications such as these allows the waste exchange to publish coded information in a way that maintains lister confidentiality while providing the potential user with a means for quickly scanning the listings for potentially usable material. Some exchanges also provide a place for the listers to give more complete information than is given by the classification system.

This problem was addressed in the Florida Hazardous Waste Survey. Materials such as heavy metal contaminated acidic solutions were classified by listing the material based on the most persistent component. In this case, the acid may be neutralized fairly easily but the metal would remain. Therefore, the material would be classified with heavy metals. Potential users of this type of waste may be concerned with either component and would require all possible information in an exchange listing.

Some classes of waste materials have historically had more transfer success than other classes at the existing exchanges.⁴ Quantitative data of this kind are scarce because of the passive nature of most waste exchanges and the desire of listing companies to protect information. The most complete data on transfer successes were compiled by the United Kingdom Materials Exchange for 1974 to 1979. This survey revealed that acids and alkalis were the most successfully transferred materials when evaluated on a weight basis and on a replacement value basis. Others classes of materials successfully transferred, in descending order of replacement value were:

- organic chemicals and solvents
- rubber and plastics
- inorganic chemicals
- minerals
- catalysts
- oils and waxes
- paper and board
- textiles and leather
- metals

Unquantified data from the Canadian Waste Exchange indicate a similar hierarchy of transfer success.

C. Potential Industrial Generators and Users

The state of Florida contains a broad range of industries. These industries produce all eight categories of hazardous wastes (described in Part A of this chapter) as well as a wide variety of non-hazardous wastes. Part II of this report gives a detailed description of the industrial character of Florida, particularly with respect to hazardous waste.

The following discussion briefly focuses on those industries producing wastes that could be listed with a Florida waste exchange and the industries that may be able to use these wastes. Categories are those from the 1977 Florida Hazardous Waste Survey. The examples given illustrate Florida industries producing wastes that have been shown to have transfer potential. This potential was quantified by the United Kingdom Waste Materials Exchange and summarized in Part B of this chapter.

Several different industries produce caustic or acid solutions. For example, acetylene manufacturers produce a caustic lime slurry. Acid solutions are produced by the engraving industry, inorganic chemical manufacturers and rubber product fabricators. As discussed previously, these materials show high transfer potential in existing waste exchanges.

Organic chemical solutions and solvents form a large part of the waste stream of plastic and synthetic rubber producers, industrial organic chemical

manufacturers and pesticide formulators. Waste oils are produced by transformer manufacturers, the steel industry and steel drum reconditioners. Firms are usually interested in this category of waste for two reasons. Solvent reclaimers/reprocessor may be interested in solvents for purification and resale, for which a market currently exists. Other firms may be interested in these materials as input in production processes.

Metals are found as discards or wastes in many industries. These include fabricated rubber producers, smelters and refiners, metal extruders or shapers, electroplating companies, and electrical component manufacturers (capacitors, coils, etc.) and battery manufacturers. Most of the waste metal produced by these industries is found as contaminants in rinse water; however, the primary and secondary battery manufacturing industry in Florida represents a significant source of both supply and demand for lead, zinc, and cadmium as well as acids.

Hazardous wastes form only a fraction of all industrial wastes produced in Florida. This leaves a large amount of non-hazardous wastes that may be of value as secondary raw materials. A substantial portion of these non-hazardous wastes are already being recycled through existing marketing channels. These materials include ferrous metals, aluminum and newsprint. The remaining industrial wastes are not being recycled to a significant degree and therefore may be transferred through a waste exchange. These materials include wood products (excluding paper), glass, textiles, leather, rubber scrap, and surplus equipment. Significant potential use of a waste exchange from the demand side can reasonably be expected from the following industries as discussed in Part II, Chapter 4.

SIC 22	textile mill products
SIC 24	lumber and wood products, except furniture
SIC 26	paper and allied products
SIC 27	printing, publishing and allied products
SIC 30	rubber and miscellaneous plastic products
SIC 31	leather and leather products
SIC 32	stone, clay, glass and concrete products
SIC 33	primary metal industries

SIC 34	fabricated metal products
SIC 35	machinery, except electrical
SIC 36	electrical and electronic machinery

D. A Special Case: Waste Oil

Discussion thus far has concentrated on two categories of waste materials of potential interest to a waste exchange:

- those materials that have existing established markets and that would be handled by the exchange on a referral basis only (e.g., aluminum, newsprint, glass).
- those materials that do not have existing established markets and the transfer of which would be facilitated by a waste exchange.

A third situation concerns the special case of used lubricating oils. While established markets exist in some areas of the U.S. for these oils, collection and transfer rates can often significantly benefit from the coordinating function and centralization of a waste information exchange. Industrial oils consistently show a greater than average transfer rate for those materials handled by waste exchanges. The Canadian Waste Exchange has reported transfer levels as high as 25 percent. The term "used oil" is preferred to the term "waste oil" since it indicates possibilities for further use rather than readiness for disposal.

Over 1.25 billion gallons of used industrial and automotive lubricating oils are generated annually in the U.S. compared with a total of over 2.3 billion gallons of oil sold. Florida generates approximately 2 percent of this total (25 million gallons) and about 75 percent of this 25 million gallons is from "do-it-yourselfers" changing their own motor oil or from service stations.⁶ Although a few oil collection and rerefining operations currently operate in Florida, they are not adequate to deal with the volume of used oils generated.

Recent legislative changes make the picture for used oil recycling substantially brighter than it was prior to 1979. In 1979, with the passage of the National

Energy Act, the 6-cent-per-gallon federal excise tax was lifted for blends of lubricating oil containing rerefined oil. This excise tax dates to the Revenue Act of 1932, which levied a 4-cent-per-gallon tax on all grades of lubricating oils to be paid by the manufacturer or producer. This tax was increased by 1/2 cent in 1940 and an additional 1 1/2 cents in 1942, thus raising the total tax to 6 cents per gallon. In practice, this tax has been applied only to virgin lube oil products; rerefined oil has never been taxed. As a result, rerefined products made from 100 percent used oil enjoyed a 6-cent-per-gallon competitive advantage over virgin oil products until 1965.

The Excise Tax Reduction Act of 1965 removed federal taxes on all lubricating oils, except those used in highway vehicles, and then earmarked this revenue for the Highway Trust Fund. The excise tax of 6 cents, still paid by the manufacturer and included in his price, was applied only to automotive products. Off-highway users then such as farmers, construction contractors and railroads, were eligible for tax refunds. Because the primary markets for rerefined oil in 1965 were concentrated among consumers of industrial oils or off-highway users of automotive oils, the effect of listing the excise tax was to equalize tax treatment of both virgin and rerefined oil in this market, causing rerefiners to lose their price advantage.

In theory, this lost price advantage could have been as high as 6 cents per gallon, provided that the rerefiner's product had been made from 100 percent used oil. However, most rerefiners manufacture blended products made from both used and virgin oil. Thus, in the case of a 50-50 blend, the rerefiner should have suffered in a lost price advantage of only 3 cents per gallon, since the tax on the virgin component prior to the passage of the act would have had to have been passed through "pro rata" as a cost of 3 cents.⁷

In reality, however, the rerefiner who made a blended product was dealt an additional setback, for under IRS ruling 68-108, unlike the virgin lube oil producer and his off-highway customer, the rerefiner and his off-highway customer were declared ineligible for the tax refund on the virgin oil component. Thus, in the case of the 50-50 blend, the combined result of the Excise Tax Reduction Act and the IRS Ruling 68-108 was to cause the rerefiner to absorb, not a 3 cent, but a 6 cent market adjustment relative to his position prior to 1965.

In addition to the provisions of the National Energy Act, the 1980 passage of the Used Oil Recycling Act removed the labeling requirement for used oils. This requirement stems from 1964 when the Federal Trade Commission, observing that the public had a preference for new oil and was therefore entitled to know the origin of its oil purchases, stipulated that rerefined oil products must be clearly labeled "made from previously used oils." Rerefiners contend that this particular wording unfairly implies inferior quality and that as a result of this ruling many middlemen have stopped handling their products and that rerefined oil now competes directly with lower quality virgin oils.

Although the rerefining industry has suffered a number of setbacks (the loss of tax advantages, the barring of federal markets, the labeling requirement, the quality controversy, the environmental questions over acid sludge disposal), there is currently more demand for rerefined oil than the industry can supply. Its chief problem today is in obtaining sufficient feedstocks of used oil. The rerefining industry is in direct competition with those who burn used oil as fuel and who are willing to pay as much as 25 cents per gallon for oil delivered in large quantities.⁷ Used oil contains approximately the same heating value per pound as virgin oil and about 30 percent more than coal. Used oil as a fuel source requires no or minimal new technology, has broad applicability in almost all regions of the country and

offers an efficient and inexpensive alternative to dumping, land spreading, road oiling and incineration.

Unfortunately, because used crankcase oil contains high concentrations of metallic contaminants, its combustion without the removal of these contaminants can cause adverse environmental effects. From the public health point of view, lead is the most significant contaminant. Used crankcase oil can be safely burned by either removing the contaminants prior to burning or by employing particulate control systems to reduce preventable lead discharge after burning. The former is commonly practiced through solvent extraction methods known as "reprocessors." The latter can be accomplished by fabric filtration (bag houses), electrostatic precipitation and high-energy venturi scrubbers. Recent studies indicate that these systems can remove over 95 percent by weight of the submicron sized particles that constitute approximately 80 percent of lead emissions.⁷

All of the previous considerations view used oil from the recoverability and reuse perspective. However, certain types of lubricating oils are listed as hazardous wastes pursuant to Section (8)(2) of the Used Oil Recycling Act of 1980.⁹ This provides an additional incentive for environmentally sound disposal of used oils, with transfer supplanting disposal in this case.

An information clearinghouse could provide as one of its services a management function for the collection and recovery of used oils. This would be particularly true in the private automobile owner market where a large volume of oil currently goes uncollected. Promotion and public education campaigns, coordinated with firms that currently collect and refine oil in Florida, might serve as one of a variety of continuing, self-supporting services offered by a waste exchange. Organizations such as the American Petroleum Institute¹⁰ and the Association of Petroleum Rerefiners are available for assistance in establishing such programs.

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VI. RESULTS OF WORKSHOP ON A FLORIDA WASTE EXCHANGE

A. Goal of the Workshop

As one of the critical steps in the investigation of the feasibility of establishing a waste exchange for Florida, a workshop was held in Tallahassee on December 2-3, 1980. Representatives were present from Florida industry, state and local chambers of commerce, the Department of Environmental Regulation, the U.S. EPA, Florida State University, the Florida Legislature, and the public. The agenda and participants list for the conference are included as Appendix B.

The goals of the workshop were:

- to provide background information on the waste exchange concept;
- to discuss possible formats, implementation strategies, and financial requirements for operation; and
- to obtain the views and recommendations of industry and other potential participants in a waste exchange for Florida.

Speakers for the workshop included: Arthur Baebler, Director of the Midwest Waste Exchange; Edward Isenberg, Project Director of a 1980 EPA study on American and foreign waste exchanges; Rolf Hill, U.S. EPA Waste Exchange Contract Officer; Roy Herndon, FSU, Project Director of the 1981 DER Waste Exchange Study; Douglas Behrman, FSU, Co-Principal Investigator on the 1981 DER Study; Frank Ryll, Staff Vice President of the Florida Chamber of Commerce; and Raoul Clarke, DER Contract Officer for the 1981 DER Study.

Through a series of brief presentations, the workshop participants were introduced to the salient points of the waste exchange concept and heard details of the operations of existing exchanges in other states. They were also provided with information on reasons for previous successes and shortcomings of other waste exchanges both in the U.S. and abroad. The potential market for hazardous waste as a secondary raw material was discussed in the context of an ongoing market survey being conducted by Florida State University (see Part Two of this report).

In addition, regulatory philosophies pertaining to a waste exchange for Florida were presented both from DER and EPA representatives. Finally, some examples of unusual and innovative uses of a waste exchange were provided in an effort to emphasize the need for active operation by the staff of a waste exchange.

In addition to the prepared presentations, workshop sessions were held each day to provide the participants with an opportunity to present their views on the ways in which a waste exchange might be run in Florida and how it might best fit into the current industrial picture. Appendix B details the responses to various questions posed to the workshop participants. These discussions centered on the following issues:

- listing procedures, both of available and wanted materials;
- sponsorship and funding;
- operating strategies (i.e., advertising, liability, publication format).

B. Results

The following is a synopsis of the predominant opinions of the participants in the three categories described above.

Listing Procedures

1. Should the waste exchange (WE) accept listings of all wastes, or only chemical wastes, or only hazardous chemical wastes?

Since hazardous wastes are the major environmental problem concerning the exchange, perhaps the waste exchange should consider them first. However, because many existing exchanges do not distinguish between hazardous and non-hazardous wastes, the audience consensus was not to limit listings but accept all types.

2. Should the proposed Florida WE exchange ads with WE's of other states?

The consensus of the participants was unanimous in suggesting that the proposed exchange work with and exchange information with other exchanges to the maximum extent possible. Problems of unmanageable volumes of listings will be resolved only when and if they arise.

3. Should the WE accept ads from out of state? Listings only? Inquiries only?

While an organized effort to work with other exchanges was considered appropriate, it was generally agreed that listings should not be solicited from out-of-state firms on an individual basis. The point was made that the exchange ought not be too ambitious initially, but perhaps as a compromise "Materials Wanted" listings should be accepted but not "Materials Available."

4. Should the confidentiality of the ads be preserved? By what mechanism?

Here, the participants felt that confidentiality was essential if the listers desired it. Adoption of a standard coding mechanism similar to that used in other states should allow both confidential or non-confidential listings at the request of the listers.

5. Should an ad be published once or more than once? What time limit might be set on listings?

Many possibilities were suggested here concerning time limitations on listings. Generally it was agreed that listings should appear in more than a single issue of the publication. Equitable solutions included: contacting the firms to determine whether they wished to continue the listings after six months; automatically terminating listing after nine months (or three issues) but making certain that this action was well understood by listers in order to avoid alienation. In any event listers should be notified before their listings are terminated. (See Appendix B for detailed responses).

Sponsorship and Funding

1. Who should sponsor and who would operate the WE? An existing trade association, a trade promotion group, or an extension of a public agency?

The clear feeling emerging from the session was that an industry-oriented private sector organization like the chamber of commerce should operate the exchange if it is to be effective. DER representative indicated that while DER was willing to provide advice on technical matters to the exchange, it did not wish to interface with operations or seek additional regulatory control of listers.

2. How should the operation be financed? a) By subscription? b) By advertising fees? c) By a sponsoring group as part of its member services? d) Other?

The financing method would depend largely on the type of organization which sponsored the exchange. Possibilities included:

- funding allocated from the operating agency for operational costs
- subscription to the regular publications
- valuable listing fees based on degree of hazard or another system
- advertising fees for transport, disposal, consulting or other services as listed in the regular publication
- donations from successful exchanges

- combination of the above

3. Should the subscription to the fliers be free?

In order to increase distribution, it was felt that at least initially the publication flier should be free. However, costs associated with the operation of the exchange will determine the final decision by the agency operating the exchange.

4. Should the ads be free?

There was a fairly even division between the members of the discussion groups with one side preferring a graduated rate schedule to favor participation by smaller firms. The alternative is a fixed rate schedule to avoid an impression of discriminating against larger firms. In large measure, this will be ultimately be determined by the organization operating the exchange.

Operating Strategies

1. What should be the space and manpower requirements?

Although this will ultimately be determined by the listing load of the exchange, it was hoped by the participants that required clerical and administrative help could be absorbed partially by the sponsoring organization by delegating a percentage of full-time staff to the operation. Computer software for storage and retrieval could greatly increase efficiency and decrease administrative costs. It was suggested that perhaps Florida could pioneer such an effort.

2. What type of publication should be developed? A flier containing just the listings? Or one with pertinent commentary on statistics and legal matters?

Three key characteristics were emphasized during the discussions. The publication should be: free, eye-catching, and identifiable. Opinions were evenly split on whether the publication should stick to basics or whether it should offer supplementary sections on services offered and information on basic hazardous waste issues.

3. How often should the publication be issued: monthly, bimonthly, or quarterly?

The consensus was that quarterly would be most advantageous. Monthly was felt to be too frequent. Perhaps a monthly update on a single sheet would refresh the memories of subscribers, as it was pointed out that most exchange activity occurs immediately following mailouts. Strong publicity at the initiation of the exchange and a compilation of mailing lists from DER, Chambers of Commerce, and other agencies were two areas of suggested emphasis. DER could help somewhat by promoting the exchange through their regular newsletter, the Waste Watcher.

4. Should the WE staff actively solicit new markets for listed wastes?

The consensus was overwhelmingly yes, to the maximum extent possible.

5. How should requests for technical assistance on chemical processing or proper disposal be handled?

Legal advice was that only referrals should be made, and advice should not be given because of potential liability problems. One comment was that waste management decisions should be made in consultation with a licensed P.E.

6. How shall mailed-in samples be handled?

If the exchange is to be strictly an information clearinghouse, no mail-in samples should be accepted, according to the discussion group. The firms listed in the publication as providing technical advice could assist in these cases. DOT regulations governing mailing and transport apply here and EPA will be issuing an interpretative memorandum soon on this subject.

7. Should the WE refer certain inquiries to other established trade channels, such as those involving used motor oils or metals?

The general feeling was that this would naturally occur with only occasional prompting by the exchange staff.

8. Should a mechanism be developed to follow-up and record successful transfers? What possible forms might this take?

All concerned felt that this was desirable but difficult to accomplish within the framework of a clearinghouse type system. Maintaining contact with negotiating firms until the transfer takes place may prove difficult, but quantifiable data are essential for evaluation of the success of an exchange and maintaining contact with firms provides the only vehicle for accurate data collection.

9. Does the WE run a liability risk? If so, what legal protection is recommended?

The discussion concluded that this could not be determined except in individual cases and through legal counsel. If a carefully worded disclaimer is included in each publication, and if the distinction between advice and referrals is clear, perhaps there are no real problems.

10. What mechanism is recommended to change or dissolve the WE, if the need arises?

The audience declared the question premature and suggested that if the need arises, the answer will already be apparent.

Post-workshop comments indicated that the participants felt the workshop was a strong success in terms of collecting information and opinions that would be of assistance in setting up a waste exchange in Florida. It was also useful from the point of view of allaying fears that participation in an exchange effort would lead to more regulatory vulnerability. Participants showed an overwhelming preference for sponsorship by a large private sector organizations (i.e., chamber of commerce) in order to maximize contacts and exchange potential. This consensus suggests that efforts sponsored by other organizations may not meet with such full cooperation from industry.

PART TWO:
THE FEASIBILITY OF HAZARDOUS
WASTE TRANSFER IN FLORIDA

VII. INTRODUCTION

A. Authorization and Scope

This part of the study focuses on the marketing potential for industrial hazardous wastes within the state of Florida. Specifically, the study examines the amounts and types of hazardous wastes produced and the potential for reusing these wastes instead of disposing of them by conventional procedures which may have a negative impact on the environment. The study was performed as an assessment of the feasibility of a waste exchange program for Florida-based industry. The purpose of this study supports the intent of the Florida Resource Recovery and Management Act which is to encourage resource recovery systems.

B. Summary of Conclusions and Findings

The following conclusions were found:

- The establishment of an industrial waste information exchange is believed desirable in Florida.
- The proposed industrial waste exchange appears to be a cost effective alternative to disposal.
- The chamber of commerce type organization is considered the most logical organization to sponsor and operate the proposed waste exchange. This type of organization appears to have the confidence of industry and would probably be able to include a waste exchange service within its existing structure.
- Funding for the proposed waste exchange is expected to be somewhat difficult as it has been for most waste exchanges. Charging high listing fees to cover costs would probably result in an inadequate number of listings. Charging subscription fees for the listing bulletins would probably have an adverse effect on their distribution and coverage. Some form of subsidization is believed necessary to sustain an industrial waste information exchange.
- From a questionnaire sent to 474 firms in Florida, 89 percent of those responding indicated that the idea of a waste exchange in Florida was a good one.
- Annual operating costs of a hazardous waste information exchange could be as low as \$10,000 and could be lower depending on the possibility of integrating the exchange operating functions with those of a currently existing chamber of commerce or industrial trade association.

- The current hazardous waste reprocessing industry in Florida is extremely small and concentrated almost entirely in waste oils.
- Acids, alkalis, solvents, and waste oils appear to be the waste categories demonstrating the most transfer potential in Florida.

C. Purpose of the Study

The U.S. Environmental Protection Agency (EPA) estimated in 1976 that 344 million metric tons (wet basis) of industrial residues are generated annually in the United States.¹ Due to a decrease in ocean dumping and a tightening of air pollution controls, these wastes have been increasingly disposed of in landfills. In 1976, it was estimated that 25 million metric tons of hazardous waste were disposed of annually, with this figure expected to double within the next decade.²

With these figures in mind, as well as the growing concern for human health and the environment, the EPA currently proposes the following priority listing of steps for handling industrial waste streams:³

- (1) Minimize the amount of waste generated by modifying the industrial process involved.
- (2) Concentrate the waste (through evaporation, precipitation, etc.) at the source to reduce handling and transportation costs.
- (3) If possible, transfer the waste "as is" to another industry which can use it as a feedstock.
- (4) When a transfer "as is" is not possible, reprocess the waste for material recovery.
- (5) When material recovery is not possible,
 - (a) Incinerate the waste for energy recovery and for destruction of hazardous materials.
 - (b) If the waste cannot be incinerated, detoxify and neutralize it through chemical treatment.
- (6) Use carefully controlled land disposal only for what remains.

This study concentrates on the feasibility of Step 3 within the boundaries of Florida. Additionally, to some extent, the current hazardous waste reprocessing industry in Florida is discussed; this pertains to Step 4 of the above listed procedures.

The task of managing waste materials, particularly those exhibiting characteristics that are hazardous to the population and the environment, has become considerably more costly and difficult in recent years. Not only have the quantities of hazardous waste streams increased, but the waste stream composition has also become more complex. This situation has arisen in an atmosphere of correspondingly increased environmental and health concerns. New standards and regulations have emerged over the past decade with the most recent of these, the Florida Hazardous Waste Management Act of 1980, being perhaps the most stringent for Florida waste generators. This has resulted in increased costs and management problems for manufacturers producing hazardous waste as a by-product of their normal manufacturing processes. Even given these stricter controls, public concern and opposition to hazardous waste management facilities (landfills, incinerators, etc.), especially when in close proximity to residential areas, has further increased the cost and administrative difficulties of disposing of hazardous wastes. In sum, the task of waste disposal is no longer a simple and inexpensive matter, rather it is a complex one and carries ramifications for all of society. The importance of waste disposal issue is magnified in the case of hazardous or potentially hazardous waste that require special waste management procedures.

The establishment of an industrial waste exchange offers a desirable solution to a portion of the industrial waste management problem. Finding a user for a waste results in resource recovery, eliminates concern over the environmental effects of disposing of the waste, and achieves cost savings through reduced treatment/disposal costs and raw material prices for demanders. The feasibility of establishing a waste exchange is highly dependent upon cost factors and the involvement of those industries that would potentially benefit from an exchange.

D. Objectives and Focus of the Study

This study has two major objectives: (1) to assess the potential supply and demand of hazardous wastes in Florida; and (2) to provide guidelines for the organization and operation of a waste exchange in Florida. In order to meet these objectives, the following tasks were completed in accordance with the EPA grant:

- Development of a profile of the hazardous waste processing industry in Florida, including: industry characteristics, materials processed, markets served, and waste categories involved.
- Identification and documentation of other special cases of commercial hazardous waste recycling activity in Florida (manufactured-sponsored programs, etc.).
- Identification of existing and potential secondary raw materials users in Florida.
- Assessment of the ability of the secondary hazardous waste materials processing industry and existing Florida markets to absorb additional quantities of secondary raw materials.
- Presentation (for discussion and distribution) of a general outline of marketing and recycling concepts relevant to the understanding of the marketing of secondary raw materials.
- Identification and analysis of the principal problems and barriers to successful recycling in Florida in the future, and presentation of recommendations and suggestions regarding legislative, administrative, and economic measures to overcome these problems and barriers and improve the market for hazardous waste as a secondary raw material.

The completion of these tasks involved:

- Examination of the industries and their location in Florida, including a determination of the prevalent industry types and selection of those included in the study.
- Examination of wastes generated by these industries.
- Examination of costs for disposal of potentially exchangeable wastes.
- Determination of potential users of exchangeable hazardous wastes.
- Estimation of costs of operation of an industrial waste exchange.
- Determination of the feasibility of a waste exchange in Florida.

E. Overview of Study Methodology

The methodology used in this study is outlined in general here. In each chapter that follows, the methodology used in gathering data presented in that chapter is provided to further clarify not only the data source but also data reliability and validity.

Five major tasks were involved in compiling data that form the basis of this study. These are:

- (1) A search of published sources concerning currently operating waste exchanges.

Purpose: To provide background information on the question of waste exchange, the types of uses of a waste exchange, the amount of use of a waste exchange, current sponsors of waste exchanges, and other relevant data that are included throughout the text of this report.

- (2) A participant survey at a hazardous waste workshop conducted by the Institute of Science and Public Affairs of Florida State University.

Purpose: To determine the current status of waste exchange in Florida among the workshop participants, and determine participant reaction to a waste exchange in Florida.

- (3) An updating, in part, of the 1977 Florida Hazardous Waste Survey.⁴

Purpose: The most frequently used method of estimating the size of hazardous waste streams is through the use of industry employment data and known waste quantities within that industry. Thus, in an earlier study (the Hazardous Waste Survey of Florida), this information were provided for those industry types that produced a significant portion of the hazardous waste stream in Florida. Employment data was obtained for the first quarter 1980 to update the figures in the Hazardous Waste Survey.

- (4) A mail survey of hazardous waste producing and potential waste user industries in Florida.

Purpose: To determine the Florida industry response to the waste exchange concept, the potential use of a waste exchange, sponsorship preferences, types of wastes that might be demanded or supplied, and specific problems industry recognized in establishing and operating a waste exchange.

- (5) A mail survey of hazardous waste reprocessors in Florida.

Purpose: To provide a profile of the nature and extent of the reprocessing industry in Florida.

These five procedures provided all the data used in completing the study. Some proved to be most fruitful in assessing the potential supply and demand of hazardous wastes, while others were useful in terms of providing subjective data concerning industry preferences and reactions to the waste exchange concept. Further details of the methodology are provided where necessary within each chapter; details of the results of each of these procedures are presented in the text of this report.

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VIII. A MODEL OF SUPPLY AND DEMAND

A. Technical Compatibilities: Potential Supply and Demand

In order for waste transfer to occur, there must be a potential demand for the hazardous waste generated in the state. Potential demand refers to that portion of the waste stream that under the right conditions (economic, marketing, technical, etc.) could be of use to a secondary market. Demanding firms would use this waste by either recycling it or incorporating it into their production process as an input. Potential demand, then, is for "potentially transferable waste" and is equal by definition to what will be referred to as "potential supply."¹

Potential demand (supply) is determined by the technical characteristics of the waste stream (i.e., physical, chemical, etc.) and its compatibility with the needs of the potential demanders. Regardless of the amount of waste generated, if the waste stream characteristics do not match the needs demanded by any firm, potential demand (supply) will be zero. No waste can be successfully transferred if its waste characteristics do not meet the needs of potential users.

The technical characteristics of a given waste stream are not static, but change over time. Production engineers are constantly looking at ways of altering the production process so that waste by-products can be more readily salvaged, either by the firm itself or others. In recent years, stricter waste disposal legislation as well as rising real prices for raw materials has provided an incentive for firms to further research potential uses of their waste stream.

Technological advances have also increased the amount of waste that can be salvaged and purified so that its physical and chemical characteristics meet the input needs of other firms. As technological knowledge advances, a greater percentage of the industrial waste stream will become potentially reusable.

The proportion of the waste stream that is potentially demanded (supplied) varies not only through time but also across industries.² Table VIII-1 gives the percentage of potentially transferable wastes for selected industries generating wastes in Florida.³ This table shows an estimated 5.4% of all hazardous waste produced in the state is potentially exchangeable. Assuming that 128,794.4 metric tons (MT) of hazardous waste were generated in the state in 1980, a potential demand for 1980 would be 6,921.2 MT.⁴ In other words, it is estimated that 6,921.2 MT of all hazardous waste generated has exchange potential. The amount that could actually be exchanged would be influenced by factors other than technical feasibility. The factors that determine to a large degree the actual demand and supply will be addressed below.

B. Determinants of Actual Supply and Demand

The determinants of actual supply (and demand) are those other than technical compatibility. In particular, the factors affecting actual demand (and supply) include: economic, legal and marketing factors. Of these, the most important are the economic factors.

1. Economic Factors and the Model

Assuming, for the purposes of discussion, that legal and marketing problems are eliminated, an economic model that estimates demand and supply can be constructed. Theoretically, an economic model would indicate the amount of waste materials users would be willing to demand (and generators to supply) given a set of cost factors (or prices). If the model could then be estimated using cost data, quantities actually demanded and supplied could then be derived.

The data necessary to estimate such a model, however, are not readily available and the scope of this project precludes the direct estimation of the model. Nevertheless, creating a generalized form of the model is useful because it can be used to show qualitatively the effect that different factors have on actual demand (supply).

TABLE VIII-1

WASTES GENERATED AND POTENTIALLY
TRANSFERABLE, FLORIDA, 1980

SIC Code	Industry Description	1980 Hazardous Waste MT/year	Percent Waste Potentially Transferable	1980 Potentially Transferable Waste
2491	wood preserving	452.3	10	45.2
2753	engraving and plate printing	680.0	10	68.0
2813	industrial gases	10,145.3	none	--
2819	inorganic chemicals	1,219.2	none	--
2821,22	plastics and rubber	6,459.2	10	645.9
2834	pharmaceuticals	7,259.0	10	725.9
2851	paints and allied products	3,998.4	8	319.9
2869	industrial organic chemicals	42.0	10	4.2
2879	pesticides	3,113.3	10	311.3
2891	adhesives, sealants	139.6	10	12.6
2892	explosives	1,128.3		112.8
3482	ammunition			
2893	printing ink	362.3	10	36.2
2952	asphalt and coatings	24,297.4	10	2,429.7
3021	rubber and plastic footwear, hose	0	0	0
3069	fabricated rubber products	1,332.7	10	133.3
3111	leather tanning and finishing	87.5	4	3.5
3292	asbestos products	55.8	10	5.6
3312,32, 33	primary metals	14,312.0	10	1,431.2
3339,41, 56,57	primary metals	132.6	10	13.3
3412	drum reconditioning	1,184.5	9	106.6
3471	electroplating and polishing	1,379.4	10	137.9
3612	transformers	195.0	5	9.8
3613	switchgear	4.4	9	.4
3675,77	electric capacitors, coils, transformers	70.2	10	7.0
3691,92	storage and primary batteries	44,260.2	none	
3732	boat building and repair	587.0	5	29.4
3861	photographic equipment and supplies	230.8	10	23.1
8221	universities	29.3	7	2.1
971	national security	5,149.0	5	257.5
—	captive electroplating shops	487.7	10	48.8
TOTAL		128,794.4	--	6,921.2

Implicitly then, we have the following economic model:

$$(1) \quad S_w = f(C, P_w, f_{1s} TM, f_{2s} A, f_{3s} B, R_s) \quad \text{Supply}$$

and

$$(2) \quad D_w = f(P_r, P_w, R/W, f_{1d} TM, f_{2d} A, f_{3d} B, R_d) \quad \text{Demand}$$

Table VIII-2 lists and defines the above variables.

In the above model, supply is said to be a function of the cost of disposal per unit of waste, the price received for waste material, the fraction of the transportation, administrative and processing costs incurred by the supplier plus a risk factor. From the generator side, the risk factor primarily involves the chance that, even after exchange takes place, the generator might still be liable for damages caused by the transferred waste.

Demand is a function of the price of virgin raw material, the price of the waste material, the share of the transportation, administration, and processing costs borne by the demander and also a risk factor. The risk factor in the demand equation not only includes the potential for legal liability for damages suffered by a third party, but also includes the potential of plant equipment damage caused by impurities left in the waste.

The most important determinant of a generator's willingness to supply waste is the "cost of disposal" variable (C). All generators of hazardous waste are required by federal law to dispose of waste in an environmentally safe manner. In the supply equation, we let C stand for the least cost alternative, in lieu of transfer, that the generators face in complying with the Resource Conservation and Recovery Act of 1976 (RCRA). The willingness of generators to supply waste for exchange, then, is positively related to this cost of disposal. Generally, the higher the cost of disposal, the greater the incentive to the generator to find an alternative means of complying with RCRA, and the greater his willingness to supply waste for exchange. In particular, whenever the cost of disposal per unit of

TABLE VIII-2
DEFINITION AND UNITS OF VARIABLES
IN THE ECONOMIC MODEL

<u>Variables</u>	<u>Definition</u>	<u>Units</u>
S_w	quantity of waste supplied	metric tons
D_w	quantity of waste demanded	metric tons
C	least cost alternative, in lieu of exchange, of complying with RCRA	\$/metric ton
P_r	price per unit of virgin raw material	metric ton
P_w	price per unit of waste	metric ton
R/W	waste material purity ratio	
T_m	transportation cost (miles x cost per unit)	\$/miles/metric ton
A	administrative cost	\$/metric ton
B	treatment and processing cost	\$/metric ton
f_{is}	fraction of the cost borne by suppliers*	
f_{id}	fraction of the cost borne by demanders*	

* $i = 1, 2, 3, \dots n$.

waste is greater than the sum of the fraction of the administrative and processing cost per unit of waste exchange that the generator has to bear minus the price per unit received by the generator for their wastes plus the implicit cost brought about by potential legal liability, the generator will be willing to supply waste for exchange. This is expressed mathematically in the inequality below:

$$(3) \quad C > f_{1s} TM + f_{2s} A + f_{3s} B + R_s - P_w$$

On the demand side, the willingness to use hazardous wastes in the production process as an input rests on the differential $P_r - P_w (R/W)$ found in equation (4). P_r is the price per unit of virgin raw material, and $P_w (R/W)$ is the value of an equivalent unit of waste for use as an input. The ratio R/W is a quality or purity ratio. This ratio is used to translate waste materials into equivalent units of virgin materials. This is necessary because wastes normally will not replace virgin materials on a pound for pound basis. The amount of waste that is equivalent to a pound of virgin raw material is usually more than one pound. R/W then usually has a value of less than one. This ratio scales the waste amount down and equates it to one unit of virgin raw material.

Whenever the differential, $P_r - P_w (R/W)$, is positive, the cost of virgin raw material is greater than the cost of the waste material necessary to substitute for it. Thus, there will be an economic incentive for firms to substitute waste material for virgin material.

The rational manufacturer will demand waste material whenever the value of the above differential is greater than the sum of the fraction of the transportation, administrative and processing costs borne by the demander plus the implicit risk factor cost. In other words, whenever the following inequality is satisfied:

$$(4) \quad P_r - P_w (R/W) > f_{1d} TM + f_{2d} A + f_{3d} B + R_d.$$

The variables TM (transportation cost), A (administrative cost), and B (processing cost) are the explicit costs involved in a transfer or exchange of

wastes. Adding to these R_d and R_f (the implicit risk costs) results in the total cost of exchange. The higher this cost (actually, the higher any of the variables are), the lower the incentive to supply or demand waste and the less likely an exchange will take place. The fraction of this cost that any individual demander or supplier will incur (the f_{ij} 's in our model) depends on their relative bargaining power.

For example, from equation (3) we can see that suppliers will be willing to exchange a given quantity of waste as long as the cost incurred in the exchange minus whatever dollar amount they get for their waste material is less than the cost of disposing an equivalent quantity. Of course, the generators will try to bear as little of the exchange cost as possible and will try to get demanders to buy their waste product at a positive price. If faced with a high enough disposal cost, the generator might willingly bear all of the exchange costs and even pay users to take his wastes. The price per unit of waste of the users in this case would be negative.

On the user side of equation (4), we can see that as the differential $P_r - P_w$ (R/W) grows larger (i.e., due to an increase in the price of virgin raw material) demanders of hazardous waste will be more likely to pay a higher price for the waste material and to bear a larger portion of the exchange costs.

Again, the fraction of the cost of exchange that an individual supplier or demander will bear and the ultimate price of the waste material (be it positive or negative) is determined by the relative bargaining power of the individuals involved, that is, by the interplay between demand and supply.

The transportation cost variable (TM = cost per unit per mile $\times$ number of miles) is the most important of the exchange cost variables. This is due mainly to the fact that transportation costs comprise a high percentage of the total exchange cost, making waste transfer highly sensitive to changes in transportation costs. Transfers, therefore, are more likely to take places between firms that are located

in close proximity to each other. The exchange of waste will be more feasible in areas of high industrial concentration in contrast to sparsely concentrated areas.

2. Implications of the Model for Florida

Lacking actual cost data, there is little that can be said about the amount of waste that will actually be transferred in Florida. Other studies have tried to estimate the percentage of waste generated that is actually being transferred. For example, a survey of the Philadelphia area suggests that the amount actually exchanged was approximately one percent of the total waste produced.¹

There is reason to believe that the percentage of waste generated that would actually be transferred in Florida in any given year will be higher than the national average. This is due to the fact that Florida is not geologically suited to the disposal of wastes.⁵ There are presently no licensed disposal sites in the state and it is unlikely that there will be any in the future. For Florida's waste generators, the least cost alternative for complying with RCRA (C in the model) is out-of-state disposal. The cost of disposing of waste in burial sites has two components: handling and burial costs, and the cost of transporting the wastes to the site. We can assume that the handling and burial cost per metric ton faced by Florida generators is comparable to that faced by generators in other states. The transportation cost per metric ton faced by the Florida generators, however, is above the national average. Figures show that Florida waste generators have to transport their wastes an average of 650 miles for disposal.⁶

Therefore, holding other factors constant, Florida waste generators face a higher than average cost of disposal, C, and thus their incentive to supply waste and the resulting potential for actual transfer should be relatively greater.

3. Some Implications for Future Supply and Demand

Looking at the trends of the variables that comprise our model (equations (1) and (2)), we can analyze whether the incentives to supply and demand hazardous wastes will increase or decrease in the future.

For example, in the last few years the cost of complying with out-of-state disposal has increased approximately 60 percent from an average of \$342.00 per metric ton in 1978 to an average of \$547.00 per metric ton in 1980.⁷ This increase has been due mainly to three factors: (1) stricter waste disposal legislation that has increased the demand for disposal site services; (2) increases in the cost of operating the sites due to inflation; and (3) increases in transportation costs due to higher fuel costs. It is highly unlikely that the trend towards higher disposal costs will be reversed in the future. This is especially true in view of continuing inflation and forecasts of rising oil prices.

As C increases through time, generators are induced to supply a greater percentage of their potential transferable waste. In fact, higher costs of disposal not only increase the proportion of potentially transferable wastes supplied, but also increase the proportion of waste that is potentially transferable. In the long-run, higher costs of disposal will induce generators to change their production process so that a greater percentage of their waste stream is recoverable.

The price of virgin raw materials used as inputs in the Florida manufacturing sector has also been increasing over time. This rising trend will induce substitution of waste for raw material, thus increasing the actual quantity demanded in the state.

The cost trend of the principal variables in the model point toward increased transfer activity in the future. This increased volume of exchange may induce some cost economies that will further increase the incentives for exchange. For example, there is some evidence that, as a higher volume of exchange takes place, the cost of transfer decreases. In particular, the administrative, processing, transportation and possibly even the risk factors will fall. This is due both to scale economies and a learning process resulting from experience in making waste

transfers. This lower cost of exchange can be expected to further increase the number of successful exchanges.

Finally, production in the manufacturing sector, a variable held constant in the model, is projected to grow in Florida (Table VIII-3). The growth of the manufacturing sector has the effect of shifting both the actual demand and supply curves. In other words, for any given set of values taken by the variables in equations (1) and (2), a larger quantity will be demanded and supplied.

4. Other Factors Affecting Exchange

The assumption up to now has been that, once technical compatibility is determined, economic factors dictate the amount of waste that actually will be exchanged. In the real world, however, there are various non-economic factors that interact with the economic parameters of our model. These non-economic factors can be grouped into two main categories: legal and marketing.

Legal Concerns. Some of the legal concerns involved in the transfer of waste have already been reflected in the economic model by the use of risk factors in both the supply and demand equations. The legal structure within which firms function affects actual supply and demand through these risk factors.

The overall legal structure can either increase or decrease the feasibility of waste exchange. For example, statutes that address the subject of the exchange of waste and define the legal responsibility faced by all parties involved would remove a lot of the legal uncertainty inherent in the exchange of waste. Currently, the state of Florida has no statutes that directly address waste exchange activity. There is nothing in the law that favors one transfer organization or sponsorship over another.

This void in the law creates uncertainty among firms regarding the legal implications of exchange. Most importantly, it creates confusion as to who bears ultimate responsibility for waste that is exchanged.

TABLE VIII-3

FLORIDA EMPLOYMENT BY MAJOR INDUSTRY,
ESTIMATED GROWTH RATES THROUGH 1989

<u>Category</u>	Average Annual Growth Rates (%)		
	<u>1970-79</u>	<u>1980-84</u>	<u>1985-89</u>
Total Non-farm Employment	4.68	2.87	4.92
Private Non-farm	4.63	2.97	4.88
Wholesale and Retail Trade	4.77	2.83	5.34
Services	6.02	3.76	5.76
Government	4.88	2.43	5.09
Manufacturing (and mining) ^a	3.13	3.48	3.12
Finance, Insurance and Real Estate	6.80	3.68	5.52
Contract Construction	2.98	.30	4.27
Transportation, Communication and Utilities	3.54	1.63	3.17

^a Average annual forecast for period 1980-90 is an arithmetic average of 3.48 and 3.12.

SOURCE: Adapted from Table 20, "Florida Employment by Industry," Florida Econometric Model, Executive Office of the Governor. Estimates are based on Chase Econometrics Associates, Inc., Standard Trend Forecast of January 1980.

The risk factor in the supply equation of the economic model captures the liability risk faced by the waste generator. In recent years, we have seen strict federal regulations governing the transportation and final disposal of hazardous waste materials. The thrust of these regulations has been toward accountability for the waste product. A hindrance to exchange occurs when generators perceive that they will be held legally liable, even after relinquishing control of the waste to others.

The risk factor is comprised of the cost of punitive government action in the event of accidents that cause environmental or personal damage and the litigation cost if damages to a third party occur. Such accidents include spills while transporting, leaks in containers, and illegal dumping of the hazardous waste.

Whether or not the generators are ultimately held liable, there remains the fear of damaging corporate image by having their waste involved in such an accident. Companies are, therefore, somewhat fearful that the exchange process will force them into a zone of liability exposure beyond their control.

On the demand side of our economic model, the risk factor R_d involves the probability that machine or product damage may occur due to impurities in the waste stream supplied. This factor is categorized as a legal concern because it may arise due to an incomplete contractual agreement between a demander and supplier. In the presence of a contractual agreement, the relative bargaining power of the individual demanders versus that of the suppliers would determine what portion of the risk of damage demanders would bear. In the absence of such an agreement over waste materials, demanders are left to assume the full cost with no legal recourse to sue suppliers. The lack of explicit contractual agreement is a hindrance to all types of new market activity. As more and more exchange activity takes place, contractual agreements will evolve that will resolve this risk

issue. However, this process will be facilitated by legislation that clearly defines the issue of transfer liability.

Another major legal concern among individuals involved in waste transfers is that of confidentiality. Federal and state regulations control the transportation of potentially harmful materials. Thus, the firm must identify the particular waste being transported. This creates a concern among generators that information about manufacturing processes would be made available that might prove of value to competitors.

A final concern is that increased exchange of waste would promote further government intervention and regulation. A survey, conducted as part of this study, indicates that the above concerns are viewed as a hindrance to the exchange of waste. In the survey, the following question was asked of Florida industry representatives: (Appendix C, question #8)

"What do you feel are the major concerns your firm would have in making a decision to participate in a Florida Industrial Waste Exchange?"

Thirty-five out of seventy-one firms that responded to the question cited a concern that could be classified as legal. A breakdown of some of the specific concerns is provided in Table VIII-4.

Five firms cited the possibility of impurities in the waste stream as being a major deterrent to participation. Four firms feared an expansion of governmental regulation. Concern over confidentiality was cited by five firms. Liability for the waste and possible environmental damage was a concern of twelve firms, while nine firms indicated concern over legal matters and government restrictions.

TABLE VIII-4
FIRMS EXPRESSING LEGAL CONCERNS ABOUT
PARTICIPATION IN A FLORIDA
INDUSTRIAL WASTE EXCHANGE

<u>Legal Concerns</u>	<u>Number of Firms</u>
Purity of waste streams	5
Confidentiality	5
Fear of government intervention	4
Legal and governmental restrictions	9
Liability and environmental damage	<u>12</u>
TOTAL	35

Marketing Concerns. Marketing concerns arise because in the real world (in contrast to the theoretical model) the time and quantity of flows of waste from suppliers are infrequently synchronized perfectly with the needs of users. Industrial manufacturing firms, in particular, place major importance on inputs being available when they are needed and may be willing to pay a premium to assure a steady supply of needed quantities. If waste generators are not able to provide a steady and sure supply of needed material, they will lose customers regardless of the cost advantage offered. In the survey, ten firms cited problems with timing or quantity availability as their main concern in participating in a waste exchange.

Another marketing hindrance is the lack of knowledge regarding the location of demanders and suppliers. The greatest contribution of a waste exchange clearinghouse is that of eliminating or reducing some of these marketing problems. The waste exchange, in fact, acts as a marketing agency, providing information through a listing to potential demanders and thus facilitating the transfer process.

C. Summary and Conclusions

Technical compatibility determines the amount of waste that can be potentially exchanged, in other words, potential demand and supply. The actual amounts that are supplied and demanded, however, depend primarily on economic factors, primarily relative costs. These economic factors are further confounded by legal and marketing concerns.

The following is a list of principal conclusions from the theoretical perspective of supply and demand as it relates to hazardous waste transfer in Florida.

- About 5.4 percent of all hazardous waste produced in the state is potentially transferable, thus a potential supply (demand) of 6,921.2 MT in 1980.
- All evidence indicates that there will be an increase in the supply and demand of hazardous wastes in the future.
- An industrial waste exchange will relieve some of the legal and marketing concerns confronting industry and enhance the transfer of waste.

REFERENCES FOR CHAPTER VIII

- (1) A.D. Little, Inc., Waste Clearinghouses and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report, EPA Hazardous Waste Management Division, Contract 68-01-3241, 1976.
- (2) These proportions are those surveyed in A.D. Little, Inc., Waste Clearinghouses and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report, EPA Hazardous Waste Management Division, Contract 68-01-3241, 1976.
- (3) The industries selected are those surveyed in Florida Department of Environmental Regulation, Hazardous Waste Survey for the State of Florida. Final Report, DER Contract S-2, October 1977.
- (4) This figure is an update of the figure cited in Florida Department of Environmental Regulation, Hazardous Waste Survey for the State of Florida. Final Report, DER Contract SW-2, October 1977.
- (5) Florida's system of aquifers is extremely vulnerable to contamination from the land filling of hazardous wastes according to the Florida Hazardous Waste Survey.
- (6) This estimate comes from the Institute of Science and Public Affairs, Florida Resources and Environmental Analysis Center, Assessment of the Economic Impact of Florida's Proposed Hazardous Waste Control Program on Selected Industries. Final Report, DER Contract SW-4, October 1979.
- (7) The estimate for the percent increase in out-of-state disposal was determined via telephone communication to a large disposal facility in Livingston, Alabama.
- (8) For a more detailed presentation, see A.D. Little, Inc., Waste Clearinghouses and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report, EPA Hazardous Waste Management Division, Contract 68-01-3241, 1976.

IX. A PROFILE OF POTENTIAL GENERATORS OF HAZARDOUS WASTE IN FLORIDA

A. Introduction

In order to estimate the estimation of potential supply of transferable hazardous wastes in Florida, it is useful to begin discussing broad topics and systematically move towards specifics as the data permit. Under this approach, this chapter begins with a brief profile of the Florida economy with special attention paid to the manufacturing sector. From here, the manufacturing sector is examined in terms of: (1) the diversity of goods produced and (2) geographic distribution. Further, the manufacturing sector is viewed in terms of the diversity of wastes generated: hazardous and non-hazardous. In turn, the hazardous waste generating component of manufacturing is profiled with respect to total quantity, geographic distribution, and major contributing industries. Finally, potential supply of transferable wastes is estimated from the estimated tonnage of hazardous waste generated in Florida in 1980.

In the concluding section, results of a survey (February 1981) of Florida manufacturers are presented and discussed. The thrust of the survey was to determine their general interest in a Florida waste exchange. Further, these manufacturers were requested to reveal their willingness to list (supply) or request (demand) hazardous waste through the exchange. Also, and more specifically, these manufacturers were requested to by category reveal the waste types that they would supply or demand. The data from the survey provide meaningful summary statistics on the feasibility of a Florida waste exchange.

B. The Florida Economy: An Overview

Florida's Gross State Product (current dollars) for 1978 was an estimated \$69,924.0 million. This level of economic activity supported a non-farm labor force of 3.14 million with a personal income of \$65,084 million. During the 1970s,

the increase in real economic activity in Florida has been approximately 74.6 percent compared to 37.5 percent for the nation. The majority of the Gross State Product is generated in tourism and in finance, insurance, and real estate. These industries contributed \$12,782.3 million (18.3 percent) to the Gross State Product.¹ In 1978, the manufacturing sector contributed \$9,077.1 million (13.0 percent) and was responsible for employing 420,500 individuals or 13.4 percent of the total labor force.²

Florida, like the rest of the nation, has experienced the trend toward a growing service-oriented economy (transportation, professional services, government, finance insurance, real estate) accompanied by a declining goods producing or manufacturing sector. However, even though the relative shares are changing in Florida, the absolute levels of these sectors are growing over time. Output in the manufacturing sector in Florida is forecast to grow at an estimated average annual rate of 3.30 percent over the decade of the eighties. It is this sector of the economy that generates a waste stream that can be classified as either hazardous or non-hazardous.

It was pointed out that the Florida economy is highly service-oriented with only 7.9 percent of wages and salaries originating in the manufacturing sector. However, this does not imply that Florida faces a small problem relative to hazardous waste generation. In 1980 Florida industry produced an estimated volume of toxic and hazardous waste of 128,794.4 metric tons (wet weight). Florida manufacturers will incur significant costs to dispose of their hazardous wastes by legally acceptable methods. There are, however, opportunities to mitigate disposal costs by reusing some portion of the total hazardous (and non-hazardous) waste stream.

Tables IX-1, IX-2, and IX-3 summarize Florida's current economy and forecast its economic future. Special emphasis should be placed on the projected average annual growth rate for employment in the manufacturing sector 8 (Table IX-3). This annual growth rate can be used as an approximation for the growth of hazardous waste generation. Over the next decade it is forecast that Florida will experience an increase of approximately 37.9 percent in various aspects of manufacturing: output, employment and waste generation. The approximate relationship between inputs (i.e., employment) and outputs (i.e., final products including waste quantities) has been used in other research to produce waste multipliers. These multipliers are, in turn, utilized to estimate waste quantities cross sectionally (across industries) and intertemporally. For the purposes of this report, waste multipliers were estimated for each industry group. These multipliers were used to update hazardous waste generated by surveyed Florida manufacturers and reported in a previous research document.³

C. Profile of Florida Manufacturing

Florida's manufacturing sector is grouped into twenty major industry groups. These industry groups are catalogued by two-digit standard industrial classifications (SIC). Table IX-4 lists and ranks these groups by number of establishments and number of employees. At the four-digit level, these twenty industry groups translate into 451 categories. Each four-digit category produces a myriad of products. Further, it is postulated that for each unique product, a unique waste stream is potentially generated. Fortunately, like industry types, waste products can be conveniently categorized. Selected waste categories will be presented later in the report. Clearly, both a diversity of products and waste materials are manufactured in Florida.

TABLE IX-1
GROSS STATE PRODUCT BY BROAD
INDUSTRIAL SECTOR, FLORIDA, 1978
(in millions of current dollars)

<u>Category</u>	<u>1978</u>	<u>Percent</u>
Total Gross State Product	\$69,924.9	100.0
Wholesale and Retail Trade	13,934.0	19.9
Finance, Insurance and Real Estate	12,782.3	18.3
Services	10,912.0	15.6
Government (state and federal) ^a	9,538.1	13.6
Manufacturing	9,077.1	13.0
Transportation, Communication and Public Utilities	7,315.7	10.5
Contract Construction	3,722.8	5.3
Farm	1,793.3	2.6
Other ^b	519.8	.7
Mining	329.8	.5

^aGovernment includes military personnel and estimated supplements.

^bIncludes agricultural services, forestry and fisheries.

SOURCE: Economic Report of the Governor, 1979-80, p. 67.

TABLE IX-2

DISTRIBUTION OF NON-FARM EMPLOYMENT
BY BROAD INDUSTRIAL SECTOR, FLORIDA, 1978
(in thousands of employees)

<u>Category</u>	<u>Employment</u>	<u>Percent</u>
Total Non-farm Employment	3,141.5	100.0
Wholesale and Retail Trade	812.1	25.9
Services	677.4	21.5
Government (state and federal) ^a	604.3	19.2
Manufacturing	420.5	13.4
Finance, Insurance and Real Estate	218.8	7.0
Contract Construction	206.6	6.6
Transportation, Communication and Utilities	192.8	6.1
Mining	9.4	.3

^aGovernment includes military personnel and estimated supplements.

SOURCE: Economic Report of the Governor, 1979-80, p. 67.

TABLE IX-3

FLORIDA EMPLOYMENT BY BROAD INDUSTRIAL SECTOR,
ESTIMATED GROWTH RATES THROUGH 1989

<u>Category</u>	<u>Average Annual Growth Rates (%)</u>		
	<u>1970-79</u>	<u>1980-84</u>	<u>1985-89</u>
Total Non-farm Employment	4.68	2.87	4.92
Private Non-farm	4.63	2.97	4.88
Wholesale and Retail Trade	4.77	2.83	5.34
Services	6.02	3.76	5.76
Government	4.88	2.43	5.09
Manufacturing (and mining) ^a	3.13	3.48	3.12
Finance, Insurance and Real Estate	6.80	3.68	5.52
Contract Construction	2.98	.30	4.27
Transportation, Communication and Utilities	3.54	1.63	3.17

^a Average annual forecast for period 1980-90 is an arithmetic average of 3.48 and 3.12.

SOURCE: Adapted from Table 20, "Florida Employment by Industry," Florida Econometric Model, Executive Office of the Governor. Estimates are based on Chase Econometrics Associates, Inc., Standard Trend Forecast of January, 1980.

TABLE IX-4

FLORIDA MANUFACTURING BY MAJOR INDUSTRY GROUPS,
1980 EMPLOYMENT AND FIRM COUNT

SIC Code	Major Industry Group	1980 Employment	Rank	1980 Number of Firms	Rank
20	Food and kindred products	52,256	2	707	7
21	Tobacco manufacturers	2,418	19	49	20
22	Textile mill products	3,949	17	136	16
23	Apparel and other finished products	35,552	6	1,177	3
24	Lumber and wood products, except furniture	23,956	9	1,403	2
25	Furniture and fixtures	12,055	14	524	11
26	Paper and allied products	16,117	12	158	15
27	Printing, publishing and allied products	40,809	4	2,081	1
28	Chemicals and allied products	26,910	8	480	13
29	Petroleum refining and related industries	1,810	20	52	19
30	Rubber and miscellaneous plastic products	16,792	11	509	12
31	Leather and leather products	3,357	18	81	18
32	Stone, clay, glass and concrete products	20,996	10	715	6
33	Primary metal industries	5,051	16	121	17
34	Fabricated metal products	34,807	7	1,096	5
35	Machinery, except electrical	35,671	5	1,115	4
36	Electrical and electronic machinery	60,049	1	525	10
37	Transportation equipment	47,864	3	670	8
38	Instruments: photo, medical, optical and watches	14,822	13	327	14
39	Miscellaneous manufacturing industries	7,679	15	535	9
TOTAL ^a		462,920	--	12,461	--

^aTotals exclude metal mining (10) and non-metal mining (14).

SOURCE: State of Florida, Department of Labor, Division of Employment Security, Office of Research and Analysis, ES-202 Data, 1975 and 1980.

An examination of Table IX-4 reveals the distribution of manufacturing activity for 1980. Table IX-5 shows the annual growth rates in employment since 1975 for each two-digit industry category.

Florida manufacturing varies geographically location also. Manufacturing occurs in virtually every county within the state (see Table IX-6). However, it is important to examine the distribution and concentration of manufacturing plants. The "proximity consideration" is paramount in location decisions. Manufacturers want to locate close to both inputs (raw materials) and customers in order to minimize total transportation costs. Therefore, economically induced geographic clustering of manufacturing facilities evolves over time. Primary manufacturers will locate near raw material sources and intermediate suppliers of semi-finished components tend to locate near primary manufacturers.

Table IX-7 shows a rank ordering of manufacturing activity across Florida counties. Four major clusters appear to stand out:

- Hillsborough and Pinellas (and parts of Polk and Manatee)
- Dade, Broward and Palm Beach
- Brevard and Orange
- Duval

Of these selected clusters, the first two are and include approximately one-half of all Florida manufacturing activity in rather close proximity. Figure IX-1 shows the location of these selected clusters. The use of the term "cluster" implies groupings of firms, not counties.

TABLE IX-5

FLORIDA MANUFACTURING BY MAJOR INDUSTRY GROUPS
1975, 1980 EMPLOYMENT LEVELS AND PERCENT INCREASE, 1975-80

SIC Code	Major Industry Group	1975 Employment	1980 Employment	Percent Increase 1975-80
20	Food and kindred products	44,084	52,256	18.5
21	Tobacco manufacturers	3,681	2,418	(34.3)
22	Textile mill products	3,514	3,949	12.4
23	Apparel and other finished products	29,309	35,552	21.3
24	Lumber and wood products, except furniture	16,864	23,956	42.1
25	Furniture and fixtures	7,637	12,055	57.8
26	Paper and allied products	15,054	16,117	7.1
27	Printing, publishing and allied products	29,048	40,809	40.5
28	Chemicals and allied products	23,234	26,910	15.8
29	Petroleum refining and related industries	1,182	1,810	53.1
30	Rubber and miscellaneous plastic products	7,719	16,792	117.5
31	Leather and leather products	2,079	3,357	61.5
32	Stone, clay, glass and concrete products	16,891	20,996	24.3
33	Primary metal industries	3,565	5,051	41.7
34	Fabricated metal products	25,536	34,807	36.3
35	Machinery, except electrical	19,814	35,671	80.0
36	Electrical and electronic machinery	35,484	60,049	69.2
37	Transportation equipment	31,024	47,864	54.3
38	Instruments: photo, medical, optical and watches	6,651	14,822	122.9
39	Miscellaneous manufacturing industries	5,686	7,679	35.1
TOTAL ^a		328,056	462,920	41.1

^aTotals exclude metal mining (10) and non-metal mining (14).

SOURCE: State of Florida, Department of Labor, Division of Employment Security, Office of Research and Analysis, ES-202 Data, 1975 and 1980.

TABLE IX-6

FLORIDA MANUFACTURING EMPLOYMENT BY COUNTY, 1980

<u>County</u>	<u>Employment</u>	<u>Percentage of Total Employment</u>
Alachua	4,396	.93
Baker	207	.04
Bay	3,517	.74
Bradford	321	.07
Brevard	22,713	4.80
Broward	41,676	8.82
Calhoun	568	.12
Charlotte	324	.07
Citrus	364	.08
Clay	1,550	.33
Collier	1,071	.23
Columbia	1,311	.28
Dade	102,124	21.60
DeSoto	398	.08
Dixie	381	.08
Duval	28,741	6.08
Escambia	11,180	2.36
Flagler	175	.04
Franklin	.84	.02
Gadsden	1,684	.36
Gilchrist	47	.01
Glades	99	.02
Gulf	1,311	.28
Hamilton	2,477	.52
Hardee	663	.14
Hendry	784	.17
Hernando	1,233	.26
Highlands	741	.16
Hillsborough	37,561	7.95
Holmes	789	.17
Indian River	2,975	.63
Jackson	1,912	.40
Jefferson	389	.08
Lafayette	19	.004
Lake	4,069	.86
Lee	4,033	.85
Leon	2,213	.47
Levy	977	.21
Liberty	275	.06
Madison	888	.19
Manatee	7,509	1.59
Marion	5,851	1.24
Martin	2,194	.46
Monroe	891	.19
Nassau	2,420	.51
Okaloosa	3,836	.81
Okeechobee	176	.04

TABLE IX-6 (continued)

<u>County</u>	<u>Employment</u>	<u>Percentage of Total Employment</u>
Orange	26,095	5.52
Osceola	1,653	.35
Palm Beach	28,771	6.09
Pasco	3,788	.80
Pinellas	35,262	7.46
Polk	29,290	6.20
Putnam	2,942	.62
St. Johns	2,213	.47
St. Lucie	2,012	.43
Santa Rosa	1,677	.35
Sarasota	6,396	1.35
Seminole	8,485	1.79
Sumter	561	.12
Suwannee	605	.13
Taylor	2,101	.44
Union	321	.07
Volusia	8,112	1.72
Wakulla	608	.13
Walton	828	.18
Washington	187	.04
Residual ^a	1,701	.36
TOTAL	472,731	100.00

^aIncludes firms without a county specific main office.

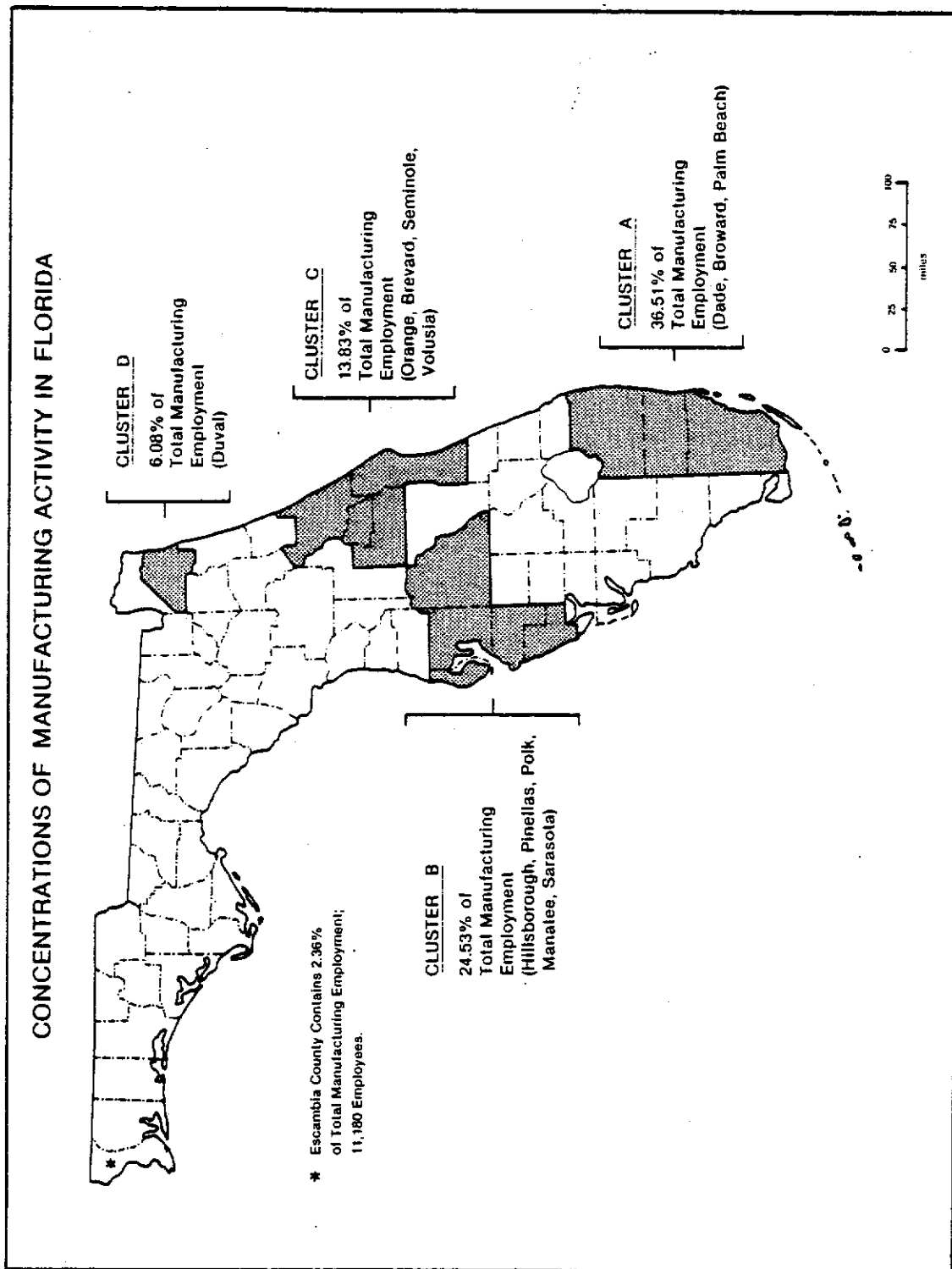
SOURCE: Employment Security Records, Florida Department of Labor, 1980.

TABLE IX-7
RANK ORDER OF FLORIDA MANUFACTURING EMPLOYMENT BY COUNTY

<u>County</u>	<u>Employment</u>	<u>Percentage of Total</u>	<u>Cumulative Percentage of Total</u>
Dade	102,124	21.60	21.60
Broward	41,676	8.82	30.42
Hillsborough	37,561	7.95	38.37
Pinellas	35,262	7.46	45.83
Polk	29,290	6.20	52.03
Palm Beach	28,771	6.09	58.12
Duval	28,741	6.08	64.20
Orange	26,095	5.52	69.72
Brevard	22,713	4.80	74.52
Escambia	11,180	2.36	76.88
Seminole	8,485	1.79	78.67
Volusia	8,112	1.72	80.39
Manatee	7,509	1.59	81.98
Sarasota	6,396	1.35	83.33
Marion	5,851	1.24	84.57
<u>All other counties contain less than 1.0% each of:</u>			
Manufacturing Employment:	72,965	15.43	--
TOTAL	472,731	100.00	100.00

SOURCE: Employment Security Records, Florida Department of Labor, 1980.

Figure IX-1



Much like primary manufacturing location criteria, waste exchange feasibility also depends upon transportation costs to a significant extent. The following excerpt illustrates the importance of transportation costs:

In making the final determination of how large an area a waste exchange should cover, the most important factor is probably the costs of transporting materials from one location to another. This cost will be weighed heavily by those people in industry who are actually deciding if a transfer should be made and if it is practical to even list a waste when a₄ market would presumably be located a considerable distance away.⁴

For hypothetical intrastate exchange, the approximate mileage from Miami to the Tampa-St. Petersburg area is 260 miles. In comparison, for out-of-state disposal, the approximate mileage to the nearest permitted disposal site is 800 miles for Miami and 570 miles for Tampa according to an earlier study.⁵ This same study estimated that out-of-state disposal is the least cost disposal alternative for hazardous wastes. Figure IX-2 shows the approximate mileages between those major industrial clusters while Table IX-8 shows the approximate mileages between selected disposal sites and the clusters.

To summarize, Florida manufacturing is geographically dispersed with a high degree of concentration in four clusters. Not surprisingly, it has been estimated that approximately 52 percent of all hazardous waste is produced in the two southern clusters of manufacturing. Table IX-9 shows the geographic concentration of Florida counties that generate hazardous waste.

In conclusion, Florida manufacturing is diverse in terms of products manufactured, waste products generated and geographic location. Viewed from another dimension, the manufacturing sector is also concentrated, especially with respect to geographic location. The fact that the manufacturing sector is geographically concentrated, especially in terms of those plants that generate (or potentially supply) hazardous wastes, enhances the feasibility of transferring some portion of this waste stream to a secondary market.

Figure IX-2

APPROXIMATE MILEAGES BETWEEN
MAJOR CITIES OF MANUFACTURING
CLUSTERS^a

	CLUSTER A	CLUSTER B	CLUSTER C	CLUSTER D
CLUSTER A	---	260	230	355
CLUSTER B	260	---	90	240
CLUSTER C	230	90	---	145
CLUSTER D	355	240	145	---

<u>Cluster</u>	<u>Selected Major City</u>
CLUSTER A	Miami
CLUSTER B	Tampa-St. Petersburg
CLUSTER C	Orlando
CLUSTER D	Jacksonville

^aSource: American Automobile Association

TABLE IX-8

DISTANCE BETWEEN SELECTED HAZARDOUS WASTE
DISPOSAL SITES IN SOUTHEASTERN UNITED STATES
AND MAJOR CITIES IN FLORIDA

Location of Permitted Disposal Sites	Florida City		
	<u>Jacksonville</u>	<u>Tampa</u>	<u>Miami</u>
Livingston, Alabama	460	570	800
Gordon, Georgia ^a	235	380	580
Dalton, Georgia ^b	375	520	720
Denhan Springs, Louisiana	650	720	950
Pinewood, South Carolina ^c	380	560	725
Nashville, Tennessee	545	700	895

^aCurrently shut down. Site is not available to receive wastes as of 1979 (permit suspended)

^bLimited to incineration (1979).

^cTransportation services are subcontracted (1979).

SOURCE: Adapted from Table V.1 in Assessment of the Economic Impact of Florida's Proposed Hazardous Waste Control Program in Selected Industries. Florida State University, 1979. All entries appear as mileages, which are approximate. Stated operating status of reported sites as existing in 1979.

TABLE IX-9
RANK ORDER AND COUNTY DISTRIBUTION OF
HAZARDOUS WASTE FOR SURVEYED FIRMS

<u>County</u>	<u>1977 Wastes^a (metric tons)</u>	<u>Percentage of Total</u>
Hillsborough	29,844.1	44.7
Dade	10,335.2	15.5
Broward	7,682.8	11.5
Duval	7,046.5	10.5
Pinellas	1,312.5	2.0
All Others ^b	<u>10,578.8</u>	<u>15.8</u>
TOTAL	66,819.9 ^c	100.0

^aIncludes liquid, sludge and solid waste reported by plants surveyed in the respective.

^bEach county accounted for no more than one percent of Florida's surveyed waste.

^cRinse water, contaminated with heavy metals, have been subtracted from the total waste generated. The predominance of rinse water is found in Dade and Brevard counties; it is generated by captive electroplating plants.

SOURCE: Adapted from the Hazardous Waste Survey Report, 1977 and background data sheets.

D. Waste Types Generated by Florida Manufacturers

As stated previously, the Florida manufacturing sector generates a total waste stream that falls into two general categories: hazardous and non-hazardous. Hazardous wastes can be classified in a variety of ways, with any chosen system being somewhat arbitrary. A frequently used and manageable system uses the following categories:

- solvents
- catalysts
- acids
- alkalis
- waste oils
- heavy metals sludges
- others

This system of categories is useful because the first six categories are potentially hazardous, while the seventh category forms a residual for wastes that defy categorization. These seven categories differ from waste categories used in Part One (Chapter V) of this report.⁶ Although these two classification systems are similar, it was not desirable to use the system in Chapter V for the purposes of a market study. An important component of the market study involves contacting companies to ascertain their preferences for demanding or supplying waste materials. The above seven categories are more general than the other categories and therefore it is more convenient for companies to respond to questions involving waste materials. These seven categories are used throughout all of Part Two.

It is possible to discuss the breakdown of total manufacturing wastes into hazardous and non-hazardous categories only indirectly. This inability to directly quantify hazardous and non-hazardous streams is not, however, a problem. The non-hazardous component is not considered here while measurement of the hazardous component is considered. A data base exists that facilitates the estimation of annual quantities of potentially hazardous wastes generated in Florida. In addition, the industry groups that generate most of those wastes are

identified. Therefore, it is possible to discuss the breakdown of Florida manufacturing by examining employment levels for the hazardous waste generating SICs and employment for the non-hazardous component.

In Table IX-10, a simple breakdown of employment levels for the two components of Florida manufacturing is presented. Caution must be used in evaluating statistics of this nature. First, it is not reasonable to assume that waste generation per employee is similar between these two groups. The industries in the hazardous waste component tend to be larger and probably more capital intensive, thus suggesting a greater production of both products and wastes per employee. Further, wastes estimated for the hazardous component industry reflect only quantity, and say nothing about quality or concentration.

The purpose of Table IX-10 is more descriptive than analytical. In terms of the purpose of this chapter, Table IX-10 illustrates the relative share of the manufacturing sector that could potentially supply hazardous wastes for exchange. Again, like the products manufactured and the geographic locations of plants, the waste constituents are diverse.

E. Determination of Hazardous Waste-Producing Industries

In order to determine the potential supply of hazardous waste materials for a waste exchange, it is first necessary to identify the industries that generate hazardous waste. Secondly, it is necessary to determine the quantities of waste generated per industry group. Thirdly, the percent recoverable or "potentially transferable" must be determined by industry groups. Finally, economic factors regarding relative costs must be considered between suppliers and demanders. These final economic factors will include relative prices: total disposal costs versus negotiated exchange costs.

TABLE IX-10

BREAKDOWN OF TOTAL FLORIDA MANUFACTURING EMPLOYMENT
INTO TWO COMPONENTS: HAZARDOUS WASTE GENERATING
COMPONENT AND NON-HAZARDOUS WASTE GENERATING

	<u>1980 Employment</u>	<u>Percent of Total</u>
Total Manufacturing Employment	472,731	100.0
• Employment in component generating hazardous waste ^a	29,981	6.3
• Employment in component not generating hazardous waste	442,750	93.7

^aQuantities reflect surveyed industry groups in the 1977 Hazardous Waste Survey for the State of Florida.

SOURCE: Employment Security Records, Florida Department of Labor, 1980.

This section will discuss the first of these tasks. An explanation of how the list of hazardous waste generating SIC's (four-digit) were determined is provided as well as a discussion of the major contributors within that list.⁷ Further, these major contributors will be evaluated in terms of their likely success in transferring waste materials through an exchange.

As a final point, profitable waste exchange activity could mitigate the prospects of future environmental degradation by reducing the amount of hazardous waste introduced (some perhaps illegally) into the environment. In addition, the benefits of the exchange will be realized with the transfer of non-hazardous wastes as well. Currently, a great deal of non-hazardous material is being discarded by manufacturers because the cost associated with independently seeking out potential demanders is perceived as too large. A statewide, or even multistate, waste exchange would reduce these searching and negotiating expenses so as to make the exchange of all waste materials more cost effective. Despite the fact that the focus of the report will be on the exchange and reuse of hazardous wastes generated in Florida, full recognition must be given to the feasibility of non-hazardous waste reuse as well.

The criteria for determining which industries, at the four-digit SIC level, are hazardous waste generating were established in 1977. At this time, the Hazardous Waste Survey for the state of Florida was undertaken. The final list of SIC codes chosen did not include all potential generators of hazardous waste. However, the final list reflects a very large percentage of all potential hazardous waste generators. An estimate for the actual percentage was not supplied.

TABLE IX-11

INDUSTRY GROUPS SURVEYED FOR THE
1977 HAZARDOUS WASTE SURVEY OF FLORIDA

<u>SIC Code</u>	<u>Industry Description</u>
2491	- wood preserving
2753	- engraving and plate printing
2813	- industrial gases
2819	- industrial inorganic chemicals, NEC
2821,2822	- plastics, synthetic resin, rubber and man-made fibers
2834	- pharmaceutical preparations
2851	- paints and allied products
2869	- industrial organic chemicals, NEC
2879	- pesticides and agricultural chemicals, NEC
2891,2892,3482,3483	- explosives, small arms ammunition, general ammunition
2893	- printing ink
2952	- asphalt felts and coatings
3021,3041	- rubber, plastic footwear, plastic hose and tubing
3069	- fabricated rubber products, NEC
3111	- leather tanning and finishing
3292	- asbestos products
3312,3332,3333	- blast furnaces, steel work, rolling mills
3339,3341	- primary lead, primary zinc, primary non-ferrous metals, NEC and secondary smelting of non-ferrous metals
3356,3357	- rolling and drawing, wire drawing and insulating
3412	- metal shipping barrels, drums, kegs, pails
3471	- plating and polishing
3612	- transformers
3613	- switchgear and switchboard apparatus
3675,3677	- electronic capacitors, coils and transformers
3691,3692	- storage and primary batteries
3732	- boat building and repairing
3861	- photographic equipment and supplies
8221	- universities
971	- national security
--	- captive electroplating shops*

*Firms in this category carry out electroplating as a part of a larger process for establishments listed under various Standard Industrial Classifications.

The final listing includes mainly manufacturing industries. Only two of the 31 categories are non-manufacturing: 8221-Universities, and 971-National Security. The decision to begin with the manufacturing sector is logical. However, the delineation of specific four-digit SIC categories within the broad category of manufacturing was made on the basis of:

- judgment as to potential importance of waste;
- analysis of work done by other states;
- consultation with the Florida Department of Environmental Regulation;
- time available;
- funds available.

Given the above constraints, the industries described in Table IX-11 were surveyed.

These thirty-four SIC categories were ultimately combined into thirty-one industry groups. This final delineation was necessary due to problems in acquiring data on either employment or waste generation or both. In order to derive waste multipliers, it is essential to have complete data on waste quantities and employment for each industry group. Therefore, merging of similar SIC's was done where necessary.

F. Estimation of the Quantity of Hazardous Waste Generated in Florida (1980)

The 1977 Hazardous Waste Survey for the state of Florida provided a valuable data base on hazardous waste generation in Florida. From this data base, it is possible to research a variety of Florida-specific topics: manufacturing, the environment, and the Florida economy. Waste quantities reported in the 1977 survey are used here extensively.

The thirty-one industry groups in Table IX-11 were surveyed via direct interview (on-site, mail and telephone) to determine the following information:

- plant identification (i.e., SIC group name, firm name, location, etc.)
- number of employees (total and production employees)

- waste information (types, quantities and constitution?)
- manufacturing process(es)
- treatment of wastes
- disposal of wastes (land, incineration, etc.)

Annual waste quantities were requested for the following categories:

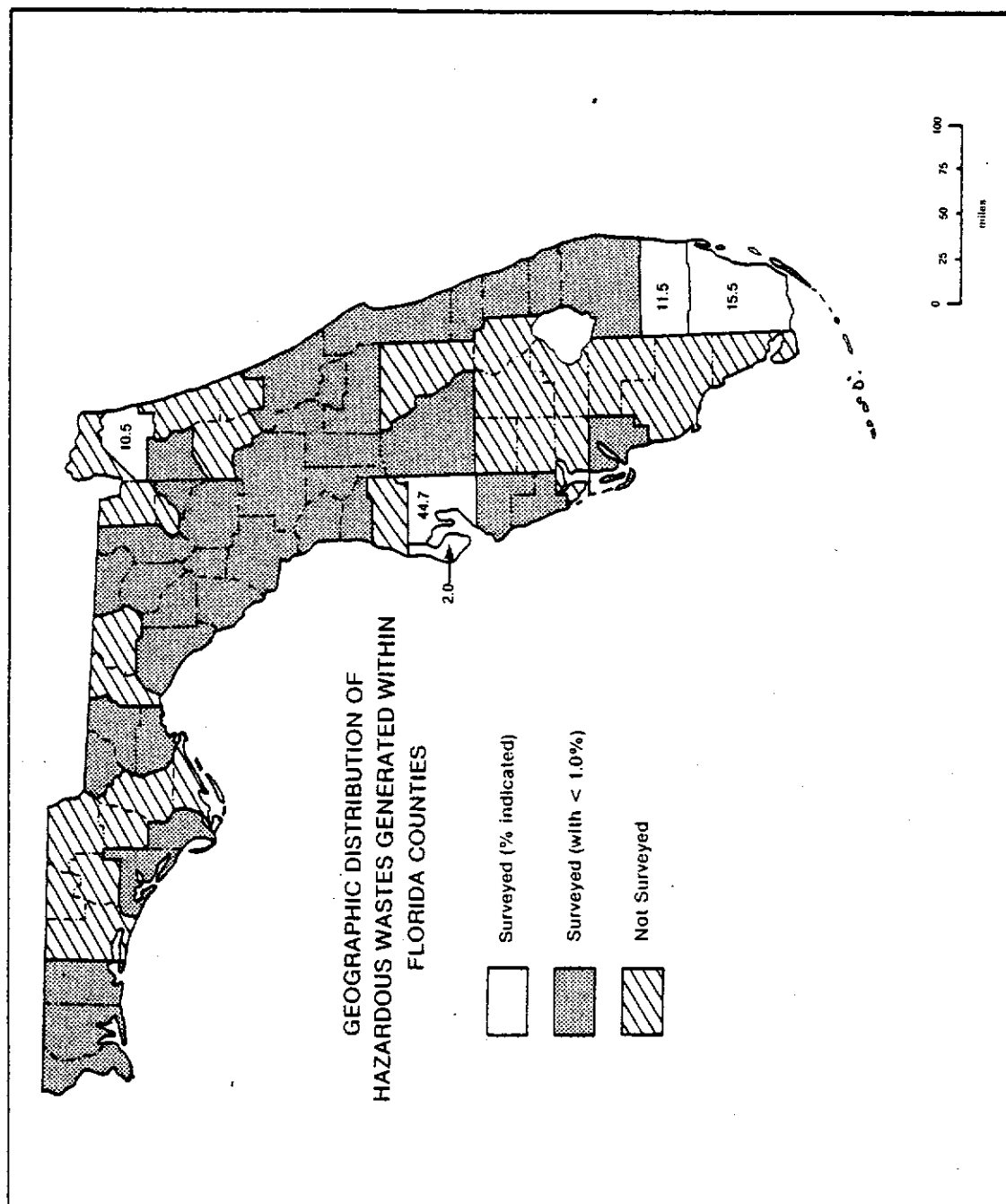
- heavy metal solutions and sludges
- organic solvents and oils
- caustic and acid solutions
- inorganic chemical solutions and sludges
- organic chemical solutions and sludges
- pesticide and fungicide wastes
- paint and ink wastes
- explosive wastes

The survey produced summary statistics for 1977. These included distributions of hazardous waste across waste categories in selected industry groups for surveyed Florida counties.

Table IX-9 and Figure IX-3 display the geographic distribution of hazardous waste generated by county. Relating this geographic distribution to the distribution of total employment in Florida manufacturing (Figure IX-2), it comes as no surprise that the clustering of the major contributing counties are similar.

There is a discrepancy between the quantities of hazardous waste reported in this study and those reported in the 1977 Hazardous Waste Survey. A brief explanation for this inconsistency follows. In the Hazardous Waste survey all waste streams, regardless of the concentration (ppm) of the hazardous component, were included in the reported tonnage of waste generated. Most firms could not provide information regarding hazardous material concentration levels. This resulted in the inclusion of a large volume of heavy metal contaminated rinse water with

Figure IX-3



"presumably small" concentrations of hazardous material in the total weight of surveyed waste. This rinse water was included in three industry groups: electroplating and polishing (SIC 3471), national security (SIC 971) and captive electroplating shops (no SIC category). Further, this rinse water was also included in waste category 1: heavy metal solutions and sludges, and generated principally in Dade and Broward counties. This contaminated rinse water amounted to approximately 61,000 gallons or 507,523.1 metric tons.⁸

Because concentration levels were not available for the 1977 Hazardous Waste Survey, the rinse water was justifiably included in the total surveyed waste stream. Since the waste concentration may be small, it is assumed that these rinse waters would not be successfully exchanged through a waste exchange. Therefore, it was decided to subtract all contaminated rinse water from the 1977 survey data. This reduces the total waste surveyed from 574,343.0 metric tons to 66,819.9 metric tons for 1977. For data in this report, the rinse water has been subtracted from all tables, figures and text.

Initially, this rather significant reduction of total waste appeared excessive. In order to determine if this lower total tonnage better approximated hazardous waste generation for the plants surveyed, corroboration was required. Data were acquired that reported surveyed hazardous waste quantities and employment for Colorado, Utah, Wyoming, and Montana.⁹ To translate this data into meaningful comparative statistics, waste tonnage per employee was chosen as a useful common denominator. Table IX-12 portrays comparative statistics between Florida and the individual states, and between Florida and a composite for the four states. The closeness of the magnitudes indicates that the exclusion of the rinse water provides a better estimate of total hazardous waste generation for the plants surveyed in 1977.¹⁰

TABLE IX-12
COMPARATIVE STATISTICS ON HAZARDOUS WASTE
GENERATED PER EMPLOYEE: SELECTED STATES

<u>State</u>	Total Waste Generated (metric tons)	Total Employment (surveyed plants)	Waste Per Employee (metric tons)
Florida (1977)	66,819.9	13,989	4.78
Colorado (1979)	83,284.5	81,245	1.03
Utah (1979)	119,109.2	35,185	3.39
Wyoming (1979)	66,421.2	8,409	7.89
Montana (1979)	53,095.9	6,594	8.05
TOTAL ^a	321,910.8	131,433	2.40

^aData reflects 1979 industrial activity.

SOURCE: 1977 Hazardous Waste Survey for Florida and the Feasibility Study for Establishing a Waste Exchange in the Rocky Mountain Region, EPA, Region VIII, December 1979.

The comparison of Florida waste generation to waste generation in these Rocky Mountain States seems reasonable given that:

1. Both Florida and the selected Region VIII states are relatively less industrialized than states located in the east coast or in the Ohio River Valley.
2. Both Florida and the selected Region VIII states have as major industries tourism and agriculture.

For the remaining industry groups (including 3471, 971 and Captive Electroplating Shops), comparative waste statistics are provided in the 1977 Hazardous Waste Survey for Florida (see pages 127-155). These intrastate comparisons along with corroborating information displayed in Table IX-12 support using the adjusted 1977 Florida Hazardous Waste Survey as a base for the estimation of potential supply for a waste exchange. This base, once established, will be updated to 1980 and adjusted further to estimate a lower bound for potential supply of industrial waste for transfer. It is important to note that only a lower bound is possible via direct estimation. There are two reasons for this:

1. Non-hazardous waste quantities, which are potential candidates for exchange, are not included here. Recognition and inclusion of this positive (but unknown) quantity would increase the magnitude of potentially transferable wastes.
2. The 1977 Florida Waste Survey provides total waste quantities for only a sample of industries that generate hazardous waste. Although the sample includes a significant portion of hazardous wastes, inclusion of the total amount would increase the absolute magnitude of potentially transferable wastes.

Table IX-13 shows 1977 waste quantities by industry group (rinse water removed). Some groups are single SIC categories while others are multiple SIC groups. As mentioned earlier, the quantities shown will be updated to reflect an estimation of waste generation for 1980. The method employed uses total employment as a way of extrapolating waste quantities through time and from sample to population for selected industry groups. Waste multipliers were established for each industry group for 1977. A waste multiplier is defined as the

TABLE IX-13

ESTIMATION OF TOTAL HAZARDOUS WASTE FOR FLORIDA, 1980
FROM SURVEY DATA, WASTE MULTIPLIERS AND
TOTAL 1980 EMPLOYMENT

SIC Code	Total 1977 Surveyed Waste (MT)	1977 Surveyed Employment	Waste Multiplier MT/ Employee	Total ESD ^a Employment 1980	Total 1980 Estimated Hazardous Waste
2491	311.8	489	.638	709	452.3
2753	519.8	133	3.908	174	680.9
2813	8,752.8	132	66.309	153	10,145.3
2819	1,219.1	559	2.181	559	1,219.2
2821,22	2,091.2	383	5.460	1,183	6,459.2
2834	2,114.3	180	11.746	618	7,259.0
2851	1,628.4	523	3.114	1,284	3,998.4
2869	5.0	148	.034	1,234	42.0
2879	1,682.5	381	4.416	705	3,113.3
2891	129.3	112	1.154	121	139.6
2892,3482(83)	731.7	431	1.674	674	1,128.3
2893	152.0	99	1.535	236	362.3
2952	14,663.0	312	46.997	517	24,297.4
3021,41	0	3152	0	4267	0
3069	961.3	732	1.313	1,015	1,332
3111	82.2	62	1.326	66	87.5
3292	1,196.8	193	6.201	9	55.8
333 ,3341	9,464.4	740	12.790	1,119	14,312.0
3356,57	53.0	170	.312	425	132.6
3412	1,542.8	211	7.312	162	1,184.5
3471	359.8	278	1.294	1,066	1,379.1
3612	116.4	892	.130	1,500	195.0
3613	3.6	91	.040	110	4.4
3675,77	12.4	269	.046	1,527	70.2
3691,92	13,020.4	526	24.754	1,788	44,260.2
3732	129.8	1,663	.078	7,526	587.0
3861	210.1	1,122	.187	1,234	230.8
8221	29.3	--	--	--	29.3
971	5,149.0	--	--	--	5,149.0
Captive	487.7	--	--	--	487.7
TOTAL	66,819.9	13,989	--	29,981	128,794.4

^aEmployment Security Data, Florida Department of Commerce, Division of Employment Security, 1980.

SOURCE: Center's estimates.

annual waste generated per employee in metric tons. Employment levels for 1980 were acquired for each industry group from the Florida Department of Labor, Division of Employment Security. Reported employment levels are for the entire industry group. This means that for multiple SIC industry groups, 1980 employment is summed for all member SIC's (i.e., industry groups 2821 and 2822 shows total employment of $1048 + 135 = 1183$).

Table IX-13 shows 1977 surveyed employment and waste tonnage for each industry group. In addition, the important linkages of industry waste generation multipliers are displayed. Finally, multiplying these factors by the respective 1980 industry group employment produces the estimates for total hazardous waste generated by these groups in 1980. This method of extrapolation is commonly employed for research of this type. In the absence of direct industry survey, this method of estimation is the best available.

In this instance, the knowledge of the waste generation factors permits extrapolation in two dimensions:

1. From a sample of firms in each industry group to the total in each group.
2. From one time period (1977) to another (1980).

The estimate of 1980 hazardous waste quantities completes the first segment of the total task of estimating the "potential supply" of transferable hazardous wastes in Florida. The total estimated metric tonnage is 128,794.4, while total employment for all industry groups is 29,981. These two statistics translate into approximately 4.30 metric tons generated per employee. This magnitude is within the range estimated in Table IX-12.

Table IX-14 provides a forecast of hazardous waste generation through 1990 for the thirty-one industry groups surveyed in 1977. By 1990, the forecast shows an estimate of 178,184.2 metric tons. This forecasted tonnage is a lower limit estimate of the total hazardous waste generated for Florida. This is because other

TABLE IX-14

FORECAST OF HAZARDOUS WASTE GENERATION THROUGH 1990

<u>1980 Estimate^a</u> <u>Hazardous Waste</u> <u>Metric Tons/Year</u>	<u>1981-85 Forecast^b</u> <u>Hazardous Waste</u> <u>Metric Tons/Year</u>	<u>1986-90 Forecast^c</u> <u>Hazardous Waste</u> <u>Metric Tons/Year</u>
128,794.4	1981 133,276.5	1986 157,587.6
	1982 137,914.5	1987 162,504.3
	1983 142,713.9	1988 167,574.4
	1984 147,680.3	1989 172,802.8
	1985 152,819.6	1990 178,194.2
	Average Annual Growth Rate 1981-85	Average Annual Growth Rate 1986-90
	3.48%	3.12%

^aSOURCE: Adapted from Table IX-3.

^b1981-1985 forecast based upon estimated growth in manufacturing employment; Florida Econometric Model, Office of the Governor, based on Chase Econometrics Associates, Inc., Standard Trend Forecast, January.

^c1986-1989 forecast based upon estimated growth in manufacturing employment; Florida Econometric Model, Office of the Governor, based on Chase Econometrics Associate, Inc., Standard Trend Forecast, January.

industries, beyond the original thirty-one, generate hazardous wastes, and the growth rates used in the forecast are for "all manufacturing." It is assumed that the major hazardous waste generators are larger and faster growing than their non-hazardous waste generating counterparts. Therefore, the "all manufacturing" growth rate is likely to be smaller than the growth rate for only the hazardous waste generating component.

G. Estimation of Potential Supply of Exchangeable Wastes

The term "potentially transferable" wastes refers to that portion of the hazardous waste stream that technologically lends itself to reuse by another company. In this chapter, "potentially transferable" will be used interchangeably with "potential supply." At this point, a distinction should be made between potential supply and actual supply. The determinants of potential supply are, for the most part, technical; i.e., concentration, purity, volume, etc. These determinants indicate whether specific materials can be physically reclaimed from diluted or contaminated wastes. The determinants of actual supply are economic; i.e., relative prices or costs. Once a specific material is recognized as potentially recoverable from a given waste stream, the decision to actually supply the material is determined when the exchange cost borne by the supplier is less than his disposal cost per unit of waste. These relative costs reflect, among others, transportation costs and are tempered with the demander's concerns of continuity of supply, dependability of product integrity, etc. Only potential supply will be estimated here, as actual supply requires data that is product-specific, highly dynamic, company-specific, and beyond the scope of this study. However, it is possible to "roughly calculate" the total annual tonnage that is likely to be supplied (exchange) from the experience of existing waste clearinghouses. The total tonnage that is likely to be actually transferred is approximately 1.0 percent of the total hazardous wastes generated.¹¹

In order to estimate the amount of hazardous waste that is potentially transferable for each industry group, data were acquired in the form of "percent potentially transferable." These percentages are applied to 1980 hazardous waste estimates in Table IX-13. The calculation of the specific percentages requires explanation.

In a study similar to this, the Philadelphia SMSA was examined as a sample area for hazardous waste generation and transfer potential.¹² This area was selected because it contained approximately 98 percent of all Standard Industrial Code Categories: an industrial microcosm. From this report, percentages were estimated for thirteen industry groups. In addition, all wastes were broken down into three general categories, and portions "potentially transferable" are reported in Table IX-15.

The percentages estimated for this study used the information reported above. The actual methodology involves a two-step procedure:

1. For the industry groups 2813, 2819 and 3691(92), previous estimates found none of their waste was transferable. Thus, a zero percent was assigned these groups.
2. Background data sheets for all industry groups in the 1977 Hazardous Waste Survey for Florida provided a breakdown of total waste generated into the eight categories previously mentioned. These breakdowns were matched to the three general categories (Table IX-15) to determine a weighted "percent potentially transferable" for every industry group.

The A.D. Little report emphasizes the fact that the exact percentages of transferable waste are unknown. Further, it is stated that:

The uncertainties in these estimates are sufficiently general to make the estimates of the amounts of specific wastes with transfer potential very difficult.¹³

TABLE IX-15
PERCENT "POTENTIALLY TRANSFERABLE"
BY GENERAL WASTE TYPE

<u>General Waste Type</u>	<u>Description of a General Waste Type</u>	<u>Percent Potentially Transferable"</u>
solvents	spent solvents, of varying concentrations and impurities, originating principally from paint plants, painting and cleansing operations; also from pharmaceutical plants	3-5
still and tank bottoms	residual chemical sediment materials of concentration from distillation or mixing/blending operations. Main use is as a fuel.	10
specialized wastes	examples are concentrated acids, off-spec materials, spent catalysts, high-metal content sludges, and some salts. Probably generated in relatively small amounts.	10

SOURCE: A.D. Little, Inc., Waste Clearinghouse and Exchanges: New Ways for Identifying and Transferring Reasonable Industrial Process Wastes, October 1976, pp. 33-34

In the absence of better data, these estimates were used. It is interesting to note, however, that the Little report estimated that approximately 6.0 percent of the total hazardous waste would be recognized as potentially transferable.¹⁴ Applying this system to the data shows that approximately 5.4 percent of all Florida hazardous waste is potentially transferable. This figure is derived from Table IX-16; it shows total "1980 potentially transferable waste" (6,921.2) as a percentage of "1980 total hazardous waste" (128,794.4). Table IX-17 presents the potential uses of wastes generated by surveyed industry groups.

It was indicated earlier that approximately 1.0 percent of the total hazardous waste generated could actually be transferred by a waste exchange. For Florida in 1980, this quantity would amount to approximately 1.0 percent of 128,794.4 metric tons or 1,278.9 metric tons. In pounds, this translates into 2,839,820 pounds, while in units of truckloads, this tonnage translates into 71 truckloads.¹⁵ This does not mean that exchanges will occur in truckload quantities; these alternative measures are provided strictly for descriptive purposes.

In 1978-79, it was estimated that the cost for out-of-state disposal (the least cost alternative for Florida industry) for Florida was \$342.¹⁶ This figure is a weighted average for seven selected industries generating waste and shipping it from selected Florida cities (Jacksonville, Tampa, and Miami). All shipped wastes were containerized in 55-gallon drums and consisted of solids, liquids, and sludges. Since that time, disposal costs have increased by approximately 60 percent. Thus, for 1980, this figure is \$547 per metric ton.¹⁷ If all waste transfers occurred without costs, then out-of-pocket disposal costs to Florida industry would be reduced by approximately \$700,000 for 1980 ($\$547 \times 1,287.9 \text{ MT} = \$700,000$). More realistically, the reduction in disposal cost must be adjusted for transportation and processing costs incurred in a waste transfer. Even considering positive exchange costs, the net private saving from a transfer will be substantial. Total cost reductions would become even larger when obvious social benefits are included.

TABLE IX-16
WASTES GENERATED AND "POTENTIALLY
TRANSFERABLE", FLORIDA 1980

<u>SIC Code</u>	<u>Industry Description</u>	<u>1980 Hazardous Waste MT/year</u>	<u>Percent Waste Potentially Transferable</u>	<u>1980 Potentially Transferable Waste</u>
2491	wood preserving	452.3	10	45.2
2753	engraving and plate printing	680.0	10	68.0
2813	industrial gases	10,145.3	none	--
2819	inorganic chemicals	1,219.2	none	--
2821,22	plastics and rubber	6,459.2	10	645.9
2834	pharmaceuticals	7,259.0	10	725.9
2851	paints and allied products	3,998.4	8	319.9
2869	industrial organic chemicals	42.0	10	4.2
2879	pesticides	3,113.3	10	311.3
2891	adhesives, sealants	139.6	10	12.6
2892	explosives	1,128.3		112.8
3482	ammunition			
2893	printing ink	362.3	10	36.2
2952	asphalt and coatings	24,297.4	10	2,429.7
3021	rubber and plastic footwear, hose	0	0	0
3069	fabricated rubber products	1,332.7	10	133.3
3111	leather tanning and finishing	87.5	4	3.5
3292	asbestos products	55.8	10	5.6
3312,32, 33	primary metals	14,312.0	10	1,431.2
3339,41, 56,57	primary metals	132.6	10	13.3
3412	drum reconditioning	1,184.5	9	106.6
3471	electroplating and polishing	1,379.4	10	137.9
3612	transformers	195.0	5	9.8
3613	switchgear	4.4	9	.4
3675,77	electric capacitors, coils, transformers	70.2	10	7.0
3691,92	storage and primary batteries	44,260.2	none	--
3732	boat building and repair	587.0	5	29.4
3861	photographic equipment and supplies	230.3	10	23.1
8221	universities	29.3	7	2.1
971	national security	5,149.0	5	257.5
--	captive electroplating shops	487.7	10	48.8
TOTAL		128,794.4	--	6,921.2

SOURCE: Adapted from Table IX-15.

TABLE IX-17

POTENTIAL USES FOR WASTE STREAMS FROM
SELECTED HAZARDOUS WASTE GENERATING
INDUSTRIES IN FLORIDA

<u>Industry Group</u>	<u>Industry Description</u>	<u>Potential Use(s)</u>
2491	wood preserving	wastes are petroleum-based; can be re-refined for reuse or incinerated as fuel
2753	engraving and plate printing	wastes are in the form of highly acidic rinse water and metal printing plates; have the potential to be reclaimed.
2813,19	industrial gases and industrial inorganic chemicals, NEC	very low reuse values with exception of neutralizing either acidic or base waste stream for other plants
2821,22	plastics and synthetic rubbers	reconstitution of plastic and rubber resins and scrap materials is possible
2834	pharmaceuticals	solvents can be constituted for cleaning, degreasing or fuels
2851	paints and allied products	cleaning solvents can be reclaimed; damaged batches can be sold or used for fuels along with tank bottoms
2869	industrial organic chemicals	general wastes include contaminated solvents for degreasing or fuels
2879	pesticides	same as 2869
2891, 3482(83)	adhesives, sealants, explosives, ammunition	same as 2869
2893	printing ink	small amounts of contaminated solvents could be used as fuels
2952	asphalt felts and coatings	primarily produced with petrochemical materials; resuse via reclaiming; or use as fuels
3021,41	rubber and plastic footwear, hose, tubing	recycling, milling and devulcanization of rubber wastes
3069	fabricated rubber products	same as 3021, 3041
3111	leather tanning and finishing	reclamation of chrome and other scarce elements; also small quantities of solvents reclaimable

TABLE XI-17 (continued)

<u>Industry Group</u>	<u>Industry Description</u>	<u>Potential Use(s)</u>
3292	bestos products	recycling to recover usable asbestos is possible
3312,32, 33,39,41, 56,57	primary metals	primary metals groups generate metal wastes which are recyclable; also galvanizing and "pickling" baths have potential for reuse
3412	drum reconditioning	wastes typically contain recoverable and scarce heavy metals such as cobalt, cadmium, etc.
3471	electroplating and polishing	same as 3412
3612	transformers	contaminated solvents and transformer oil can be reclaimed or used as fuel
3613	switchgear	fiberglass wastes have some potential for reprocessing as well spent solvents
3675,77	electronic capacitors, coils and transformers	potential recoverable wastes include scarce heavy metals in sludge and rinse waste
3691,92	storage and primary batteries	storage batteries (3691) have negligible recovered wastes while primary battery wastes include potential for metal recovery from reject cells (Zn, Hg, Pl, Cd) and waste water treatment sludge (Cr)
3732	boat building and repair	waste oils, solvents, and fuels are currently sold to reconditioners
3861	photographic equipment and supplies	potential exists to store and recondition waste solvents and heavy metals wastes
8221	universities	reconditioning of spent organic solvents, oil based paints and used lubricating oil
971	national security	large quantities of used oils, fuels, and spent solvents (some of which are currently sold to reclaimers); also paint sludges and paint contaminated thinners could be reclaimed successfully

H. Supply-Specific Survey Results - Florida Manufacturers Survey

In order to assess the desire of Florida industry to have a waste exchange, a sample of 474 Florida manufacturers were contacted and surveyed. The primary purpose of the survey was to assess the "willingness to participate" in a clearing-house type waste exchange. In addition, basic categorical supply and demand information was requested by waste type. The survey requested two levels of inquiry for both supply and demand. Specifically for supply, questions pertaining to willingness to list waste with an exchange and the types of wastes that would be listed were asked (see questions 1 and 6, Appendix C).

A total of 97 companies responded to the survey for a 20 percent response rate. Other similar surveys have had lower response rates.¹⁸ This is presumably attributable to the sensitive or protective attitudes of generators of potentially hazardous wastes.

To begin at the most general level, Tables IX-18 and IX-19 show the total willingness to list (supply) first by four-digit Standard Industrial Classification (SIC), then by county. The totals show that 40 of the 97 respondents indicated that their company would definitely list waste materials with the exchange. Table IX-20 shows the waste category distribution reported by all respondents.

The total count of the waste category breakdown exceeds 97 because companies could check multiple waste categories. Of the total, 15 respondents indicated that they would "definitely not" list with the proposed waste exchange; however, some of these companies indicated that they would request or demand waste products through the exchange. As expected, some companies indicated that they would be exclusively demanders of waste while others indicated only an interest in listing wastes. The remainder of the respondents were either "no response" or "don't know". Again, some of these suppliers indicated that they would demand waste materials.

TABLE IX-18
FREQUENCY OF WILLINGNESS TO LIST
WASTES BY SIC CODES

SIC Code	Definitely Yes (1)	(2)	(3)	(4)	Definitely No (5)	Don't Know	No Response
2221	0	0	0	0	1	0	0
2491	1	1	0	0	0	1	0
2499	0	0	0	0	0	1	0
2611	1	0	0	0	0	1	0
2631	1	0	0	0	0	1	0
2752	1	0	0	0	0	1	0
2812	1	0	0	0	0	0	0
2813	0	0	0	0	0	0	0
2819	1	0	1	0	1	1	0
2821	1	0	0	0	0	1	0
2824	0	0	1	0	0	1	0
2833	1	0	0	0	0	0	0
2834	0	0	0	0	0	1	0
2841	0	0	0	0	2	0	0
2842	2	0	0	0	0	1	0
2851	3	0	0	0	0	0	0
2869	0	0	1	0	1	1	0
2874	1	0	0	0	0	0	1
2875	0	0	1	0	0	0	0
2892	1	0	0	0	0	0	0
2893	0	0	0	0	0	0	0
2899	0	0	1	0	0	1	0
2911	1	1	0	0	0	0	0
2952	0	0	0	0	0	0	0
2992	2	0	0	0	0	1	0
3069	1	0	0	0	0	0	0
3079	2	1	0	0	0	0	1
3111	1	0	0	0	0	0	0
3221	0	2	1	0	0	0	0
3253	0	1	0	0	0	0	0
3273	1	0	0	0	0	1	0
3312	1	0	0	0	0	1	0
3313	0	0	0	0	0	0	0
3316	0	0	0	0	2	0	0
3317	1	0	0	0	0	0	1
3325	1	0	0	0	0	0	0
3341	1	0	0	0	0	0	0
3355	1	0	0	0	0	0	0
3357	1	0	0	0	0	0	0
3361	0	0	0	0	0	0	0
3362	0	0	0	0	0	1	0
3369	0	0	0	0	0	1	0
3398	0	0	0	0	1	0	0
3462	0	0	0	0	0	0	1
3471	1	0	0	0	0	1	0
3519	0	1	0	0	0	1	0
3544	0	0	0	0	1	0	0
3613	3	0	0	0	0	0	0
3643	1	0	0	0	0	0	0
3662	0	0	0	0	1	0	0
3811	2	0	0	0	0	1	0
3822	0	0	0	0	0	1	0
3823	1	0	0	0	2	0	0
3825	1	0	0	0	0	0	0
3829	1	0	0	0	0	0	0
3841	0	0	0	0	1	0	0
Unknown ^a	1	0	1	0	0	1	0
TOTAL	40	7	7	0	15	22	6

^aCertain survey responses were impossible to identify by SIC.

SOURCE: Survey conducted by the Center, January 1981.

TABLE IX-19
FREQUENCY OF WILLINGNESS TO LIST WASTES BY COUNTY

<u>County</u>	Definitely Yes (1)	(2)	(3)	(4)	Definitely No (5)	Don't Know	No Response
Bay	1	0	0	0	0	0	0
Bradford	1	0	0	0	0	0	0
Broward	1	0	0	0	1	2	2
Dade	6	1	1	0	1	4	2
Duval	5	0	0	0	0	3	0
Escambia	0	0	0	0	0	3	0
Gulf	1	0	0	0	0	0	0
Highlands	1	0	0	0	0	0	0
Hillsborough	7	1	0	0	5	3	0
Leon	0	0	0	0	0	1	0
Marion	0	0	0	0	0	1	0
Orange	4	0	1	0	3	0	0
Palm Beach	1	0	1	0	0	1	0
Pinellas	0	0	1	0	0	0	0
Polk	1	1	1	0	2	2	1
Wakulla	1	1	0	0	0	0	0
Unknown ^a	8	1	2	0	3	2	1
Out-of-state ^b	2	2	0	0	0	0	0
TOTAL	40	7	7	0	15	22	6

^aUnknown: certain survey responses were impossible to identify by county of origin.

^bOut-of-state: at least two respondents had main offices in other states; Florida locations were impossible to identify.

SOURCE: Survey performed by the Center, January 1981.

Table IX-19 shows the frequency of willingness to list (supply) by Florida county. Of the "definitely yes" category, many of the industrial cluster counties (noted earlier) resurfaced (i.e., Dade, Duval, and Hillsborough).

Returning to Table IX-20, the frequency of willingness to list by waste category shows a count of: solvents, 24.6%; oil wastes, 18.7%; acids, 11.9%; heavy metals in sludge or solution, 9.7%; alkalis, 9.0%; catalysts, 4.5%; and other, 21.6%. Solvents and waste oils are the predominant categories listed. However, little can be said of the quantity distribution across waste categories. It is not possible to infer that, for example, twice as many alkalis than catalysts will be supplied. The "other" category requires further explanation.

Table IX-21 displays the specific items reported by surveyed companies in the "other" category. A total of twenty-two different industries reported waste materials in the "other" category. Specific quantities were not reported and many items reported currently have organized reclaiming industries in operation. For example, scrap paper, oil and metals have exchange activities occurring in most large cities in Florida. Some of the materials listed appear to be non-hazardous; for example, sand, steel, metal scrap, and gravel. In retrospect, it may have been desirable to have requested responses specifically from a perceived non-hazardous category as well as a hazardous waste category.

The next set of tables presents a crosstabulation of waste category by county and a crosstabulation of waste categories by four-digit SIC within selected counties. An examination of Table IX-22 shows the following counties as containing the greatest frequency of response to the survey with respect to willingness to list:

- Dade
- Duval
- Hillsborough
- Orange
- Polk

TABLE IX-20
FREQUENCY OF WILLINGNESS TO LIST
BY WASTES CATEGORY

<u>Category</u>	<u>Count</u> ^a
Solvents ^b	33
Acids	16
Alkalis	12
Catalysts	6
Waste oils	25
Heavy metal sludges	13
Other	<u>29</u>
TOTAL	134

^aEach category reflects a waste type checked per plant for potential supply; inferences regarding absolute or relative quantities supplied are not possible.

^bNational Defense (SIC 971) or military establishments were not surveyed. The solvent category could be larger (in count and quantity) if defense sectors were included and exchange was legally possible.

SOURCE: Survey performed by the Center, January 1981.

TABLE IX-21

WILLINGNESS TO LIST: DESCRIPTION OF
"OTHER" CATEGORY BY SIC CODE

<u>Listing Industry (SIC)</u>	<u>Waste Material Listed</u>
2491	wood wastes, empty paper bags, 55 gallon drums
2499	vinyl film strip, small pieces of plywood and particle board
2821	fatty amides, rosin oil
2824	textile scraps
2833	scrap paper products
2841	polyester resin
2851	paint sludge
2892	waste treatment sludge
2952	solid asphalt wastes
2992	waste cardboard cans
3069	paper, cork and plaster scrap
3079	waste packaging materials and ink
3273	concrete production residue
3325	sand, slag
3341	metal slag
3361	sand and dross
3362	sand
3398	steel and metal scrap
3519	paints and varnish
3613	scrap: sheet metal, copper, aluminum and brass
3643	gravel and roofing material
3811	paper scrap, waste flux

TABLE IX-22
FREQUENCY OF WILLINGNESS TO LIST
BY WASTE CATEGORY BY COUNTY

<u>County</u>	<u>Solvents</u>	<u>Acids</u>	<u>Alkalis</u>	<u>Catalysts</u>	<u>Waste Oils</u>	<u>Sludges</u>	<u>Other</u>	<u>County Total</u>
Bay	0	0	0	0	0	0	1	1
Bradford	0	0	0	0	0	0	0	0
Broward	0	0	0	0	1	2	1	4
Dade	9	4	2	0	2	3	5	25
Duval	2	1	1	0	1	0	4	9
Escambia	2	0	0	0	1	0	0	3
Gulf	0	0	0	0	1	0	0	1
Highlands	0	0	0	0	0	1	0	1
Hillsborough	5	2	2	0	3	3	4	19
Leon	0	0	0	0	0	0	1	1
Marion	0	0	0	0	0	0	0	0
Orange	3	2	1	1	3	1	1	12
Palm Beach	1	0	0	0	1	0	1	3
Pinellas	0	0	0	0	0	0	0	0
Polk	3	2	0	2	4	0	1	12
Wakulla	1	0	1	0	1	0	1	4
Unknown	5	3	3	3	6	3	6	29
Out-of-State	2	2	2	0	1	0	3	10
Category	33	16	12	6	25	13	29	134

Individually, each county is examined in Table IX-23 to show the reporting industry and the corresponding distribution of listed waste by category.

In general, for those companies surveyed, it appears as though there exists substantial interest in the establishment of a clearinghouse type waste exchange in Florida. In addition, if each positive listing "checked" by respondents can be viewed as a "potential listing," we can anticipate that at least 40-50 of individual companies surveyed would participate in a preliminary listing of industrial suppliers. This anticipation is bolstered when manufacturers realize that the exchange will be conducted with complete confidentiality. The 40-50 initial listings figure should be viewed as a "lower bound" because it is based on data from only 97 Florida manufacturers. The potential, therefore, is much greater than this lower bound.

I. Conclusions and Recommendations

This chapter has focused attention on the component of the Florida manufacturing sector generating a waste stream that is believed to be hazardous. The rationale for this is that exchange of hazardous waste may prove to be a least-cost way for the manufacturer to dispose safely of some quantity of waste. The alternative to exchange is disposal, and for almost all Florida generators, the least-cost disposal alternative is out-of-state disposal. This expense is estimated to be approximately \$547 per metric ton for 1980-81. Intrastate reuse of hazardous wastes in the production process or waste neutralization (i.e., acids in concert with base materials) could prove to be a cost-effective alternative to out-of-state disposal.

TABLE IX-23
SELECTED COUNTY SUMMARIES BY WASTE
CATEGORIES BY SIC CODE

<u>Dade County</u>								
<u>SIC Code</u>	<u>Industry Description</u>	<u>Solvents</u>	<u>Acids</u>	<u>Alkalis</u>	<u>Catalysts</u>	<u>Oils</u>	<u>Heavy Metal Sludges</u>	<u>Other</u>
2491	Wood preserving	1	0	0	0	0	0	1
2812	Alkalis and chlorine	1	1	1	0	0	0	0
2824	Synthetic organic fibers	0	0	0	0	0	0	1
2834	Pharmaceutical preps.	0	0	0	0	0	0	1
2851	Paints and allied products	2	0	0	0	1	0	0
3079	Misc. plaster products	2	0	0	0	0	0	0
3316	Steel: cold sheet, strip, bars	0	0	0	0	0	0	0
3398	Metal heat treating	0	0	0	0	0	0	1
3471	Electroplating, polishing, anodizing	1	1	1	0	1	2	0
3811	Instruments: scientific, laboratory	0	0	0	0	0	0	1
3823	Instruments: industrial	1	1	0	0	0	1	0
3841	Instruments: medical, surgical	1	1	0	0	0	0	0
TOTAL		9	4	2	0	2	3	5

<u>Duval County</u>								
<u>SIC Code</u>	<u>Industry Description</u>	<u>Solvents</u>	<u>Acids</u>	<u>Alkalis</u>	<u>Catalysts</u>	<u>Oils</u>	<u>Heavy Metal Sludges</u>	<u>Other</u>
2611	Pulp mills	0	0	0	0	0	0	0
2631	Paperboard mills	0	0	0	0	0	0	0
2851	Paints and allied products	1	0	0	0	0	0	0
3069	Fabricated rubber products	0	0	0	0	0	0	1
3325	Steel foundries	0	0	0	0	0	0	1
3362	Brass, copper, bronze foundries	0	0	0	0	0	0	1
3643	Wiring devices (current carrying)	0	0	0	0	0	0	1
TOTAL		2	1	1	0	1	0	4

TABLE IX-23 (continued)

<u>Hillsborough County</u>								
<u>SIC Code</u>	<u>Industry Description</u>	<u>Solvents</u>	<u>Acids</u>	<u>Alkalis</u>	<u>Catalysts</u>	<u>Oils</u>	<u>Heavy Metal Sludges</u>	<u>Other</u>
2221	Fabric mills: broad woven	0	0	0	0	0	0	0
2752	Commercial printing: lithographics	0	0	0	0	0	0	1
2842	Special cleaning preparations	1	0	0	0	0	0	0
2952	Asphalt felts and coating	0	0	0	0	1	0	1
3253	Ceramic floor and wall tiles	0	0	0	0	0	1	0
3273	Ready mixed concrete	0	0	0	0	0	0	1
3357	Non-ferrous wire: drawing and insulating	1	1	1	0	0	1	0
3369	Non-ferrous foundries	0	0	0	0	0	0	0
3613	Switchgear apparatus	1	0	0	0	1	0	1
3811	Instruments: scientific, laboratory	1	0	0	0	0	0	0
3823	Instruments: industrial	0	0	0	0	0	0	0
3825	Instruments: electrical testing	1	1	1	0	1	1	0
3841	Instruments: medical and surgical	0	0	0	0	0	0	0
TOTAL		5	2	2	0	3	3	4

Orange County

<u>SIC Code</u>	<u>Industry Description</u>	<u>Solvents</u>	<u>Acids</u>	<u>Alkalis</u>	<u>Catalysts</u>	<u>Wastes Oils</u>	<u>Heavy Metal Sludges</u>	<u>Other</u>
2875	Fertilizer	0	0	0	0	1	0	0
3079	Misc. plastic products	0	0	0	0	0	0	0
3313	Electrometallurgical	0	0	0	0	0	0	0
3317	Steel pipe and tubes	1	1	0	0	1	0	0
3613	Switchgear apparatus	1	1	1	1	1	1	0
3662	Transmitting gear: radio and T.V.	0	0	0	0	0	0	0
3811	Instruments: scientific, laboratory	1	0	0	0	0	0	1
TOTAL		3	2	1	1	3	1	1

TABLE IX-23 (continued)

Polk County

<u>SIC Code</u>	<u>Industry Description</u>	<u>Solvents</u>	<u>Acids</u>	<u>Alkalis</u>	<u>Catalysts</u>	<u>Wastes Oils</u>	<u>Heavy Metal Sludges</u>	<u>Other</u>
2833	Medicinal chemicals	1	0	0	1	1	0	0
2841	Soap and other detergents	0	0	0	0	0	0	1
2869	Industrial inorganic chemicals	0	0	0	0	0	0	0
2874	Phosphate fertilizer	2	2	0	1	2	0	0
2899	Chemicals, NEC	0	0	0	0	0	0	0
3221	Glass containers	0	0	0	0	1	0	0
3313	Electrometallurgical	0	0	0	0	0	0	0
TOTAL		3	2	0	2	4	0	1

The economic theory of supply and demand can be conceptualized in terms of relative prices. The decision to exchange hazardous wastes is made only after including various non-price judgments (i.e., legal liability of hazardous wastes continuity of supply, etc.) in the decision process. For the potential supplier, the decision to supply depends upon the alternative costs, specifically disposal costs vs. exchange costs. The exchange costs borne by the supplier will depend upon the relative bargaining or negotiating abilities of both supplier and demander. This is due to the fact that the demander is probably also a generator of hazardous waste. The demander is, therefore, acquainted with the alternatives facing the supplier. The demander knows that for each ton of hazardous waste generated, the supplier would be willing to pay the demander to accept his waste for some amount equal to or less than the disposal cost. This, however, ignores the question of the supplier's legal liability for spills, etc. that may occur after the exchange has been made. Therefore, the supplier may have to pay the demander to accept a waste stream that is useful to the demander.

To carry this thought further, the supplier may even expend substantial amounts of capital to alter his manufacturing process to, for example, remove wastes earlier in the production process (advanced site separation of waste materials). This may allow the supplier to actually lower the average exchange cost (cost per metric ton) if the waste material is higher in purity (less diluted or contaminated) and hence more attractive to potential demanders. In effect, the supplier's bargaining strength becomes enhanced. The economic incentives for such long-term responses would become more apparent given the presence of a waste exchange. These incentives would also impact the exchange of non-hazardous wastes also; however, the negotiation of exchange would proceed along somewhat different lines. Under the non-hazardous exchange scenario, the supplier would

potentially receive a positive price for wastes, but certainly not a negative price (cost) as in the case of the hazardous waste supplier.

The following is a list of principal conclusions from this chapter:

- The manufacturing sector of Florida contributes approximately 13.0 percent of the Gross State Product; it ranks fourth behind the wholesale/retail sector (19.9 percent) the Finance, Insurance and Real Estate sector (18.3 percent) and the Service sector (15.6 percent).
- Over the decade of the 1980s, employment in the manufacturing sector is forecast to grow at an average annual rate of 3.3 percent or a total of approximately 37.9 percent. The relationship between inputs (i.e., employment) and outputs (i.e., products and wastes) provides an approximation for expected growth in hazardous waste generation.
- The approximate percentage breakdown of the 1980 employment in the manufacturing sector into two components (hazardous waste generating and non-hazardous waste generating) is 6.3 percent versus 93.7 percent, respectively.
- Florida manufacturing activity is clustered in four selected areas: Hillsborough/Pinellas counties, Dade/Broward/Palm Beach counties, Brevard/Orange counties and Duval County.
- Transportation costs are predominant in waste exchange decisions. This relates to the previous conclusion that the proximity of industry clusters relative to an out-of-state disposal site enhances the feasibility of exchange.
- For 1980, it has been estimated that approximately 128,794.4 metric tons of hazardous wastes have been generated by Florida industry. This is a "lower bound" estimate because it is representative of only a sample of all industries that generate hazardous wastes.
- From this estimated tonnage of hazardous waste for 1980, approximately 6,921.2 metric tons are viewed as potential supply ("potentially transferable") while approximately 1.0 percent (1,287.8 metric tons) of all hazardous wastes are estimated to have actual supply potential. This translates into 71 truckloads (at 40,000 pounds per truckload) for 1980.
- A survey (January 1981) of 474 Florida manufacturers provided responses from 97 companies regarding attitudes waste supply and demand information. Regarding the willingness to list, 40 respondents indicated "definitely yes" with 15 respondents indicating "definitely no." The remainder of responses fell into categories between "definitely yes" and "definitely no" - 14, "don't know" - 22, and "no response" - 6.
- Survey responses regarding waste types that would be listed or supplied showed the following distribution: solvents, 33; other, 29; waste oils, 25; acids, 16; heavy metals sludges, 13; alkalis, 12; and catalysts, 6. The "other" category includes non hazardous wastes and hazardous wastes

that were difficult to categorize. Respondents indicated waste types only; information as to quantities by category was determined too sensitive to request.

- As a lower bound, 40-50 companies would be initially anticipated to list with a waste exchange. It is assumed that a portion of the non-respondents would list with the exchange, as well as the many companies not surveyed.
- Based strictly on supply-oriented survey data, the waste exchange concept has substantial industry support and appears to be recognized as an economic alternative to out-of-state disposal of hazardous wastes by Florida manufacturers.

REFERENCES FOR CHAPTER IX

- (1) State of Florida Department of Commerce, Division of Tourism. Tourism: The Greening of the Sunshine State, 1978.
- (2) State of Florida Executive Office of the Governor, Revenue and Economic Analysis. Economic Report of the Governor, 1979-80.
- (3) Florida Department of Environmental Regulation, Hazardous Waste Survey for the State of Florida. Final Report, DER Contract SW-2, October 1977.
- (4) Franklin Associates, Ltd., Feasibility Study for Establishing a Waste Exchange in the Rocky Mountain Region, U.S. EPA, Region VIII, December 4, 1979.
- (5) Institute of Science and Public Affairs, Florida Resources and Environmental Analysis Center. Assessment of the Economic Impact of Florida's Proposed Hazardous Waste Control Program on Selected Industries. DER Final Report SW-4, October 1979.
- (6) Florida Department of Environmental Regulation, Hazardous Waste Survey for the State of Florida. Final Report, DER Contract SW-2, October 1977.
- (7) Florida Department of Environmental Regulation, Hazardous Waste Survey for the State of Florida. Final Report, DER Contract SW-2, October 1977.
- (8) The estimate of approximately 61,000 gallons was derived by assuming a conversion of 8.3 pounds per gallon of primary rinse water.
- (9) Franklin Associates, Ltd., Feasibility Study for Establishing a Waste Exchange in the Rocky Mountain Region, U.S. EPA, Region VIII, December 4, 1979.
- (10) The waste quantities reported in the Region VIII feasibility study were on wet weight basis. Rinse water with low concentrations of hazardous waste were not included in reported waste quantities. This information was confirmed via phone conversation with co-author, Nicholas S. Artz on February 21, 1981.
- (11) The estimate for waste quantities actually exchanged is reported in Arthur D. Little, Inc., Waste Clearinghouse and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report, EPA Hazardous Waste Management Division, Contract 68-01-3241, 1976, p. 34.
- (12) A.D. Little, Inc., Waste Clearinghouses and Exchanges, p. 31.
- (13) A.D. Little, Inc., Waste Clearinghouses and Exchanges, p. 34.
- (14) A.D. Little, Inc., Waste Clearinghouses and Exchanges, p. 31.
- (15) Typical common carrier truckload quantities equal approximately 40,000 pounds.

- (16) See page S.15 of Assessment of the Economic Impact of Florida's Proposed Hazardous Waste Control on Selected Industries.
- (17) The estimate for the percentage increase in out-of-state disposal was determined via telephone communication to a large disposal facility in Livingston, Alabama. Cost increase are broken down into two categories: transportation (50 percent increase) and handling of burial (approximately 67 percent increase).
- (18) For example, a mail survey performed by Franklin Associates, Ltd. for their study: Feasibility Study for Establishing a Waste Exchange in the Rocky Mountain Region, experienced a 15.2 percent response rate (30/198).

CHAPTER X. PROFILE OF POTENTIAL HAZARDOUS WASTE USERS IN FLORIDA

A. Profile of Potential Waste Users

Potential users or demanders of waste material can be broken down into two main categories: (1) firms that use waste as an input in their production process; and (2) firms that act as reclaimers, reprocessing the waste to purify specific chemical compounds. The user category will be discussed first, followed by a discussion of reclaimers in Florida.

To date, no Florida-specific survey of manufacturing industries has been conducted to determine which industries use waste materials or could potentially become users of waste material. Therefore, there is no directory of demander industries in the state. Without such a directory, an indirect approach has been used to identify likely waste demanders. Thus, information in this section is based on studies conducted in other geographic regions and from the findings of a limited mail survey conducted as part of this study.

Previous research has suggested that potential demanders of waste material fall mainly into eleven two-digit SIC manufacturing categories.¹ These are:

SIC 22	textile mill products
SIC 24	lumber and wood products, except furniture
SIC 26	paper and allied products
SIC 27	printing, publishing and allied products
SIC 30	rubber and miscellaneous plastic products
SIC 31	leather and leather products
SIC 32	stone, clay, glass and concrete products
SIC 33	primary metal industries
SIC 34	fabricated metal products
SIC 35	machinery, except electrical
SIC 36	electrical and electronic machinery

For this study, it was assumed that these eleven SIC groups comprise the majority of the potential clients for waste materials.

For the purpose of analyzing the possibility of a waste exchange, it is useful to know something about the size, employment level, and location of potential demanders. Using data provided by Florida's Department of Labor, Employment Security Records, such a profile was developed.

Table X-1 lists the selected eleven manufacturing industries and shows their 1980 employment levels. Furthermore, these are ranked according to the number of employees. The largest employment is in SIC 36, electronics, with 60,049 employees and the smallest employment is in SIC 22, textiles, with 3,949 employees.

Total 1980 employment in the eleven SIC groups statewide is 261,554. With total manufacturing employment being 472, 731 (see Table X-2), the eleven industries comprise 55.33 percent of Florida's employment in the manufacturing sector. This suggests that over half of the state's manufacturing sector is a potential demander of hazardous wastes.

These selected eleven two-digit SIC categories are primarily composed of small to medium sized firms. Table X-3 gives the number and rank of firms in each of these categories. In addition, in Table X-4 gives an estimate of average firm size (by number of employees). Of the industries listed, the highest average employment is in SIC 36, electronics. While the electronics industry has an average firm size of approximately 114 employees, even this average size does not constitute a large firm.

The firm size of potential demanders becomes important when we consider that larger firms would be more able to afford to search for potential suppliers on their own. It is the small to medium sized firms which, lacking these resources, benefit more from a centralized waste exchange service.

TABLE X-1

POTENTIAL DEMANDERS OF WASTE MATERIAL IN FLORIDA
EMPLOYMENT BY TWO-DIGIT SIC CODE

<u>SIC Code</u>	<u>Industry Description</u>	<u>Employment</u>	<u>Percentage of Total Potential Demanders</u>	<u>Rank</u>
22	Textile mill products	3,949	1.51	11
24	Lumber and wood products, except furniture	23,956	9.16	5
26	Paper and allied products	16,117	6.16	8
27	Printing, publishing and allied products	40,809	15.60	2
30	Rubber and miscellaneous plastic products	16,792	6.42	7
31	Leather and leather products	3,357	1.28	10
32	Stone, clay, glass and concrete products	20,996	8.03	6
33	Primary metal industries	5,051	1.93	9
34	Fabricated metal products	34,807	13.31	4
35	Machinery, except electrical	35,671	13.64	3
36	Electrical and electronic machinery	60,049	22.96	1
TOTAL		261,554	100.00	

Florida Potential Waste Demanders as Percentage of Total Manufacturing

Total Florida Manufacturing Employment	472,731
Total Potential Waste Demander Employment	261,554
Percentage of Total	55.33%

SOURCE: Employment Security Records, Florida Department of Labor, 1980.

TABLE X-2
TOTAL FLORIDA MANUFACTURING EMPLOYMENT
BY TWO-DIGIT SIC CODE

<u>SIC Code</u>	<u>Industry Description</u>	<u>Employment</u>	<u>Percentage of Total Employment</u>	<u>Rank</u>
10	Metal mining	411	.09	22
14	Mining and quarrying of non-metallic minerals	9400	2.00	15
20	Food and kindred products	52,256	11.05	2
21	Tobacco manufacturers	2,418	.51	20
22	Textile mill products	3,949	.84	18
23	Apparel and other finished products	35,552	7.52	6
24	Lumber and wood products, except furniture	23,956	5.07	9
25	Furniture and fixtures	12,055	2.55	14
26	Paper and allied products	16,117	3.41	12
27	Printing, publishing and allied products	40,809	8.63	4
28	Chemicals and allied products	26,910	5.69	8
29	Petroleum refining and related industries	1,810	.38	21
30	Rubber and miscellaneous plastic products	16,792	3.55	11
31	Leather and leather products	3,357	.71	19
32	Stone, clay, glass and concrete products	20,996	4.44	10
33	Primary metal industries	5,051	1.07	17
34	Fabricated metal products	34,807	7.36	7
35	Machinery, except electrical	35,671	7.55	5
36	Electrical and electronic machinery	60,049	12.70	1
37	Transportation equipment	47,864	10.12	3
38	Instruments: photo, medical, optical and watches	14,822	3.14	13
39	Miscellaneous manufacturing industries	7,679	1.62	16
TOTAL		472,731	100.00	

SOURCE: Employment Security Records, Florida Department of Labor, 1980.

TABLE X-3
POTENTIAL DEMANDERS OF WASTE MATERIALS
IN FLORIDA FIRMS BY TWO-DIGIT SIC CODE

<u>SIC Code</u>	<u>Industry Description</u>	<u>Firms</u>	<u>Percentage of Total Potential Demanders</u>	<u>Rank</u>
22	Textile mill products	136	1.71	9
24	Lumber and wood products, except furniture	1,403	17.67	2
26	Paper and allied products	158	1.99	8
27	Printing, publishing and allied products	2,081	26.21	1
30	Rubber and miscellaneous plastic products	509	6.41	7
31	Leather and leather products	81	1.02	11
32	Stone, clay, glass and concrete products	715	9.01	5
33	Primary metal industries	121	1.52	10
34	Fabricated metal products	1,096	13.81	4
35	Machinery, except electrical	1,115	14.04	3
36	Electrical and electronic machinery	525	6.61	6
TOTAL		7,940	100.00	

SOURCE: Employment Security Records, Florida Department of Labor, 1980.

TABLE X-4
AVERAGE FIRM SIZE OF POTENTIAL
DEMANDERS OF WASTE MATERIAL

<u>SIC Code</u>	<u>Industry Description</u>	<u>Employment</u>	<u>Number of Firms</u>	<u>Average Sized Firm (number of employees)</u>
22	Textile mill products	3,949	136	29
24	Lumber and wood products, except furniture	23,956	1,403	17
26	Paper and allied products	16,117	158	102
27	Printing, publishing and allied products	40,809	2,081	20
30	Rubber and miscellaneous plastic products	16,792	509	33
31	Leather and leather products	3,357	81	41
32	Stone, clay, glass and concrete products	20,996	715	29
33	Primary metal industries	5,051	121	42
34	Fabricated metal products	34,807	1,096	32
35	Machinery, except electrical	35,671	1,115	32
36	Electrical and electronic machinery	60,049	525	114

SOURCE: Adapted from Tables X-1 and X-3.

The geographic location of firms in the potential demander industries is of central importance to the feasibility of hazardous waste exchange. As discussed in an earlier section, the cost of transporting hazardous wastes comprises a significant percentage of the total exchange cost. The shorter the distances between potential demanders and suppliers, the lower this cost, and the more likely an exchange will occur.

Table X-5 presents employment in the eleven two-digit categories within each of Florida's counties and the percentage of total demander employment in each county is displayed. The residual figure at the end of the table is comprised of firms that could not be assigned to one particular county.²

It is interesting to note that over 80 percent of potential demand employment can be found within thirteen of Florida's sixty-seven counties (Table X-6). Five of these counties (Dade, Broward, Pinellas, Hillsborough and Duval) account for over 50 percent of potential demander employment.

The demanders can, in fact, be divided into four geographical sectors (Table X-7). The first cluster is located on Florida's southeastern coast and includes Dade, Broward and Palm Beach counties. Within these three counties, 37.07 percent of potential demander employment is found. A second cluster consists of Pinellas, Hillsborough, Polk, Sarasota, and Manatee counties, which are on the southern Gulf coast of the state. Employment within these five counties accounts for 23.44 percent of the total. In central Florida, Brevard, Orange, Seminole and Volusia counties comprise a third cluster and share 15.11 percent of the total employment. Finally, we can consider Duval County, in northern Florida, as a demander cluster; this county contains 5.69 percent of the total demander employment. Other than the counties within the selected clusters, Escambia County comprises 20 percent of the total manufacturing employment. However, two percent of manufacturing activity does not qualify Escambia as a cluster.

TABLE X-5

POTENTIAL DEMANDERS OF WASTE MATERIALS
IN FLORIDA, EMPLOYMENT BY COUNTY

<u>County</u>	<u>Employment</u>	<u>Percentage of Total Employment</u>
Alachua	3,464	1.32
Baker	161	.06
Bay	1,920	.75
Bradford	122	.05
Brevard	14,335	5.48
Broward	31,223	11.94
Calhoun	296	.11
Charlotte	292	.11
Citrus	191	.07
Clay	565	.22
Collier	916	.35
Columbia	953	.36
Dade	53,656	20.51
Desoto	298	.11
Dixie	287	.11
Duval	14,893	5.69
Escambia	5,268	2.01
Flagler	172	.07
Franklin	17	.01
Gadsden	699	.27
Gilchrist	47	.02
Glades	6	negligible
Gulf	1,067	.41
Hamilton	60	.02
Hardee	283	.12
Hendry	47	.02
Hernando	388	.15
Highlands	492	.19
Hillsborough	18,812	7.19
Holmes	132	.05
Indian River	501	.19
Jackson	471	.18
Jefferson	133	.05
Lafayette	19	.01
Lake	1,735	.66
Lee	2,743	1.05
Leon	1,824	.70
Levy	802	.31
Liberty	176	.07
Madison	392	.15
Manatee	3,392	1.30
Marion	3,589	1.37
Martin	1,082	.41
Monroe	319	.12
Nassau	1,605	.61
Okaloosa	2,559	.98
Okeechobee	78	.03
Orange	12,937	4.95
Osceola	1,613	.62
Palm Beach	13,925	5.32
Pasco	1,368	.52
Pinellas	26,161	10.00
Polk	7,694	2.94
Putnam	2,202	.84
St. Johns	512	.20
St. Lucie	659	.25
Santa Rosa	80	.03
Sarasota	5,259	2.01
Seminole	6,689	2.56
Sumter	326	.12
Suwannee	221	.08
Taylor	1,814	.69
Union	93	.04
Volusia	6,072	2.32
Wakulla	30	.01
Walton	73	.03
Washington	116	.04
Residual	1,228	.47
TOTAL	261,554	100.00

SOURCE: Employment Security Records, Florida Department of Labor, 1980.

TABLE X-6
RANK ORDER OF SELECTED COUNTIES WITH THE LARGEST
EMPLOYMENT OF POTENTIAL DEMANDERS

<u>County</u>	<u>Employment</u>	<u>Percentage of Total Potential Demander Employment</u>	<u>Cumulative Percentage</u>
Dade	53,656	20.51	20.51
Broward	31,223	11.24	31.75
Pinellas	26,161	10.00	41.75
Hillsborough	18,812	7.19	48.94
Duval	14,893	5.69	54.63
Brevard	14,335	5.48	60.11
Palm Beach	13,925	5.32	65.43
Orange	12,937	4.95	70.38
Polk	7,694	2.94	73.32
Seminole	6,689	2.56	75.88
Volusia	6,072	2.32	78.20
Escambia	5,268	2.01	80.21
Sarasota	5,259	2.01	82.22

SOURCE: Adapted from Table X-5.

TABLE X-7
GEOGRAPHIC CLUSTERS OF POTENTIAL DEMANDERS

	<u>Counties</u>	<u>Percentage of Total Potential Demander Employment</u>	<u>Cluster Percentage of Total Potential Demander Employment</u>
CLUSTER 1	Dade Broward Palm Beach	20.51 11.25 <u>5.32</u>	<u>37.07</u>
CLUSTER 2	Pinellas Hillsborough Polk Sarasota Manatee	10.00 7.19 2.94 2.01 <u>1.30</u>	<u>23.44</u>
CLUSTER 3	Brevard Orange Seminole Volusia	5.28 4.95 2.56 <u>2.32</u>	<u>15.11</u>
CLUSTER 4	Duval	<u>5.69</u>	<u>5.69</u>

SOURCE: Adapted from Table X-5.

The geographic pattern that has been established above coincides with the overall location pattern of all of Florida manufacturers. Of particular interest is the fact that it also coincides with the location pattern of Florida's waste-generating industries. In other words, Florida's potential suppliers and demanders are heavily concentrated in the same areas of the state. This will, no doubt, facilitate exchange.

B. Demand Potential: Survey Results

An additional purpose of the survey was to try to substantiate information gathered from secondary data bases and test their applicability to the state of Florida. Four hundred and seventy-four firms from potential supply and demand four-digit categories were sent questionnaires; of these, 97 responded. Chapter XI reports the methodology and description of the survey, along with the findings derived from it. This section deals only with those questions that pertain to the potential demand for waste (see Appendix C, questions 2 and 5).

In Table X-8, the responses to the first of these questions are displayed by SIC code. Out of 97 respondents, 42 would "definitely" request waste through a waste exchange. In comparison, 16 would "definitely not" request waste. Of the remaining respondents, 7 were "neutral," 15 indicated "don't know," and 10 failed to check any response.

It is important to note that the percentage of the "yes" responses only gives an indication of a lower bound on potential demand. It is suggested that some of those responding "no" to this question may be willing to demand some type of waste in the future.

Furthermore, it is interesting to examine the yes/no response ratio of those industries that fall within the eleven potential demander industry groups. Comparing this ratio to that of other industry groups expands the number of potential demander categories.

TABLE X-8
FREQUENCY OF WILLINGNESS TO REQUEST WASTE
BY SIC CODE

SIC Code	Definitely Yes (1)	(2)	(3)	(4)	Definitely No (5)	Don't Know	No Response
2221	0	0	0	0	1	0	0
2491	1	0	0	1	0	1	0
2499	0	0	0	0	0	1	0
2611	2	0	0	0	0	0	0
2631	1	0	0	0	0	1	0
2752	1	0	0	0	0	0	0
2812	1	0	0	0	0	0	0
2813	0	0	0	0	1	1	0
2819	1	0	1	0	0	1	0
2821	1	0	0	0	0	1	0
2824	0	0	1	0	0	0	0
2833	2	0	0	0	0	0	0
2834	0	0	0	0	2	0	0
2841	0	0	0	0	1	0	0
2842	2	0	0	0	0	0	0
2851	1	0	0	0	0	1	3
2869	0	0	1	0	1	0	0
2874	2	0	0	0	0	0	0
2875	0	0	0	0	1	0	0
2892	1	0	0	0	0	0	0
2893	0	0	0	0	0	1	0
2899	0	0	1	0	0	0	0
2911	2	0	0	0	0	0	0
2952	0	0	0	0	0	1	0
2992	2	0	0	0	0	0	0
3069	1	0	0	0	0	0	1
3079	2	0	0	1	0	0	2
3111	1	0	0	0	0	0	0
3221	0	2	1	0	0	0	0
3253	1	0	0	1	0	0	0
3273	2	0	0	0	0	0	0
3312	1	0	0	0	0	0	0
3313	0	0	0	0	2	0	0
3316	0	0	0	0	0	0	1
3317	0	0	1	0	0	0	0
3325	1	0	0	0	0	0	0
3341	1	0	0	0	0	0	0
3355	0	0	0	0	0	0	1
3357	1	0	0	0	0	0	0
3361	0	0	0	0	0	1	0
3362	0	0	1	0	0	0	0
3369	0	0	0	0	1	0	0
3398	0	0	0	0	0	0	1
3462	0	0	0	1	0	0	0
3471	2	0	0	0	0	0	0
3519	0	0	0	1	0	0	0
3544	0	0	0	0	1	0	0
3613	2	0	0	0	0	1	0
3643	1	0	0	0	0	0	0
3662	0	0	0	0	1	0	0
3811	2	0	0	0	1	0	0
3822	0	0	0	0	0	1	0
3823	1	0	0	0	1	1	0
3825	0	0	0	0	0	1	0
3829	1	0	0	0	0	0	0
3841	1	0	0	0	1	0	0
9999*	1	0	0	0	1	1	0
TOTAL	42	2	7	5	16	15	10

*SIC Code 9999 was assigned to those respondents for which a SIC Code could not be established.

SOURCE: Survey conducted by Center.

Table X-9 shows the willingness of potential demanders to participate, while Table X-10 shows the response of firms not originally considered potential demanders. Of the responding firms, 49 (out of 97) fell into the potential demanders category. Of these, 21 responded that they would definitely request waste. Firms that initially were not included as potential demanders totaled 48. Of these, 21 again responded in the affirmative, compared to 10 that responded negatively.

Comparing the yes/no ratio of these two groups of firms, no significant difference between the two was found, with an original potential demanders responding in a ratio of 21/6 and the others of 21/10. These results suggest that we might want to add the two-digit SIC 28, 29 and 38 to our potential demander category. Doing so will increase the statewide employment in the potential demander sector from 261,554 to 305,096 employees.

Table X-11 presents results of question No. 2. No implications can be made from this table, however, because the sample was biased toward industrially concentrated counties.

The responses to question No. 5 are provided in Tables X-12 and X-13. Table X-12 shows the categories of waste that could be requested by SIC codes. Table X-13 shows the same categories crossed with counties. Twenty-five of the respondents indicated that they would demand solvents; 14, acids; 11, alkalis; 1, catalysts; 10, waste oils; 3, heavy metal sludges; and 18, some other type of waste. In Table X-14, a description of these other types of wastes requested is presented.

TABLE X-9

FREQUENCY OF WILLINGNESS TO REQUEST:
POTENTIAL DEMANDERS BY SIC CODE

<u>SIC Code</u>	Definitely Yes (1)	(2)	(3)	(4)	Definitely No (5)	Don't Know	Number of Firms	No Response
22	0	0	0	0	1	0	1	0
24	1	0	0	1	0	2	4	0
26	3	0	0	0	0	1	4	0
27	1	0	0	0	0	0	1	0
30	3	0	0	1	0	0	7	3
31	1	0	0	0	0	0	1	0
32	3	2	1	1	0	0	7	0
33	4	0	2	0	3	1	13	3
34	2	0	0	1	0	0	4	1
35	0	0	0	1	1	0	2	0
36	3	0	0	0	1	1	5	0
TOTAL	21	2	3	5	6	5	49	7

SOURCE: Adapted from Table X-8.

TABLE X-10

FREQUENCY OF WILLINGNESS TO REQUEST: INDUSTRIES
NOT INITIALLY IDENTIFIED AS POTENTIAL DEMANDERS

<u>SIC Code</u>	Definitely <u>Yes</u> <u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(4)</u>	Definitely <u>No</u> <u>(5)</u>	<u>Don't</u> <u>Know</u>	<u>Number of</u> <u>Firms</u>	<u>No</u> <u>Response</u>
28	11	0	4	0	6	5	29	3
29	4	0	0	0	0	1	5	0
38	5	0	0	0	3	3	11	0
99	1	0	0	0	1	1	3	0
TOTAL	21	0	4	0	10	10	48	3

SOURCE: Adapted from Table X-8.

TABLE X-11
FREQUENCY OF WILLINGNESS
TO REQUEST BY COUNTY

<u>County</u>	Definitely Yes (1)	(2)	(3)	(4)	Definitely No (5)	<u>Don't Know</u>	<u>Number of Firms</u>	<u>No Response</u>
Bay	1	0	0	0	0	0	1	0
Bradford	1	0	0	0	0	0	1	0
Broward	1	0	0	1	1	1	6	2
Dade	7	0	1	1	2	1	15	3
Duval	4	0	1	0	0	1	8	2
Escambia	0	0	0	0	0	3	3	0
Gulf	1	0	0	0	0	0	1	0
Highlands	1	0	0	0	0	0	1	0
Hillsborough	8	0	0	1	4	3	16	0
Leon	0	0	0	0	0	1	1	0
Marion	0	0	0	0	0	1	1	0
Orange	2	0	1	0	3	1	8	1
Palm Beach	1	0	1	0	0	1	3	0
Pinellas	0	0	1	0	0	0	1	0
Polk	3	1	1	0	3	0	8	0
Wakulla	2	0	0	0	0	0	2	0
Other ^a	10	1	1	2	3	2	21	2
TOTAL	42	2	7	5	16	15	97	10

^aNo costs could be established for respondents.

SOURCE: Survey conducted by the Center, January 1981.

TABLE X-12
FREQUENCY OF WILLINGNESS TO REQUEST
BY WASTE CATEGORY BY SIC CODE

SIC Code	Solvents	Acids	Alkalies	Catalyst	Waste Oils	Heavy Metal Sludges	Other
2221	0	0	0	0	0	0	0
2491	1	0	0	0	0	0	0
2499	0	0	1	1	0	0	1
2611	0	1	1	0	0	0	1
2631	0	0	1	0	1	0	2
2752	0	0	0	0	0	0	1
2812	1	1	1	0	0	0	0
2813	0	0	0	0	0	0	0
2819	1	2	1	0	2	0	0
2821	1	0	0	0	1	0	0
2824	0	0	0	0	0	0	1
2833	1	1	1	0	0	0	1
2834	0	0	0	0	0	0	1
2841	0	0	0	0	0	0	0
2842	2	1	1	0	0	0	0
2851	1	0	0	0	0	0	1
2869	0	0	0	0	0	0	0
2874	1	1	1	0	0	0	1
2875	0	0	0	0	0	0	0
2892	1	0	0	0	0	0	0
2893	1	0	0	0	0	0	0
2899	1	1	0	0	0	0	0
2911	1	0	0	0	2	0	0
2952	0	0	0	0	0	0	0
2992	1	0	0	0	1	0	0
3069	1	0	0	0	0	0	0
3079	1	0	0	0	0	0	1
3111	0	0	0	0	0	0	0
3221	0	0	0	0	0	0	1
3253	0	0	0	0	0	0	1
3273	1	0	0	0	1	0	1
3312	1	0	0	0	0	0	0
3313	0	0	0	0	0	0	0
3316	0	0	0	0	0	0	0
3317	0	1	0	0	0	0	0
3225	0	0	0	0	0	0	0
3341	0	0	0	0	0	0	1
3355	0	0	0	0	0	0	0
3357	1	1	1	0	0	1	0
3361	0	0	0	0	0	0	1
3362	0	0	0	0	0	0	0
3369	0	0	0	0	0	0	0
3398	0	0	0	0	0	0	0
3462	1	0	0	0	1	0	0
3471	0	1	1	0	0	0	0
3519	0	0	0	0	0	0	0
3544	0	0	0	0	0	0	0
3613	1	0	0	0	0	0	0
3643	0	0	0	0	0	0	0
3662	0	0	0	0	0	0	0
3811	1	0	0	0	0	0	1
3822	1	0	0	0	1	0	0
3823	1	1	0	0	0	0	0
3825	0	0	0	0	0	0	0
3829	0	0	0	0	0	0	0
3841	1	1	0	0	0	0	0
9999 ^a	0	1	1	0	0	0	0
TOTAL	25	14	11	1	10	1	18

^aSIC 9999 was assigned to responded which SIC code would not be determined.

SOURCE: Survey conducted by Center.

TABLE X-13
FREQUENCY OF WILLINGNESS TO REQUEST
BY WASTE CATEGORY BY COUNTY

<u>County</u>	<u>Solvents</u>	<u>Acids</u>	<u>Alkalies</u>	<u>Catalyst</u>	<u>Waste Oils</u>	<u>Heavy Metal Sludges</u>	<u>Other</u>
Bay	0	0	0	0	0	0	1
Bradford	0	0	0	0	1	0	0
Broward	1	0	0	0	1	0	1
Dade	6	4	2	0	0	1	3
Duval	1	1	1	0	1	0	1
Escambia	2	0	0	0	0	0	0
Gulf	0	0	1	0	0	0	1
Highland	0	0	0	0	0	1	0
Hillsborough	4	1	1	0	1	1	3
Leon	0	0	1	1	0	0	1
Marion	0	0	0	0	1	0	0
Orange	1	1	0	0	0	0	1
Palm Beach	1	0	0	0	1	0	1
Pinellas	0	0	0	0	0	0	0
Polk	2	3	2	0	0	0	2
Wakulla ^a	2	0	0	0	1	0	0
Other ^a	5	4	3	0	3	0	3
TOTAL	25	14	11	1	10	3	18

^aNo county could be established for respondents.

SOURCE: Survey conducted by Center.

TABLE X-14

WILLINGNESS TO REQUEST: DESCRIPTION OF
"OTHER" CATEGORY BY SIC CODE

<u>SIC Code</u>	<u>Type of Waste Requested</u>
2499	clean wood for particle board or fuel
2611	wood bark and other waste fuel
2631	wood waste for fuel
2752	paper
2821	fatty acids
2824	polyvinyl chloride
2833	paper and plastic products
2874	minor amounts of miscellaneous chemicals
3079	scrap polyethylene films
3253	ceramic material, clay, glass, etc.
3273	minerals
3341	metal slag for recycling furnace
3361	scrap cast aluminum
3811	waste flux

SOURCE: Survey conducted by the Center.

At this juncture, several points need clarification. First, from the response category "other" in Table X-12, it is obvious that the respondents have considered both hazardous and non-hazardous waste materials in their responses. This does not create a major problem, considering that the major task of this study was to establish the feasibility of an industrial waste exchange. As such, the waste exchange could provide transfer information to generators and users of both hazardous and non-hazardous wastes.

Second, it is impossible to derive from these results an estimate regarding the absolute or relational quantities of waste demanded in each category. For example, over 25 firms indicated that they would demand solvents and only 11 indicated that they would demand alkalis. However, to imply that more than twice the amount of solvent will be demanded over alkalis is not accurate.

A third item in the questionnaire is also of importance to the study of demand. The surveyed firms were asked to respond to a question concerning any current participation in any of waste transfer, either intercompany or intracompany (see Appendix C, question 7). Eighteen companies responded in the affirmative to this question. Table X-15 provides a description of the type of activities in which these firms are involved. Of these firms, at least four reclaimed or recycled their waste internally. One respondent indicated that it gave its waste oil to reclaimers.

It is also of interest to note that two of the firms responding claimed that their major supplier takes back most of their waste product. This, in conjunction with other information, suggests that at least some of the major chemical corporations in the state (who supply smaller firms with virgin chemical as inputs) will, for a fee below disposal costs, take their customer's waste out of state for recycling or disposal. These operations are carried out with profits accruing to the chemical suppliers.³

TABLE X-15
CURRENT EXCHANGE ACTIVITY BY SIC CODE

<u>SIC Code</u>	<u>Type of Waste or Description of Activity</u>	<u>Number of Firms</u>
2491	wood wastes	2
2819	spent 32% sulfuric acid sold to 1 paper company	1
2821	waste rosin oil	1
2842	solvents reclaimed internally	1
	exchange with branch plants	1
2851	recycling all wash solvents internally	1
2952	waste oils	1
2992	waste oils are given to reclaimers	1
3069	paper, plastic cork scrap	1
3221	buys clean container glass	1
3357	major supplier trucks away waste	1
3361	aluminum supplier buys dross and recycles it	1
3544	waste is sold as scrap	1
3613	scrap metal wire	1
3823	recycling sodium hydroxide, solvents, heavy metals, and acids	1
N.A. ^a	waste oils heavy metals	1
N.A.	have accepted alkaline waste products into plant and also have contributed limited quantities of acidic wastes to commercial organizations	1
TOTAL		18

^aN.A.: SIC code not available.

SOURCE: Survey conducted by the Center.

A final item of interest was the question pertaining to potential hindrances to waste transfer (see Appendix C, question 8). Responses to this question are summarized in Table X-16. These hindrances can be grouped into three major categories: economic, legal, and marketing. Of the responses to this question, 22 were categorized as economic, 10 as marketing, and 35 as legal.

C. Profile of Florida Material Reclaimer Industry

Florida currently has six material reclaimer firms listed with the Florida Department of Environmental Regulation. It is, however, doubtful that all six are presently operating. As mentioned in a preceding section, reclaimers form the second potential group of users (or demanders) of waste material, although in actual number they are rather small.

In an effort to provide such a profile, the reclaimers were surveyed (Appendix D); only two responded. This response rate was anticipated, given the sensitivity of the subject matter. The purpose of the survey was to gather information on the type of wastes these firms reprocess, the type of final product produced, what firms the reclaimers served, the type of contractual agreement they currently have with their clients, and the size and capacity of these firms.

Table X-17 lists the types of waste processed by the reclaimers. The two responding firms process more than one type of waste, with both reclaimers processing oil and solvents, and one also processing acids. Both reclaimers are supplied by manufacturing firms, with which they have long-term contracts that provide a continuous flow of material (see Tables X-18 and X-19). Furthermore, note that both reclaimers pay a negotiated fee for their wastes (Table X-20). In other words, suppliers of waste material receive a positive price for these wastes. Table X-21 shows that both of the reclaimers produce solvents as a final product. One of them also produces acids and sludges.

TABLE X-16

POTENTIAL HINDRANCES TO WASTE EXCHANGE BY CATEGORY

	<u>Number of Firms</u>
<u>Economic</u>	
Cost of transportation	2
Cost effectiveness of exchange	<u>20</u>
TOTAL	22
<u>Marketing</u>	
Quantity or timing	<u>10</u>
TOTAL	10
<u>Legal</u>	
Impurities in waste	5
Confidentiality	5
Fear of government intervention	4
Legal and government restrictions	9
Liability and environmental damage	<u>12</u>
TOTAL	35

SOURCE: Survey conducted by the Center.

TABLE X-17
TYPES OF WASTES CURRENTLY PROCESSED

Reclaimer	Types of Wastes				
	Oils	Acids	Solvents	Alkalis	Other
No. 1	1	1	1	0	0
No. 2	1	0	1	0	0
TOTAL	2	1	2	0	0

SOURCE: Florida Material Reclaimer Survey

TABLE X-18
TYPES OF COMPANIES SUPPLYING
WASTE TO RECLAIMERS

Reclaimer	Manu- facturing	Gas Stations	Waste Collectors	Private Individuals
No. 1	1	0	0	0
No. 2	1	0	0	0
TOTAL	2	0	0	0

SOURCE: Florida Material Reclaimer Survey

TABLE X-19
ARRANGEMENT WITH PRIMARY SUPPLIERS

Reclaimer	A		B	
	Long Term	Short Term	Sporadic	Continuous
No. 1	1	0	0	1
No. 2	1	0	0	1
TOTAL	2	0	0	2

SOURCE: Florida Material Reclaimer Survey

TABLE X-20
PAYMENT ARRANGEMENT WITH SUPPLIERS

Reclaimer	No Charge	Transportation Cost Only	Negotiated Charge
No. 1	0	0	1
No. 2	0	0	1
TOTAL	0	0	2

SOURCE: Florida Material Reclaimer Survey

TABLE X-21
END PRODUCTS CURRENTLY PRODUCED

Reclaimer	Oil	Acids	Chemicals: Organic/ Inorganic	Solvents	Catalyst	Sludges	Other
No. 1	0	1	0	1	0	1	0
No. 2	0	0	0	1	0	0	0
TOTAL	0	1	0	2	0	1	0

SOURCE: Florida Material Reclaimer Survey

The final customers of these firms are manufacturing companies that use the reclaimed product as input in the production process. One of the reclaimers specified that his primary customers were pharmaceutical, electronic and other manufacturing firms (Table X-22). Finally, in Table X-23, it is shown that legal responsibility for waste is assumed by both firms at the time the material is received.

It is clear from the results of this survey that the reclaimer industry in Florida is not currently significant. The two firms responding to this survey employ a total of 130 people, an average of 65 employees per firm. Assuming that all six material reclaimers in the state are operating, using 65 employees as the average size, we estimate that the entire statewide industry has a total of 400 employees.

This survey reveals little about the current status of exchange and reprocessing activity in Florida. There is evidence from the manufacturers survey that firms are reclaiming waste internally or having their waste reclaimed by out-of-state firms. Thus, there is demand for growth in the reclaiming industry in Florida.⁴

D. Summary and Conclusions

In this section, a profile of potential users of hazardous waste has been presented. The information in this chapter is primarily based on two mail surveys conducted for this study.

The following are the conclusions reached concerning potential hazardous waste demanders in Florida.

- Potential demanders in Florida make up over 50 percent of the total manufacturing employment.
- The potential demander industries are made up of primarily small to medium sized firms.

TABLE X-22
PURCHASERS OF REPROCESSED PRODUCTS

Reclaimer	Final Use (consumers)	Intermediary Use (manufacturer)
No. 1	0	1
No. 2	0	1
TOTAL	0	2

SOURCE: Florida Material Reclaimer Survey

TABLE X-23
ASSUMPTION OF LEGAL LIABILITY BY RECLAIMER

	Reclaimer 1	Reclaimer 2
At time of payment	0	0
At time of receipt of material	1	1
After waste is on premises	0	0
Other	0	0

SOURCE: Florida Material Reclaimer Survey

- These firms are located mainly in four geographical clusters, coinciding with the pattern of all Florida manufacturing and in particular industries that generate waste.
- A substantial amount of transfer activity already occurs in Florida.
- The hazardous waste reclaimer industry in Florida is comprised of six known plants. It is currently viewed as insignificant. However, substantial growth in this industry is anticipated.

REFERENCES FOR CHAPTER X

- (1) A.D. Little, Inc., Waste Clearinghouses and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Waste. Final Report, EPA Hazardous Waste Management Division, Contract No. 68-01-3241, 1976, p. 29.
- (2) The Florida Department of Labor, Division of Employment Security Records, was unable to identify county-specific locations for certain firms.
- (3) This information comes from the Workshop Questionnaire, Appendix E.
- (4) This information comes from the Workshop Questionnaire, Appendix E.

XI. A SURVEY OF FLORIDA INDUSTRY

A. Purpose of the Survey

An examination of available secondary data sources did not provide insight into the attitudes of Florida industry towards the waste exchange concept. Thus it was necessary to conduct a mail survey of selected SICs. The survey was conducted during the month of February 1981 through a mailing to 474 individually owned firms in Florida. The firms were provided a cover letter explaining the questionnaire's purpose, a questionnaire and a pre-stamped return envelope. Questionnaires were addressed to specific individuals within each firm; however, complete anonymity was promised and maintained. The survey was designed to ascertain industry preferences in four major areas. First, industry willingness to participate in a waste exchange by either listing or requesting wastes through the exchange. For further amplification, an assessment of industry reaction to the waste exchange concept was also sought. Second, input concerning industry preferences regarding the sponsoring and operating of the waste exchange was sought. Third, the questionnaire was used to get an idea of the types of wastes that would be listed or requested through the waste exchange. Finally, industry concerns regarding the major obstacles to participation in a waste exchange program were requested.

Information gathered from this survey is displayed and discussed in various chapters throughout this report. However, response to selected questions are shown and discussed in the result section of this chapter as the content of these questions did not lend itself to the thrust and purpose of the other chapters comprising this report.

B. Sample Design

The process by which the list of firms to be surveyed was determined is patterned after previous surveys of this type. Initially, the list was to be

comprised of approximately 500 firms that fell into the broad category of manufacturing. The selection process involved a two-step procedure. First, potential demanders were identified from a previous report studying waste transfer.¹ Second, potential suppliers were those industries surveyed in the 1977 Florida Hazardous Waste Survey.² As it turned out, these two lists overlapped extensively. Being constrained financially to survey a maximum of 500 firms, the list was designed to spread these firms over 60-80 four-digit SICs. Under this strategy, it was hoped to broadly diagnose the preferences of those industries most likely to use the services of a waste exchange. The final list consisted of 474 firms surveyed in 78 four-digit SICs, with as few as one firm surveyed in SIC 3332 and as many as thirty-one firms in SIC 3078. The average number of firms surveyed per SIC was approximately six.

As a general starting point, the A.D. Little study, "Waste Clearinghouses and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes" was consulted. This study indicated that the following two-digit categories are considered "potential clients of transfer agents."

<u>SIC Code</u>	<u>Industry Group Description</u>
22	textile mill products
24	lumber and wood products, except furniture
26	paper and allied products
27	printing, publishing and allied products
28	chemicals and allied products
29	petroleum refining and related industries
30	rubber and miscellaneous plastics products
31	leather and leather products
32	stone, clay, glass and concrete products
33	primary metal industries
34	fabricated metal products
35	machinery, except electrical
36	electric and electronic machinery

Categories 28 and 29 include chemical manufacturers while the remaining eleven categories include users of chemicals as raw materials. Coincidentally, this broad listing includes "all potential suppliers" as indicated in Chapter X, except

category 38 (instruments: medical, optical, watches/clocks, etc.). The final survey list included firms in eleven four-digit categories within the two-digit SIC 38.

At this point, the selection process became more detailed as the focus shifted into the four-digit SIC categories. Each two-digit SIC category was examined in terms of the specific four-digit sub-categories. Special emphasis was placed on the demander categories measured by employment shares. Other research studies on the same topic were consulted to determine the final list of four-digit industrial categories to include in the survey.³

Finally, specific firms were selected from the 1981 Directory of Florida Industries. The directory lists firms by SIC (four-digit) as well as by Florida county. Firm name, address, telephone number and employment (male, female) are provided in the directory, plus other multiple SIC listings. In addition, a firm contact and title is provided (i.e., John Doe, President). For each selected four-digit SIC, five to ten specific firms were chosen. Regarding firm size (i.e., employment), no specific emphasis was made except that extremely small firms (i.e., 2-5 employees) were avoided. In a recent study, it was indicated that:

... small to medium sized firms ... would benefit the most (from an exchange) ... however, larger corporations use the exchange as well.⁴

In addition, it was noted in another study that a very typical exchange was from large firm (supplier) to a small firm (demander).

Initially, approximately 510 firms were selected. However, significant duplication existed since many firms are listed under multiple SIC categories, especially in the SIC categories 28 and 33. After eliminating all duplication the final listing of firms surveyed totaled 474 individual companies. Table XI-1 shows the number of firms surveyed and the number of surveys returned by four-digit SIC.

TABLE XI-I

FIRMS SURVEYED AND FREQUENCY OF RESPONSE BY SIC CODE

<u>SIC Code</u>	<u>Number of Firms Surveyed</u>	<u>Surveys Returned</u>	<u>SIC Code</u>	<u>Number of Firms Surveyed</u>	<u>Surveys Returned</u>
2221	4	1	2892	2	1
2253	4	0	2893	3	1
2261	5	0	2899	10	1
2491	10	3	2911	7	2
2499	5	1	2952	2	1
2611	4	2	2992	5	2
2631	6	2	3021	3	0
2751	4	0	3069	5	2
2752	7	1	3079	31	5
2812	4	1	3111	2	1
2813	7	2	3199	2	0
2819	12	3	3221	4	3
2821	6	2	3253	3	2
2824	2	1	3271	5	0
2831	5	0	3273	5	2
2833	2	2	3312	7	1
2841	5	1	3316	2	1
2842	8	2	3317	5	1
2844	8	0	3321	4	0
2851	15	5	3325	2	1
2865	4	0	3332	1	0
2869	8	2	3334	4	0
2874	8	2	3341	4	1
2875	72	1	3334	4	0
2879	7	0	3355	2	1
2891	8	0	3356	5	0
3357	5	1	3662	9	1
3361	10	1	3811	8	3
3362	7	1	3822	7	1
3369	4	1	3823	6	3
3398	4	1	3824	4	0
3462	3	2	3825	11	1
3471	17	2	3829	5	1
3519	4	1	3832	5	0
3544	5	1	3841	11	2
3612	7	0	3842	7	0
3613	5	3	3861	6	0
3622	9	0			
3643	8	1	Unknown ^a	--	3

Total Firms Surveyed: 474
Total Surveys Returned: 97

^aFor this category, it was not possible to detect the SIC of the anonymously returned survey form.

SOURCE: Industry Survey Results, FREAC, January 1981.

C. Questionnaire Design

The subject of hazardous waste generation and its subsequent disposal is a very sensitive issue with which industry must deal. Given this operating atmosphere every effort and precaution was taken to maximize the response to the survey. The following steps were taken to enhance their involvement:

1. The mailout was coordinated with the Florida Chamber of Commerce.
2. Personally addressed cover letters were sent to individuals within each of the surveyed firms.
3. A brief explanation of the waste exchange concept was provided in the cover letter.
4. The confidentiality of participating in the waste exchange was emphasized. In addition, complete anonymity of the firms participating in the survey was promised and maintained.

D. Survey Results

The results presented here represent only the survey information that has not been previously discussed in this report.

1. Response Rate

Of the 474 questionnaires sent out, 97 were returned for a 20 percent response rate. Given the sensitivity of the subject matter and the recent legislative actions dealing with hazardous wastes, this represents a good response rate. The response itself indicates an interest on the part of industry in the waste exchange concept. Table XI-2 shows the responses received by SIC and Table XI-3 shows the responses received by Florida counties. As can be seen, the survey effectively covers both a wide spectrum of SICs and industrial counties in Florida. Chapter IX of this report discusses the geographical proximity and its implications for successful waste exchange. Both the industry SICs and counties represented support the validity of that discussion. Furthermore, although the survey does not

TABLE XI-2
QUESTIONNAIRE RESPONSE FREQUENCY BY SIC CODE

<u>SIC</u>	<u>Frequency</u>
2221	1
2491	3
2499	1
2611	2
2631	2
2752	1
2812	1
2813	2
2819	3
2821	2
2824	1
2833	2
2834	2
2841	1
2842	2
2851	5
2869	2
2874	2
2875	1
2892	1
2893	1
2899	1
2911	2
2952	1
2992	2
3067	2
3079	5
3111	1
3221	3
3253	2
3273	2
3312	1
3313	2
3316	1
3317	1
3325	1
3341	1
3355	1
3357	1
3361	1
3362	1
3369	1
3398	1
3462	2
3471	2
3519	1
3544	1
3613	3
3643	1
3662	1
3811	3
3822	1
3823	3
3825	1
3829	1
3841	2
9999*	3
TOTAL	97

*This refers to those responses on which it was not possible to identify SIC.

TABLE XI-3
QUESTIONNAIRE RESPONSE FREQUENCY BY COUNTY

<u>County</u>		<u>Frequency</u>
3	Bay	1
4	Bradford	1
6	Broward	6
13	Dade	15
16	Duval	8
17	Escambia	3
23	Gulf	1
28	Highlands	1
29	Holmes	16
37	Leon	1
42	Marion	1
48	Orange	8
50	Palm Beach	3
52	Pinellas	1
53	Polk	8
65	Wakulla	2
80	Unidentified	17
81	Out-of-state	<u>4</u>
TOTAL		97

cover specifically all industry in Florida, the response rate is believed to be sufficient to reflect the sentiments and views of Florida industry towards the waste exchange concept, as well as potential use of a waste exchange.

2. Reaction to the Waste Exchange Idea

The idea of a waste exchange in Florida received strong support from the Florida firms responding to the survey. The results from the statement, "I feel that the waste exchange concept is a good idea for Florida industry to support" are presented by both SIC and county breakdowns (Tables XI-4 and XI-5). The mean of all responses was 1.35 (1-definitely yes, 5-definitely no). Of the 97 responses to the survey, 72 recorded a "definitely yes", with 10 more responding favorably toward the concept. Only 4 responses indicated "no" to support for the concept.

Thus, the responses are very much weighted towards industry support for the waste exchange concept in Florida. On the basis of this finding alone, it would be worthwhile to pursue the development of a waste exchange in Florida.

3. Sponsorship of the Waste Exchange

Florida industry was asked to indicate their preference as to the organization or agency they felt should sponsor a hazardous waste exchange. Of those responding to this question, 36 percent preferred a trade organization and 56 percent preferred the Chamber of Commerce. Of further interest is the fact that only 2.5 percent suggested a government agency. The remaining 5.5 percent preferred other private sector organizations. Two conclusions can be reached from these findings: (1) there is a mandate from industry to have the exchange sponsored by some organization in the private sector, because the desire to protect confidentiality is imperative to the success of a waste exchange; and (2) a chamber of commerce, while being the most logical choice to sponsor the exchange, is also the most preferred choice by Florida industry.

TABLE XI-4
RESPONSE FREQUENCY TO WASTE EXCHANGE
CONCEPT BY SIC CODE

SIC Code	Definitely Yes (1)	(2)	(3)	(4)	Definitely No (5)	Don't Know	Total ^a	No Response
2221	0	0	0	0	1	0	1	0
2491	3	0	0	0	0	0	3	0
2499	1	0	0	0	0	0	1	0
2611	2	0	0	0	0	0	2	0
2631	1	0	1	0	0	0	2	0
2752	1	0	0	0	0	0	1	0
2812	1	0	0	0	0	0	1	0
2813	2	0	0	0	0	0	2	0
2819	3	0	0	0	0	0	3	0
2821	2	0	0	0	0	0	2	0
2824	1	0	0	0	0	0	1	0
2833	2	0	0	0	0	0	2	0
2834	0	1	0	0	1	0	2	0
2841	1	0	0	0	0	0	1	0
2842	2	0	0	0	0	0	2	0
2851	4	0	0	0	0	1	4	0
2869	0	1	0	0	1	0	2	0
2874	2	0	0	0	0	0	2	0
2875	1	0	0	0	0	0	1	0
2892	1	0	0	0	0	0	1	0
2893	0	0	0	0	0	1	0	0
2899	1	0	0	0	0	0	1	0
2911	2	0	0	0	0	0	2	0
2952	1	0	0	0	0	0	1	0
2992	2	0	0	0	0	0	2	0
3069	1	0	0	0	0	0	1	1
3079	3	0	0	0	0	1	3	1
3111	1	0	0	0	0	0	1	0
3221	1	2	0	0	0	0	3	0
3253	2	0	0	0	0	0	2	0
3273	2	0	0	0	0	0	2	0
3312	1	0	0	0	0	0	1	0
3313	0	1	0	0	0	1	1	0
3316	0	0	0	0	0	0	0	1
3317	1	0	0	0	0	0	1	0
3325	1	0	0	0	0	0	1	0
3341	1	0	0	0	0	0	1	0
3355	1	0	0	0	0	0	1	0
3357	1	0	0	0	0	0	1	0
3361	1	0	0	0	0	0	1	0
3362	0	0	1	0	0	0	1	0
3369	1	0	0	0	0	0	1	0
3398	0	0	0	0	0	0	0	1
3462	1	0	0	0	0	0	1	1
3471	2	0	0	0	0	0	2	0
3519	0	1	0	0	0	0	1	0
3544	1	0	0	0	0	0	1	0
3613	3	0	0	0	0	0	3	0
3643	1	0	0	0	0	0	1	0
3662	0	0	0	0	0	1	0	0
3811	3	0	0	0	0	0	3	0
3822	1	0	0	0	0	0	1	0
3823	1	0	1	0	0	1	0	0
3825	1	0	0	0	0	0	1	0
3829	1	0	0	0	0	0	1	0
3841	1	0	0	0	1	0	2	0
9999	2	0	1	0	0	0	3	0
TOTAL	72	6	4	0	4	6	86	5

MEAN RESPONSE:^b 1.348

^aThe raw totals do not include "no response" and "don't know" categories.

^bthe mean is calculate only on those responding with a 1 through 5 on the question.

TABLE XI-5
RESPONSE FREQUENCY TO WASTE EXCHANGE CONCEPT
BY COUNTY

<u>SIC Code</u>	Definitely Yes <u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(4)</u>	Definitely No <u>(5)</u>	Don't Know	<u>Total</u> ^a	<u>No Response</u>
Bay	1	0	0	0	0	0	1	0
Bradford	1	0	0	0	0	0	1	0
Broward	4	0	0	0	0	0	4	2
Dade	10	1	0	0	0	2	11	2
Duval	6	0	2	0	0	0	8	0
Escambia	2	0	0	0	0	1	2	0
Gulf	1	0	0	0	0	0	1	0
Highlands	1	0	0	0	0	0	1	0
Holmes	12	0	1	0	2	1	15	0
Leon	1	0	0	0	0	0	1	0
Marion	1	0	0	0	0	0	1	0
Orange	6	0	0	0	0	2	8	0
Palm Beach	2	1	0	0	0	0	3	0
Pinellas	1	0	0	0	0	0	1	0
Polk	5	2	0	0	1	0	8	0
Wakulla	2	0	0	0	0	0	2	0
Unidentified	14	0	1	0	1	0	16	1
Out-of-state	2	2	0	0	0	0	4	0
TOTALS	72	6	4	0	4	6	86	5

MEAN RESPONSE:^b 1.348

^aThe raw totals do not include "no response" and "don't know" categories.

^bthe mean is calculated only on those responding with a 1 through 5 on the question.

4. Supply/Demand Relationship

As mentioned earlier, the general purpose of the survey was to assess the willingness of Florida industry to participate in an information clearinghouse type waste exchange. Although individual chapters (IX and X) discuss the specific supply and demand data from the survey, it will be revisited here along with a view of supply and demand responses in concert with each other. When viewing the supply/demand results by county, the results are as expected in most instances. For intracounty exchange that was not determined as feasible (i.e., for a given county, there is positive supply and no demand or vice versa), the data showed contiguous county exchange possibilities, in most cases.

First, the total "willingness to list" (supply) and "request" (demand) will be individually presented by SIC code. Secondly, the survey responses for "listing" and "requesting" will be individually presented by waste category by county. Lastly, potential suppliers and demanders will be shown by waste category by county. This last presentation is an effort to geographically link supply and demand by waste type. Caution must be used in evaluating the linking of supply and demand due to significant uncertainties. For example, the responses represent only potential suppliers and demanders that responded to the survey; obviously, many other demanders and suppliers exist. Further, affirmative responses say nothing about the quality of the specific items supplied or demanded. Beyond this, the waste categories are highly aggregated, with many items falling within each category. However, for the eight counties identified as having the largest shares of manufacturing activity, there are 8,267 firms. The survey was distributed to only 474 firms, with 40 indicating that they would definitely list with an exchange. No extrapolation is attempted here; rather these numbers are presented to give an indication of the minimum willingness to supply and demand.

Tables XI-6 and XI-7 show the total willingness to list (supply) and request (demand) waste products. For suppliers, 40 indicated that they would definitely list, with 15 responding definitely no. Twenty-eight respondents indicated that they didn't know if they would supply or elected not to respond. As mentioned in previous chapters, it is presumed that the sensitive issues of hazardous waste generation is reflected here, as potential suppliers are hesitant to reveal quantities of hazardous waste produced by their firm. For demanders, 42 indicated that they would definitely demand potentially reusable wastes, while 16 said that they would not. Again, 25 either indicated "don't know" or didn't respond. Of the 97 total respondents, 82 indicated some degree of definite participation in a proposed waste exchange.

Tables XI-8 and XI-9 show the preferences of total potential suppliers and demanders across selected waste categories and across respective counties of residence. The magnitudes shown in these tables reflect categories selected by respondents; in no way do they reflect quantities, frequencies of supply or demand, etc. Therefore, it is difficult to make comparisons across counties or categories. Rather, it is appropriate to identify major categories or counties (i.e., solvents, other and Dade, Hillsborough, etc.). However, these dominant counties or categories come as no surprise.

Finally, Table XI-10 shows a geographic linkage of potential suppliers and demanders by waste category. The totals by waste category exclude the categories "unknown" or "out-of-state" in Tables XI-8 and XI-9. Also, not shown is the waste category "other", because this category is a residual (including a variety of materials) and would not allow the "linking up" of a specific category of a waste material. It is, however, reassuring to note that in every category (including "other") the number of suppliers is at least equal to, and for the most part exceeds, the number of potential demanders. Also, for every category, the proximity of

TABLE XI-6
FREQUENCY OF WILLINGNESS TO LIST BY SIC CODE

SIC Code	Definitely Yes (1)	(2)	(3)	(4)	Definitely No (5)	Don't Know	No Response
2221	0	0	0	0	1	0	0
2491	1	1	0	0	0	1	0
2499	0	0	0	0	0	1	0
2611	1	0	0	0	0	1	0
2631	1	0	0	0	0	1	0
2752	1	0	0	0	0	0	0
2812	1	0	0	0	0	0	0
2813	0	0	0	0	1	0	0
2819	1	0	1	0	0	1	0
2821	1	0	0	0	0	1	0
2824	0	0	1	0	0	0	0
2833	1	0	0	0	0	1	0
2834	0	0	0	0	0	1	0
2841	0	0	0	0	0	1	0
2842	2	0	0	0	0	0	0
2851	3	0	0	0	1	1	0
2869	0	0	1	0	1	1	0
2874	1	0	0	0	0	0	1
2875	0	0	1	0	0	0	0
2892	1	0	0	0	0	0	0
2893	0	0	0	0	0	1	0
2899	0	0	1	0	0	0	0
2911	1	1	0	0	0	0	0
2952	0	0	0	0	0	1	0
2992	2	0	0	0	0	0	0
3069	1	0	0	0	0	0	1
3079	2	1	0	0	1	0	1
3111	1	0	0	0	0	0	1
3221	0	2	1	0	0	0	0
3253	0	1	0	0	0	1	0
3273	1	0	0	0	0	1	0
3312	1	0	0	0	0	1	0
3313	0	0	0	0	2	0	0
3316	0	0	0	0	0	0	1
3317	1	0	0	0	0	0	0
3325	1	0	0	0	0	0	0
3341	1	0	0	0	0	0	0
3355	1	0	0	0	0	0	0
3357	1	0	0	0	0	0	0
3361	0	0	0	0	0	1	0
3362	0	0	0	0	0	1	0
3369	0	0	0	0	1	0	0
3398	0	0	0	0	0	0	1
3462	0	0	0	0	0	1	0
3471	1	0	0	0	0	1	0
3519	0	1	0	0	0	0	0
3544	0	0	0	0	1	0	0
3613	3	0	0	0	0	0	0
3643	1	0	0	0	0	0	0
3662	0	0	0	0	1	0	0
3811	2	0	0	0	0	1	0
3822	0	0	0	0	0	1	0
3823	1	0	0	0	2	0	0
3825	1	0	0	0	0	0	0
3829	1	0	0	0	0	0	0
3841	0	0	0	0	1	1	0
Unknown ^a	1	0	1	0	0	0	1
TOTAL	40	7	7	0	15	--	6

^aCertain survey responses were impossible to identify by SIC.

SOURCE: Survey performed by the Center, January 1981.

TABLE XI-7
FREQUENCY OF WILLINGNESS TO REQUEST BY SIC CODE

SIC Code	Definitely Yes (1)	(2)	(3)	(4)	Definitely No (5)	Don't Know	No Response
2221	0	0	0	0	1	0	0
2491	1	0	0	1	0	1	0
2499	0	0	0	0	0	1	0
2611	2	0	0	0	0	0	0
2631	1	0	0	0	0	1	0
2752	1	0	0	0	0	0	0
2812	1	0	0	0	0	0	0
2813	0	0	0	0	1	1	0
2819	1	0	1	0	0	1	0
2821	1	0	0	0	0	1	0
2824	0	0	1	0	0	1	0
2833	2	0	0	0	0	0	0
2834	0	0	0	0	2	0	0
2841	0	0	0	0	1	0	0
2842	2	0	0	0	0	0	0
2851	1	0	0	0	0	0	3
2869	0	0	1	0	1	0	0
2874	2	0	0	0	0	0	0
2875	0	0	0	0	1	0	0
2892	1	0	0	0	0	0	0
2893	0	0	0	0	0	1	0
2899	0	0	1	0	0	0	0
2911	2	0	0	0	0	0	0
2952	0	0	0	0	0	1	0
2992	2	0	0	0	0	0	0
3069	1	0	0	0	0	0	1
3079	2	0	0	1	0	0	2
3111	1	0	0	0	0	0	0
3221	0	2	1	0	0	0	0
3253	1	0	0	1	0	0	0
3273	2	0	0	0	0	0	0
3312	1	0	0	0	0	0	0
3313	0	0	0	0	2	0	0
3316	0	0	0	0	0	1	0
3317	0	0	1	0	0	0	0
3325	1	0	0	0	0	0	0
3341	1	0	0	0	0	0	0
3355	0	0	0	0	0	1	0
3357	1	0	0	0	0	0	0
3361	0	0	0	0	0	0	1
3362	0	0	1	0	0	0	0
3369	0	0	0	0	1	0	0
3398	0	0	0	0	0	1	0
3462	0	0	0	1	0	1	0
3471	2	0	0	0	0	0	0
3519	0	0	0	1	0	0	0
3544	0	0	0	0	1	0	0
3613	2	0	0	0	0	0	1
3643	1	0	0	0	0	0	0
3662	0	0	0	0	1	0	0
3811	2	0	0	0	1	0	0
3822	0	0	0	0	0	0	1
3823	1	0	0	0	1	0	1
3825	0	0	0	0	0	0	0
3829	1	0	0	0	0	0	0
3841	1	0	0	0	1	0	1
Unknown ^a	1	0	0	0	1	0	1
TOTAL	42	2	7	5	16	--	15

^aCertain survey responses were impossible to identify by SIC.

SOURCE: Survey performed by the Center, January 1981.

TABLE XI-8

FREQUENCY OF WILLINGNESS TO LIST
BY WASTE CATEGORY BY COUNTY

<u>County</u>	<u>Solvents</u>	<u>Acids</u>	<u>Alkalies</u>	<u>Catalyst</u>	<u>Waste Oils</u>	<u>Heavy Metal Sludges</u>	<u>Other</u>	<u>County Total</u>
Bay	0	0	0	0	0	0	1	1
Bradford	0	0	0	0	0	0	0	0
Broward	0	0	0	0	1	2	1	4
Dade	9	4	2	0	2	3	5	25
Duval	2	1	1	0	1	0	4	9
Escambia	2	0	0	0	1	0	0	3
Gulf	0	0	0	0	1	0	0	1
Highlands	0	0	0	0	0	1	0	1
Hillsborough	5	2	2	0	3	3	4	19
Leon	0	0	0	0	0	0	1	1
Marion	0	0	0	0	0	0	0	0
Orange	3	2	1	1	3	1	1	12
Palm Beach	1	0	0	0	1	0	1	3
Pinellas	0	0	0	0	0	0	0	0
Polk	3	2	0	2	4	0	1	12
Wakulla	1	0	1	0	1	0	1	4
Unknown	5	3	3	3	6	3	6	29
Out-of-state	2	2	2	0	1	0	3	10
TOTAL	33	16	12	6	5	13	29	134

TABLE XI-9
FREQUENCY OF WILLINGNESS TO REQUEST
BY WASTE CATEGORY BY COUNTY

<u>County</u>	<u>Solvents</u>	<u>Acids</u>	<u>Alkalies</u>	<u>Catalyst</u>	<u>Waste Oils</u>	<u>Heavy Metal Sludges</u>	<u>Other</u>	<u>County Total</u>
Bay	0	0	0	0	0	0	1	1
Bradford	0	0	0	0	1	0	0	1
Broward	1	0	0	0	1	0	1	3
Dade	6	4	2	0	0	1	3	16
Duval	1	1	1	0	1	0	1	5
Escambia	2	0	0	0	0	0	0	2
Gulf	0	0	1	0	0	0	1	2
Highland	0	0	0	0	0	1	0	1
Hillsborough	4	1	1	0	1	1	3	11
Leon	0	0	1	1	0	0	1	3
Marion	0	0	0	0	1	0	0	1
Orange	1	1	0	0	0	0	1	3
Palm Beach	1	0	0	0	1	0	1	3
Pinellas	0	0	0	0	0	0	0	0
Polk	2	3	2	0	0	0	2	9
Wakulla	2	0	0	0	1	0	0	3
Unknown	5	4	3	0	3	0	3	14
Out-of-state	1	1	1	0	0	0	1	4
TOTAL	25	14	11	1	10	3	18	82

TABLE XI-10
SURVEYED COMPANIES SUPPLYING AND DEMANDING WASTES
BY CATEGORY BY COUNTY

<u>Solvents</u>		
<u>Number of Firms Supplying</u>	<u>County</u>	<u>Number of Firms Demanding</u>
0	Broward	1
9	Dade	6
2	Duval	1
2	Escambia	2
5	Hillsborough	4
3	Orange	1
1	Palm Beach	1
3	Polk	2
1	Wakulla	2
<u>26</u>		<u>20</u>

<u>Acids</u>		
<u>Number of Firms Supplying</u>	<u>County</u>	<u>Number of Firms Demanding</u>
4	Dade	4
1	Duval	1
2	Hillsborough	1
2	Orange	1
<u>2</u>	Polk	<u>3</u>
<u>11</u>		<u>10</u>

<u>Alkalis</u>		
<u>Number of Firms Supplying</u>	<u>County</u>	<u>Number of Firms Demanding</u>
2	Dade	2
1	Duval	1
0	Gulf	1
2	Hillsborough	1
0	Leon	1
1	Orange	0
0	Polk	1
<u>1</u>	Wakulla	<u>0</u>
<u>7</u>		<u>7</u>

<u>Waste Oils</u>		
<u>Number of Firms Supplying</u>	<u>County</u>	<u>Number of Firms Demanding</u>
0	Bradford	1
1	Broward	1
2	Dade	0
1	Duval	1
1	Escambia	0
1	Gulf	0
3	Hillsborough	1
0	Marion	0
3	Orange	0
1	Palm Beach	1
4	Polk	0
<u>1</u>	Wakulla	<u>1</u>
<u>18</u>		<u>7</u>

<u>Heavy Metal Sludges</u>		
<u>Number of Firms Supplying</u>	<u>County</u>	<u>Number of Firms Demanding</u>
2	Broward	0
3	Dade	1
1	Highlands	1
3	Hillsborough	1
<u>1</u>	Orange	<u>0</u>
<u>10</u>		<u>3</u>

potential suppliers to demanders is favorable to exchange, especially given the costly alternative of out-of-state disposal. Potential exceptions to this trend are revealed for Escambia, Wakulla, Leon and Gulf counties. However, negotiations between these suppliers and demanders may allow for cost effective exchange.

REFERENCES FOR CHAPTER XI

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- (2) Institute of Science and Public Affairs, Florida Resources and Environmental Analysis Center, Assessment of the Economic Impact of Florida's Proposed Hazardous Waste Control Program in Selected Industries, 1977.
- (3) Franklin Associates, Ltd., Feasibility Study for Establishing a Waste Exchange in the Rocky Mountain Region, EPA, December, 1979, p. 9.
- (4) Rolf P. Hill, Waste Exchanges: Concepts and Reality, EPA, Office of Solid Waste Management Programs. Presentation to the American Institute of Metalurgical Engineers, February, 1979 (revised November, 1980), p. 38.

XII. OVERVIEW OF MARKETING AND RECYCLING CONCEPTS RELEVANT TO THE MARKETING OF HAZARDOUS WASTES

A. The Marketing Concept

There is no universal definition of marketing; however, for the purposes of this study, marketing does not occur unless there are two or more parties, each with something to exchange, and each able to carry out necessary communications and distribution. Given that the basic idea of marketing is provided in the exchange process, another concept can be postulated, that of marketing management, which is defined as:

the analysis, planning, implementation, and control of programs designed to bring about desired changes with target audiences for the purpose of personal or mutual gain. It relies heavily on the adaptation and coordination of product, price, promotion, and distribution for achieving effective response.

Therefore, marketing management occurs when people become conscious of an opportunity to gain from a more careful planning of their exchange relations. Marketing, then, is primarily concerned with facilitating effective exchange of goods and services. Prerequisites include a buyer with certain needs, a seller with a product or service to satisfy those needs, and communication between the two. The transaction results when two parties agree to terms of an exchange from which both parties benefit. The terms of exchange in hazardous waste exchange include such things as a product's technical specifications (purity, concentration, etc.), transportation and storage factors, delivery time, quantity and regularity of quantity available, and price and payment terms.

From the perspective of hazardous waste exchange, the marketing and marketing management concepts provide some theoretical structure for understanding and developing a successful waste exchange. Both the exchange itself and private industry share in making the waste exchange successful through marketing management. In this section, market factors that effect successful transfers are

discussed in the context of marketing management, then the role of marketing in waste transfer is expanded in the following sections.

As has been discussed previously, technical and economic requirements must be satisfied before market considerations are of concern. Subsequent to this, the first factor is recognition of each other's needs. The discussion above points to the waste exchange as the organization to perform this function.

Typically, exchange contracts are made with much difficulty (due to the nature of the waste and public concern over its amount and disposal); therefore, the need for mutual confidence cannot be underestimated. Generators are reluctant to release wastes for fear of charges concerning poor product quality or, more so, inadvertently revealing a trade secret. On the other side, users hesitate to incorporate waste by-products in their manufacturing process when the risk associated with the decision may be the loss of a large production run due to impurities or substandard specifications. The user, then, is particularly concerned with the generator's technical reputation, integrity, and willingness to guarantee the wastes chemical characteristics. Mutual confidence is developed over time but enhanced by technical reputation and financial strength.

Another factor that may have particular bearing on the success of a waste exchange is that of industry attitudes. A company may consider the particular problems inherent in a waste transfer and conclude that the associated risks of a transfer are not worth the time and effort. Such time could well be spent on more profitable activities.

A final factor is timing. The generator and user must be able to manage delivery times and quantities acceptable to both. Generators cannot store wastes indefinitely, nor can users afford to shut down or delay manufacturing process due to a lack of raw materials.

Obviously, the number of marketing factors, their complexity, their interrelationships and their variability complicate the transfer process. A waste exchange is able to provide, in a confidential and virtually risk free environment, enough of the information needed by interested firms to begin the negotiation process. Further questions and arrangements must be made bilaterally between the two companies concerned.

B. The Waste Transfer (Recycling) Concept

Due to the mass production and mass consumption patterns that have evolved in American society, there has been both a tremendous drain on our sources of raw materials and, correspondingly, a tremendous increase in the amount of wastes produced. This results in not only a reduction in finite levels of raw materials, but also a waste disposal problem. Waste transfer for reuse in a subsequent manufacturing process offers an attractive partial solution to both of these occurrences. The reuse of a hazardous waste by-product not only aids in reducing waste, improving waste management, and maintaining environmental quality, but will also prove to be financially attractive to companies engaged in the activity.

The continuity of the exchange process is achieved through establishing and cultivating the marketing channel. That is, subsequent to finding a satisfactory product at an acceptable price, distribution channels must be established and maintained or the transaction collapses. This is particularly true in the area of industrial feedstock supplies. In hazardous waste markets, these channels tend to be very short in comparison to most industrial or commercial products. This is in part due to the novelty of the transfer concept with respect to hazardous wastes (i.e., distribution channels have not had time to develop), and in part due to the sensitivity of the product being transferred. Of further impact on this relatively short channel is the fact that there are comparatively fewer buyers and sellers in the hazardous waste market compared to the finished consumer products market.

Intermediaries in a distribution channel are established for the purpose of completing the exchange between seller and buyer. However, their need is limited and the product risks too great to support their development in the area of hazardous wastes. Thus, currently most hazardous waste transfer results from direct contacts between the buyer and seller.

As has been previously described, there is some waste transfer already taking place between private companies in Florida. This transfer occurs through two different modes: (1) waste is transferred directly between two parties, and (2) waste is transferred between two parties using an intermediary, in this case a reprocessor. Either one of these procedures of recycling wastes is preferred to landfill disposal. The waste exchange would facilitate both of these transfer routes. That is, private industry would be encouraged to deal directly or through a reprocessor.

In the first case, the waste exchange provides the mechanism for information exchange that would permit, without risk, the identification of potential users or generators. Any further information exchange is between the two interested parties. The transmittal of information needed to initiate the waste transfer is the function of the waste exchange and is therefore a crucial step leading to the waste transfer.

In the second case, that involving a reprocessor, the waste material is acquired at a negotiated charge to a firm with the physical plant and resources to refine the waste, then resold to another user. The reprocessor performs the functions of gathering the hazardous waste, storing it, refining it, contacting interested users, and redistributing the now useful product to the market place. Again, in this case, the waste exchange can be a catalyst in stimulating industry interest in this cost-effective channel. As before, the waste exchange offers a forum for risk-free information exchange.

The marketing functions of a waste exchange should not be limited to that of an information clearinghouse, though this is an important and key element in the encouragement of hazardous waste transfer by industry. The equally important task is that of promotion. Information concerning the existence of the waste exchange, the services it provides, and the contribution it is trying to make must be presented to private industry and other potential users of a waste exchange. This promotion function is extremely important and must be approached aggressively. In addition to information distribution, through mailings and news exposure, personal presentations at trade association conferences, local chambers of commerce, etc., would be beneficial in both generating interest and allaying fears and reservations.

C. Summary and Conclusions

There is little an independent organization such as a waste exchange can do subsequent to providing a brokerage function (putting a prospective buyer and seller in contact with each other). Further negotiations are dependent upon the two parties interested in making a transaction. However, there are opportunities for the waste exchange to facilitate this exchange process.

First, in the absence of a private broker the service of providing otherwise unknown information (waste type, amount, location, availability, etc.) to a possible user through a listing service is most important. The lack of information is obviously the most serious deterrent to a transfer. Second, the exchange can promote its existence, functions, and successes, although the actual participating firms would remain anonymous. Success will, in effect, breed success. And finally, the exchange or its sponsor can lobby for legislation that would be favorable to and provide incentive for the waste transfer and reuse concept.

Private industry, which is supportive of the waste exchange concept, needs to follow up this interest with active participation. Additionally, as successful

transfers are made, other firms need to be made aware of these successes. Private industry must recognize that, as with any new channel for feedstock, there will be initial problems and complications. However, the financial considerations should be such that long term transfer relationships will develop. Furthermore, businesses in Florida need to reexamine their current supply sources and manufacturing processes in an effort to find opportunities for using compatible waste streams as a replacement for raw materials. The awareness of an opportunity for waste transfer should stimulate this kind of search.

As has been the case with other exchanges, most listings with the waste exchange will be from companies having wastes they are interested in transferring to another company. Initially, relatively few companies will be listing requests of waste streams. However, Florida industry will become aware of the importance of looking for opportunities to demand waste materials as virgin material prices rise over time. The basic marketing objective, then, is to expand the use of hazardous wastes in manufacturing and production processes within Florida.

PART THREE:
CONCLUSIONS AND RECOMMENDATIONS

XIII. ADMINISTRATIVE STRUCTURES, IMPLEMENTATION STRATEGIES, AND PROCEDURES

A. Economic Feasibility

Economic feasibility implies cost-effectiveness. This report studies the economic feasibility of: (1) waste transfer and (2) the waste exchange clearinghouse. The thrust of this study is not to determine the cost effectiveness of a Florida Waste Exchange Clearinghouse. It has been shown that the annual operating expense of a clearinghouse is negligible, and that the social benefits easily outweigh these costs. On the other hand, the emphasis of this study has been to determine the economic feasibility of waste transfer and the desirability of an exchange clearinghouse. In Chapters VIII, IX, X, and XI it has been shown that the economic feasibility of transfer is determined by relative prices and costs. There is strong evidence that these relative values currently favor waste transfer in Florida. Further, the trends of these relative values enhance the probability of successful waste transfer occurring in the future. Throughout this report, we have established the desirability of a waste exchange facilitating this transfer.

The economic requirements of a transfer are fairly obvious. The basic requirement is that the transfer must be advantageous to the user. That is, the net cost of the waste material must be lower at this point than that of the current alternative feedstock. Similarly, there must be some advantage to be gained by the generator. In the most ideal situation the generator gains by selling the waste. However, it is more likely that he will gain some economic benefit by reducing his disposal costs by simply giving the waste away or by paying transportation costs that are less than disposal costs.

The costs that are critical to both the generator and user then are net costs. Transportation or processing costs, if necessary, can be absorbed either by one party or jointly. In the end, however, the waste transfer alternative must be lower

in cost to both parties than either disposal or the purchase of raw materials. Given current disposal and transportation costs, as well as rising raw material costs, the reuse of hazardous wastes has rapidly qualified as a cost effective alternative for both the operator and user. Such a transfer most assuredly depends on other factors such as timing, amount, concentration, etc., but if these requirements can be met the transfer of wastes for reuse benefits both participants in the transaction.

The second question concerning operating expenses is discussed here in terms of finding support for these expenses. Actual projected expenses are discussed below in the section entitled "Administrative Feasibility". Funding appears to be one of the major obstacles to the continued operation of a waste exchange. This is because continued successful exchange activity, over time, will serve to reduce business rather than increase it. Initially the exchange must overcome resistance by industry to participate as well as a lack of knowledge about the exchange's existence. As time passes, the use of the exchange increases as its services become known. Then as contacts are made between suppliers and demanders future waste transfers can be made without having to use the services of the waste exchange, thus volume may decrease.

In terms of funding, this has several implications. Initially there must be money expended to promote the exchange concept and its functions, as well as gain the confidence of industry. These initial costs will have to be born by the sponsoring agency. Since an organization like a chamber of commerce is functionally prepared to perform these services for its members, such an effort may not be a major expense.

After starting, continued operating funds could be derived from three sources. First, a listing fee can be assessed for each item placed with the exchange. Though a nominal amount (\$10 - \$20 per listing) would be charged, this

revenue would assist in defraying total costs. Second, a subscription fee might be charged to receive the publication (\$10 annually) itemizing the various hazardous wastes for transfer or desired by participating companies. Third, the sponsoring organization would have to subsidize the operating expenses to some degree with personnel, facilities, and supplies. One last source may be federal or state funding designated to assist in developing viable alternatives to hazardous waste disposal. It appears that given the operating costs and the sources of operating funds, that financing a waste exchange is highly feasible.

The third question, does society benefit, is almost too obvious in its answer. These benefits are broken down into two components: private and public. The private benefits result due to the cost effective nature of exchange over disposal. (This includes the cost of operating the waste exchange clearinghouse.) The public benefits (sometimes referred to as external benefits) result due to a cleaner and safer environment.

In sum, there is strong evidence to support from an economic viewpoint the development of a hazardous waste exchange. The cost outlays in terms of out-of-pocket expenditures are minimal when compared to the possible social benefits.

B. Administrative Feasibility

I. Organization and Operation

Waste exchanges are sponsored and operated in the United States by a number of different types of agencies and individuals. Operators include a university, trade associations, and chambers of commerce. The operation of an information exchange is relatively simple. The process is initiated when a waste operator sends an offer of waste material which is of some value to someone else to the waste exchange (this process may also be waste user initiated by sending in a request). The exchange publishes the offer in its regular listing publication. Code numbers are used to protect company identification. A prospective user must then

contact the exchange to indicate an interest. This name is then forwarded to the generator who in turn contacts the potential user. Further negotiations are conducted between the two firms only and such questions as price, date of delivery, and quality are decided during these negotiations.

The organization of such a service can take several forms, two basic organizations are the subsidized and the self-supporting exchange. Due to expected volume, costs and skills required to generate an exchange the subsidized approach appears to be the more favorable for the situation currently existing in Florida. A subsidized operation needs only a part-time manager and a part-time secretary initially. As volumes increase, the time commitments of these personnel would correspondingly increase.

2. Personnel Skills

Due to the limited services offered in a waste exchange, only some basic managerial and clerical skills are required. In a subsidized organization such skills would already be present and would simply require allocating these professionals' time to the functioning of a waste exchange. In addition, skills such as marketing and advertising would also most likely be found in-house in the subsidizing organization. A manager with some knowledge of industrial chemistry and familiarity with client industries that would be using the exchange would be desirable, but is not essential to the success of the exchange.

3. Sponsorship

Since industry confidence and confidentiality is such an important requirement for success, the exchange must start out to initially and continually maintain the highest level of integrity among the clientele. The method by which this is most readily accomplished is through sponsorship by either a trade organization or chamber of commerce. Such broad based and generally trusted organizations lend credibility, industry trust, and an initially large clientele to the initiation of the

exchange. In addition, public approval may be easier to obtain with such sponsorship. The affiliation also provides a ready vehicle for dissemination of information as well as providing financial support.

4. Facilities

An exchange, as has been described above, needs very little in the way of a physical plant. The usual office with standard clerical equipment plus access to printing/duplicating facilities and mailing facilities is all that is initially required. These types of facilities are most readily available if the exchange is housed within an existing trade association or chamber of commerce head offices.

5. Capital Needs and Operating Costs

Again, the advantage of a subsidized exchange (trade association or chamber of commerce sponsored) is that capital needs are small. The exchange, being one of the services offered by the subsidizing organization, may simply be included in the operating budget. However, initial capital needs would include little more than the necessary office equipment to operate essentially an information program. Operating expenses and means for funding these expenses vary, however, as listing and sometimes subscription fees are used to defray a portion of these expenses. The remainder are generally funded through the sponsoring organization. Table XIII-1 outlines the possible costs if a full-time manager and secretary for the exchange is not required. These expenses are considered minimal and would naturally increase as volume increased. Increased demands for more employee time, larger and more frequently published listing, and other factors could push these expense estimates up three or four times.

TABLE XIII-I
ANNUAL EXPENSE ESTIMATES FOR A
SUBSIDIZED WASTE EXCHANGE

1.	Labor	
	Manager (10% of annual time)	\$ 2,000
	Secretary (20% of annual time)	2,000
	Sponsor's Executive Overhead	1,000
	TOTAL	<u>\$ 5,000</u>
2.	Office and Administration	
	Rent and Utilities (pro rated)	\$ 1,000
	Telephone	500
	Supplies	1,000
	Printing	1,000
	Mailing	1,000
	Transportation	500
	TOTAL	<u>\$ 5,000</u>
3.	Contingency at 10%	<u>\$ 1,000</u>
	TOTAL	<u><u>\$11,000</u></u>

C. Technical Feasibility

Two areas of question exist in assessing technical feasibility. First, does the capability exist for both the generator and user to transfer and then transform the waste to a reusable state? And second, is the subject waste of such a level of purity to allow it to be transferred from one process to another without damaging the second process, and if so, are there possibly unknown impurities that might damage the second process?

The answer to the first question has two parts, one strictly technological, the other financial. Based on current disposal regulations and requirements, the technological expertise and experience for the physical transfer of wastes already exist. Nothing more is required than the provision of unloading and storage facilities at the user's plant site. This then does not appear to pose any real problem for either side involved in the transfer.

The financial consideration has already been discussed in the "economic feasibility" section above. Again, the question here pertains to whether or not it is: (1) financially feasible to build the necessary facility to extract the desired chemical compounds from the waste (i.e., does the technology exist at a financially feasible cost to extract the desired compounds?) and (2) will the facility be a self supporting and financially sound investment in terms of reducing annual quantity expenses compared to direct purchasing of raw materials. Answers to these questions are naturally dependent on the process in question. However, in general the technology exists to extract compounds in parts per million concentrates that would be acceptable for reuse.

The real problem exists in finding quantities of waste materials on a basis that is consistent in terms of delivery time, quantity, and quality. If a facility can be built to handle the obvious peaks and slacks in a business venture of this nature,

then the individual firm receiving the hazardous waste will have found a viable alternative to raw material inputs.

The second factor, purity compatibility, is a somewhat more complex question with which to deal (this discussion follows closely that presented in the A.D. Little Study (1976)).¹ The problem of impurities lends itself to a hierarchy that indicates the direction which transfer of hazardous wastes are most likely to take. The hierarchy is two dimensional, depending on industry type and material type. Different industries have different purity requirements due to their processes and end products. The following industry categories are listed in order of decreasing purity requirements.

- (1) Producers of fine chemicals - for example, pharmaceuticals, photographic chemicals, and some organics;
- (2) Producers of chemicals - for example, bulk organics and most inorganics;
- (3) Formulations - for example, paints and leaving solutions;
- (4) Hardware manufacturers - for example, wire and machine parts.

Note that the first category, fine chemicals, is such that the product must be pure. If not pure, the manufacturer risks significant financial penalties as well as tarnished reputations. Pharmaceuticals intended for human consumption have particularly high purity requirements. The second category, bulk organic, chemicals and inorganics generally have less stringent purity requirements. Formulations such as paints and solvents are generally used in less sensitive applications thus have further reduced purity requirements. And finally, hardware manufacturers, have the least stringent needs for pure feedstock. The nature of their process and products is such that the chemical is not an integral part of the functioning product and thus does not impair the product's performance. Thus, as one moves down the

list there is less of a need for highly pure chemicals and correspondingly a greater opportunity and willingness to use wastes as replacements for raw materials.

The second dimension, different types of materials required by each industry type, can be categorized as follows:

- (1) Basic raw materials - the substances or inputs from which the main end products are made;
- (2) Additives - materials used in small amounts to produce or enhance specific product characteristics; and
- (3) Process fluids - Materials not incorporated into the product but used in its production (for example, cleaning solution or deoxidizing solution).

As before, the purity requirements generally decrease down the list in part because the end products require progressively fewer raw materials. Thus, within each industry, wastes are likely to be transferred down the list. For example, the waste from a chemical intense production process may become a process fluid input to another process.

These two dimensions when combined show the purity requirement relationship that exists between the input requirements and manufacturing process. These highest purity requirements are for raw materials in fine chemicals while the lowest are for process fluids in manufacturing industries (see Figure XIII-1). This two-dimensional hierarchy is useful in identifying the market for a waste exchange. It can be seen that both manufacturers of products essentially composed of chemicals as well as those using chemicals as part of the manufacturing process are potential users of a waste exchange. Thus, the exchange should attempt to include the broadest possible range of industries as potential clients.

Figure XIII-1

HIERARCHY OF PURITY REQUIREMENTS

		Type of Material		
		Basic Raw Materials	Additives	Process Fluids
Type of Industry	Fine Chemicals	Very High	High	Low to Moderate
	Chemicals	High	Significant	Low to Moderate
	Formulations	Moderate	More Moderate	Low
	Hardware Manufacturing	Low	Lower	Lowest

Source: Arthur D. Little, Inc.

The ideal situation would be for the transferred waste to meet the user's specification perfectly, thus the transfer could be made without any modifications to the waste (i.e., filtering, distilling, etc). The more usual case, however, is for the purity specification levels, to result in less than a perfect match. A change in the waste material must then be made either by the generator (this then gives him a possibly attractive alternative to disposal), or the user (this gives them an alternative to buying raw materials). Such changes may be physical (higher concentrations, larger batches, etc.) or chemical (fewer impurities). If the market is large enough to support a reprocessor, then this middleman may perform the necessary changes.

In sum, the technological problems confronting Florida waste transfer do not appear to be major obstacles. Although Florida is not a major industrial state, medium and light industry located here does lend itself to the waste exchange concept. Of further importance is the fact that medium and small sized firms have proven to be successful users of a waste exchange as well as larger companies. This is because large firms have the capital, expertise, and facilities to handle many of their waste problems internally. That is, these firms can recycle wastes at an intracompany level, while medium size and small firms generally must use a disposal system. The waste exchange then is even more attractive to Florida industry due to the size and number of firms in Florida.

D. Summary

This section consists of an itemization of potential problems and a brief analysis of each problem with respect to the question of a waste exchange in Florida. Finally, recommendations are given with support for those recommendations provided.

1. Transfer Requirements

A summary of the report for requirements for a transfer is presented here. As is true with any transaction, certain requirements must be met before the transaction can be consummated. These requirements can be classified as follows:

- (1) Technical - the potential for reuse requires that the waste have specific characteristics.
- (2) Economic - since both parties involved with the transfer must gain, each must recognize a net operating cost reduction.
- (3) Marketing and institutional - once technical and economic requirements are satisfied, availability, timing, confidentiality, and need become important.
- (4) Legal and regulatory - the transfer of wastes must be defined and sanctioned as allowed by law, must be handled confidentially, and must be unlikely to result in liability suits. In fact, action on the part of the Legislature to encourage waste transfer would be a stimulus to the success of a waste transfer.

These requirements must be satisfied in a sequential manner to consummate a transfer. It would be pointless to consider the economic and marketing possibilities for a waste transfer if the technical compatibility is unacceptable. This logic is summarized in Figure XIII-2. As can be seen, an orderly progression of requirements must be satisfied before a transfer occurs.

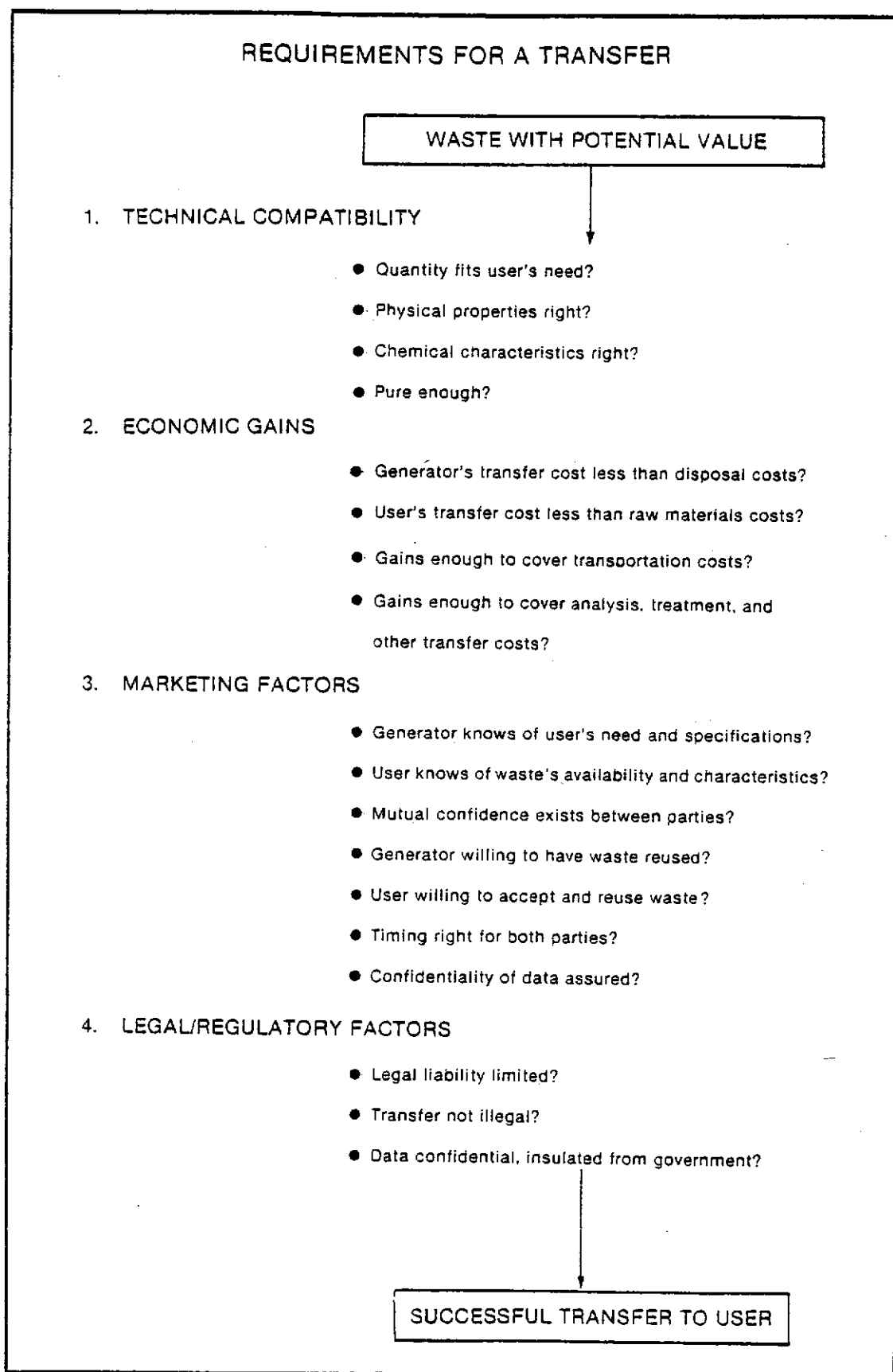
2. Problems and Analysis

The following is a list of relevant problems regarding the feasibility of a waste exchange for Florida.

- Problem: Sponsorship of a hazardous waste exchange.

Analysis: This does not appear to pose a problem for Florida in that the Florida Chamber of Commerce has expressed an interest in sponsoring a waste exchange.

Figure XIII-2



- Problem: Funding of the hazardous waste exchange.

Analysis: Again, there appears to be satisfactory resources for initial start-up costs and operating expenses. The sponsoring organization would most likely absorb some of these costs as part of an expanded service for Florida industry. Additionally, there is the potential for revenues from listing and subscription fees. Lastly, the possibility for government funding (either federal or state) should not be ruled out as long as this involvement does not destroy the confidentiality of business.

- Problem: Staffing the hazardous waste exchange.

Analysis: The staffing requirements are neither prohibitive in terms of man hours or expertise required. The redistribution of time or assignment of administrative responsibility of one manager and one secretary at the outset from the personnel currently employed by the sponsoring organization would be required. Additional manhours and/or staff could be added as the need arose.

- Problem: Dissemination of information.

Analysis: In order to have the best possible opportunity for success, fast and extensive information distribution is important. Three avenues are available for this effort. First, existing chamber of commerce publications are available. Second, the Department of Environmental Regulation's monthly publication could advertise the exchange's existence. Third, newspapers and television stations could be contacted for publicity and exposure. Additionally, once the listing service begins, the publication itself will provide further information to potential users. Finally, government recognition and endorsement of the program would provide beneficial exposure for the hazardous waste exchange.

- Problem: Industry resistance to change.

Analysis: Procedures for acquiring feedstock and disposing of hazardous waste are established within most companies. Convincing a company to change its disposal channel to one of transfer does not pose a serious problem as long as certain financial and legal considerations are met. The real problem arises in convincing companies to consider hazardous waste as a feedstock in their manufacturing process. Companies are reluctant to change current sources of supply given that shortages and strong long-term arrangements exist. However, the fact that there are shortages may stimulate interest in alternative sources of feedstock supply. This resistance to change will take time and transfer successes to overcome. Additionally, a good promotional program aimed at industry can help shorten this time period.

- Problem: Establishing confidence.

Analysis: There are two levels of the problem of confidence. One is the confidence between the hazardous waste exchange and industry, the other is between the firms involved in a waste transfer. The first level of confidence is most readily established by having the waste exchange

sponsored by an organization from the private sector. The second level of confidence results from the successful transfer between companies. As with any transaction involving a feedstock between two companies, confidence is established when both parties meet pre-stated requirements to their respective satisfaction. Due to the potential of financial savings to both firms participating in a transfer, the effort of both parties to complete the transfer satisfactorily should be such to quickly establish mutual confidence.

- Problem: Geographic proximity of Florida industry.

Analysis: There are four industrial centers in Florida centered in Miami, Tampa-St. Petersburg, Orlando and Jacksonville. Although these centers may appear to be somewhat distant and thus not conducive to transfer, in actuality the opposite is true. The trucking distances are very favorable when compared to waste transfers in other parts of the country. Additionally, disposal of waste involves transportation outside Florida to Alabama and far as away as Missouri. Thus, the geographic proximity of Florida business is actually a positive consideration.

- Problem: Transportation technology.

Analysis: The same technology and precautions that are currently used and required in the transporting of hazardous wastes for disposal purposes would apply for making a transfer.

- Problem: Chemical compatibility.

Analysis: Due to impurities and concentration levels of specific chemicals in a waste stream, the waste may not meet the user's specifications. If there appears to be financial benefit due to transfer, one or both parties would take the responsibility to bring about compatibility.

- Problem: Legal liability.

Analysis: There is a need for both the operator and user to feel free from legal liability arising from a transfer, given all reasonable precautions have been taken. Generators may be reluctant to transfer wastes due to the fact that any third party damage may result in suits against both the generator and user. Additionally, generators may worry that transferring wastes could increase their exposure to scrutiny by regulatory agencies. The current Hazardous Waste Management Act does not specifically address the waste exchange concept. In order to reduce or eliminate these fears of waste transfer, perhaps some legislation that specifically addresses the hazardous waste transfer process could be considered.

- Problem: Delivery timing and amounts of hazardous waste.

Analysis: As with the establishment of any new source for a raw material delivery times and amounts must be reliable and consistent. These types of relationships can only be established through time and several successful transfers.

- Problem: Industry use of a waste exchange.

Analysis: Waste exchange usage tends to grow steadily up to a point and then declines. The growth is due to the increasing number of firms becoming aware of the waste exchange and the service it provides. The decline results from firms establishing long-term agreements that no longer need the services provided by the waste exchange. However, due to the number of medium and smaller companies in Florida and the correspondingly greater need these firms have of services provided by a waste exchange, any decline would most likely not take place in the next decade.

Recommendations

The following recommendations have been developed from this study:

- It is recommended that a waste exchange be organized in Florida to serve as an information clearinghouse for potential hazardous waste transfer for Florida industry.
- It is recommended that a chamber of commerce like organization sponsor the waste exchange.
- It is recommended that an organization from private industry, such as a chamber of commerce, work with the Department of Environmental Regulation to develop legislation to be added to the Hazardous Waste Management Act or to stand alone. Such legislation would specifically address hazardous waste transfer.

These recommendations are supported by the following major reasons:

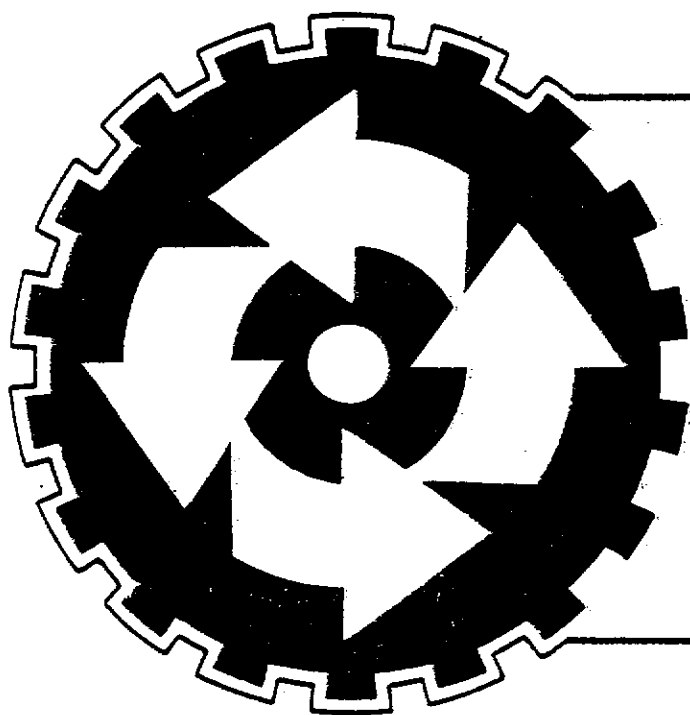
- The waste exchange appears to be a cost effective alternative to disposal for a portion of the hazardous waste stream generated in Florida.
- The waste exchange is an environmentally attractive alternative to disposal.
- The waste exchange encourages and facilitates resource recovery.
- There is strong interest among Florida industry to support and participate in the waste exchange.

REFERENCES FOR CHAPTER XIII

- (1) A.D. Little, Inc. Waste Clearinghouses and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes. Final Report, EPA Hazardous Waste Management Division, Contract 68-01-3241, 1976.

APPENDICES

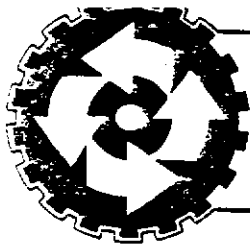
APPENDIX A: SAMPLE PUBLICATIONS FROM
EXISTING U.S. AND FOREIGN WASTE EXCHANGES



**MIDWEST
INDUSTRIAL
WASTE
EXCHANGE**

CLEARINGHOUSE CATALOG AND NEWS

'80



MIDWEST INDUSTRIAL WASTE EXCHANGE

Ten Broadway, St. Louis, Missouri 63102 Telephone (314) 231-5555/TWX 910-761-1080

August 15, 1980
Volume V - Issue No. 12-80

Organized in 1975, and dedicated to the concept that a waste from one process can represent a raw material for another, the Midwest Industrial Waste Exchange continues today to serve as an information clearinghouse for recycling industrial waste among industries.

Since its establishment, day-to-day operations of the Exchange have been performed by members of the St. Louis Regional Commerce & Growth Association staff. In 1979, however, the Greater Kansas City Chamber of Commerce joined RCGA as a co-sponsor of the program. Currently, the Exchange is being upgraded and expanded with assistance from the U.S. EPA through the East-West Gateway Coordinating Council and its 208 Program.

The Clearinghouse Catalog and News is published quarterly and lists both items available and items wanted. Response to these listings may be made by writing a separate letter-of-inquiry for each item, identifying it by code number. All inquiries should be sent to the attention of Arthur G. Baebler at the address shown on this letterhead. Sample letters-of-inquiry are included in this catalog.

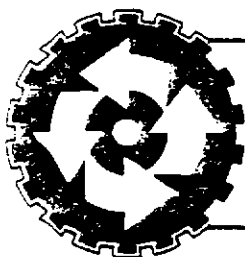
The listing fee is \$10 per item which covers publication in three consecutive issues of the catalog or until the waste is no longer available. Confidential and non-confidential listing forms are also included in this catalog, and the appropriate form should be selected based on the following referral conditions:

1. Confidential - upon receipt of a letter-of-inquiry, the Exchange forwards the letter to the listing firm. Contact with the interested party is then initiated by the listing firm at its discretion.
2. Non-confidential - after receiving a letter-of-inquiry, the Exchange notifies each party of the other's identity. This permits either to initiate contact with the other.

The Exchange does not participate in negotiations regardless of the method of listing.

The next "Catalog & News" is scheduled for publication on November 15, 1980. Closing date for all new listings is October 31, 1980.

For additional information, notify Arthur G. Baebler in St. Louis or Max Norman in Kansas City at (816) 221-2424.

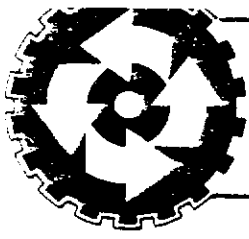


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The Catalog is composed of six sections:

Introduction	a brief historical and functional description of the exchange.
Items Available	material a generator wants to sell, trade or give away.
Items Wanted	material that a company wants to acquire as a raw material, feedstream supplement or auxiliary energy source.
News	a summary of the latest EPA Rules and Regulations, surplus materials available from the Defense Property Disposal Service, and a calendar of events.
Listing Forms	these are for parties wishing to have their available waste, distressed material, or waste wanted listed in future catalog issues.
Sample Letters	Examples of typical letters of inquiry for material available or wanted.



ITEMS Available

Code Identification: A12-1

Item: Toluene contaminated with Chlorinated Organics. Toluene - 35%;
Ring Chlorinated Toluene - 65%
Availability: 70,000 lbs/month. Bulk.
Location: Tennessee

Code Identification: A12-2

Item: Crude Coal Tar
Availability: 300,000 gallons. One time availability. Bulk.
Location: Tennessee

Code Identification: A12-3

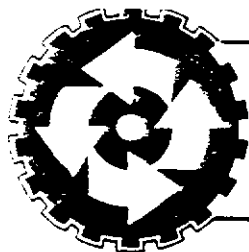
Item: Used paint thinners and material containing the following volatiles:
12% Acetone 4% n-Butyl Acetate
3% MEK 17% Glycol Ether EE Acetate
8% IPA 19% Aliphatic similar to Hi Initial VM&P
7% N-Butanol 11% Toluene
5% Ethyl Acetate 14% Xylene
(Percentages are approximate due to component overlap on the gas chromatograph.)
Availability: Approximately 25,000 gallons/year. Bulk shipments of approximately 5,000 gallons.
Location: Kansas City, Missouri

Code Identification A12-4

Item: Ammonium Fluoride, 13% NH_4F in water solution
Availability: 200,000 - 300,000 gallons/month.
Location: St. Louis, Missouri

Code Identification: A12-5

Item: Combustible Used Lacquer Solvents: Ketones, Esters, Hydrocarbons. 10-20 % Inorganic Pigment Content.
Availability: 1500-2000 gallons/month - continuous. Drum and Bulk.
Location: Cuba, Missouri



ITEMS Available

Code Identification: A12-1

Item: Toluene contaminated with Chlorinated Organics. Toluene - 35%;
Ring Chlorinated Toluene - 65%
Availability: 70,000 lbs/month. Bulk.
Location: Tennessee

Code Identification: A12-2

Item: Crude Coal Tar
Availability: 300,000 gallons. One time availability. Bulk.
Location: Tennessee

Code Identification: A12-3

Item: Used paint thinners and material containing the following volatiles:
12% Acetone 4% n-Butyl Acetate
3% MEK 17% Glycol Ether EE Acetate
8% IPA 19% Aliphatic similar to Hi Initial VM&P
7% N-Butanol 11% Toluene
5% Ethyl Acetate 14% Xylene
(Percentages are approximate due to component overlap on the gas chromatograph.)
Availability: Approximately 25,000 gallons/year. Bulk shipments of approximately 5,000 gallons.
Location: Kansas City, Missouri

Code Identification A12-4

Item: Ammonium Fluoride, 13% NH_4F in water solution
Availability: 200,000 - 300,000 gallons/month.
Location: St. Louis, Missouri

Code Identification: A12-5

Item: Combustible Used Lacquer Solvents: Ketones, Esters, Hydrocarbons. 10-20 % Inorganic Pigment Content.
Availability: 1500-2000 gallons/month - continuous. Drum and Bulk.
Location: Cuba, Missouri

Code Identification: A12-6

Item: Chromic Acid with PH of 1.1
Cr + 6 of 22,000 mg/l;
Cr + 3 of 15,000 mg/l;
Cu of 45,000 mg/l;
Sulfate of 250,000 mg/l;
Sodium of 24,000 mg/l;
Zinc of 1,000 mg/l;
Availability: 300 gallons/2 weeks. Drum.
Location: Wisconsin

Code Identification: A12-7

Item: Phosphoric Acid Pickling Solution, Approximately 25% by weight
Phosphoric Acid, approximately 3% by weight Iron W/Inhibitor.
Availability: 3,000 gallons/month. Bulk.
Location: Wisconsin

Code Identification: A12-8

Item: 40 lb Natural Kraft Paper - 1 mil glass Polypropylene finish one
side, shredded.
Availability: 3,000 lbs/week. Continuous basis. Packed in .004 mil poly bags
(can be changed).
Location: Eastern Missouri

Code Identification: A12-9

Item: Sulfuric Acid Pickle Liquor, 3-5% by weight Sulfuric Acid, 9-12%
by weight Iron.
Availability: 12,000 gallons/month. Bulk - tank truck or rail.
Location: Minnesota

Code Identification: A12-10

Item: Solution of 10%-20% Caustic soda (NaOH) in Water.
Availability: Approximately 5,000-10,000 gallons/week from May through
November at Minneapolis and Davenport - year-round at Memphis.
Bulk.
Location: Memphis, Tennessee; Minneapolis, Minnesota; and Davenport, Iowa.



ITEMS Available

Code Identification: A12-11

Item: Dichloro Phenol and By-Products.
2,5 DCP - 5%
2,4 DCP - 5%
3,4 DCP - 60%
Anisol Isomers - 20%
Trichloronated Benzene - 10%
Availability: 13,000 gallons/month.
Location: Southeast Texas

Code Identification: A12-12

Item: Calcined Coke (78%) mixed with Cryolite and Alumina (22%).
Availability: 75,000 ton stockpile. Present rate of generation is 400 tons/month. Bulk.
Location: Spokane, Washington

Code Identification: A12-13

Item: Methanol contaminated with small amount of organic and inorganic material. (No water)
Availability: 12,000 gallons/month.
Location: Bush, Louisiana

Code Identification: A12-14

Item: Zinc Monochloroacetic Acid Filtercake wet with Methanol.
Availability: 8 tons/month.
Location: Bush, Louisiana

Code Identification: A12-15

Item: Ferric Hydroxide Filtercake
Availability: 15 tons/month.
Location: Bush, Louisiana

Code Identification: A12-16

Item: Toluene Solution of Substituted Ureas
Availability: 4000 gallons/month - continuous. Bulk - tank or truck.
Location: Northwestern Indiana

Code Identification: A-11-1

Item: Spent Nitric Acid - contains approximately 1.2 lb/gal Nickel (Ni) and 0.7 lb/gal copper (Cu).
Availability: Approximately 3,300 gallons every 8-10 weeks.
Bulk (not containerized).
Location: St. Louis, Missouri

Code Identification: A-11-2

Item: Oily Waste Sludge with the following composition:
50% Mineral Oil
20% Water
30% Solids
No toxic elements
Trace amounts of heavy metals
2% Ash
8,000-12,000 BTU's/lb
A complete lab analysis available upon request.
Availability: 20,000 gallons/week.
Location: Tennessee

Code Identification: A-11-3

Item: Silica Filter Cake - approximately 40% solids, 2½% Inorganic Impurities, Balance Water. Silica consists of spherical particles 0.3 microns in diameter.
Availability: 100 wet tons/day.
Location: Southern Louisiana

Code Identification: A-11-4

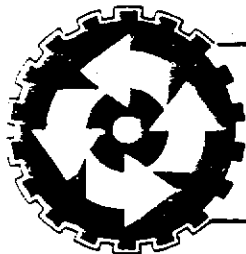
Item: Polyethelene Film, Red, 0.015" thick, 40" wide, rolls approximately 150 yards long.
Availability: Approximately 8 tons total weight - one time only.
Location: Illinois

Code Identification: A-11-5

Item: Uncured Rubber Scrap - nylon cord covered with black uncured rubber compound that can be cured.
Availability: Approximately 28,000 lbs/month in 425-500 lb. bales (3'x3'x2)
Location: Illinois

Code Identification: A-11-6

Item: Lubricating Oil. Mixture of No. 10 and 20 weight oil with small amounts of solvents and water.
Availability: 800-900 gallons every 5-6 months. Bulk.
Location: St. Louis, Missouri



ITEMS Available

Code Identification: A-11-7

Item: Mixed Alcohols. Average analysis -
80% Ethanol 72% Ethanol
10% Methanol 9% Methanol
2% Acetone 1.6% Acetone
0.5% MIBK OR 0.4% MIBK
7.5% Water 17.0% Water

Availability: Approximately 50,000 gallons/year of each mixture.
Bulk.

Location: St. Louis, Missouri

Code Identification: A-11-8

Item: By-Product Sulfuric Acid. Approximately 59% H_2SO_4 , 50 ppm
Iron. Dark Brown Color.

Availability: 3,500 gallons/week. Bulk.

Location: St. Louis, Missouri

Code Identification: A-11-9

Item: Heavy Fuel Oil with trace amounts of Urea and Ammonium Nitrate.

Availability: 140 55-gallon drums. One time only.

Location: Nebraska

Code Identification: A-11-10

Item: Ferric Hydroxide Filter Cake, 35% solids. Contains Calcium and
traces of Magnesium.

Availability: 24 tons/day on a continuous basis - maximum. Bulk.

Location: Northwest Pennsylvania

Code Identification: A-11-11

Item: Regenerated Iron Oxide suitable for Ferrite or Red-Oxide Primer.
99% pure, less than 0.5% Chlorides.
Particle size: 40-100 microns.

Availability: Up to 100 tons/week. 50-lb. bags or 20 tons bulk.

Location: South

Code Identification: A-11-12

Item: Mixture of Paints and Solvents.

Availability: 50 to 75 55-gallon drums per month

Location: Greater St. Louis Area.

Code Identification: A-11-13

Item: Recovered Chromic Acid from a plating operation. Liquid containing 80 ounces per gallon.
Availability: 1,500 lbs/month in drums.
Location: Kentucky

Code Identification: A10-1

Item: By-product Sulfuric Acid, assay - 78%
Total Bromine - 3% max.
Particulate matter - 3% max.
Color - amber to black
Availability: 125 tons/month. Bulk.
Location: El Dorado, Arkansas

Code Identification: A10-2

Item: By-product Sulfur Dioxide, assay - 99.5% SO₂
Liquid Color - red
Moisture - 100 ppm
SO₃ - 20 ppm
Bromine - 2.5% max.
Non-volatile - 0.5% max.
Availability: 35 tons/month.
Location: El Dorado, Arkansas

Code Identification: A10-3

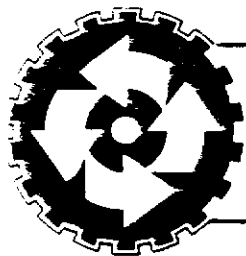
Item: Synthetic and semi-synthetic water-base cutting fluids. Applicable to light- and medium-duty machining on steel or iron. Virgin product in original drums.
Availability: 55 x 55 gal. drums - one time availability.
Location: Wisconsin

Code Identification: A10-6

Item: Hydrated Lime slurry or paste - chemical analysis approximately the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Milwaukee, Wisconsin

Code Identification: A10-7

Item: Hydrated Lime slurry or paste - chemical analysis approximately the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Indianapolis, Indiana



ITEMS Available

Code Identification: A10-8

Item: Hydrated Lime slurry or paste - chemical analysis approximately the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Duluth, Minnesota

Code Identification: A10-9

Item: Hydrated Lime slurry or paste - chemical analysis approximately the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: St. Louis, Missouri

Code Identification: A10-10

Item: Hydrated Lime slurry or paste - chemical analysis approximately the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Minneapolis, Minnesota

Code Identification: A10-11

Item: Hydrated Lime slurry or paste - chemical analysis approximately the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Albuquerque, New Mexico

Code Identification: A10-12

Item: Hydrated Lime slurry or paste - chemical analysis approximately the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Amarillo, Texas

Code Identification: A10-13

Item: Hydrated Lime slurry or paste - chemical analysis approximately the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Altoona, Pennsylvania

Code Identification: A10-14

Item: Hydrated Lime slurry or paste - chemical analysis approximately
the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Syracuse, New York

Code Identification: A10-15

Item: Hydrated Lime slurry or paste - chemical analysis approximately
the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Norfolk, Virginia

Code Identification: A10-16

Item: Hydrated Lime slurry or paste - chemical analysis approximately
the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Albany, New York

Code Identification: A10-17

Item: Hydrated Lime slurry or paste - chemical analysis approximately
the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Phoenix, Arizona

Code Identification: A10-18

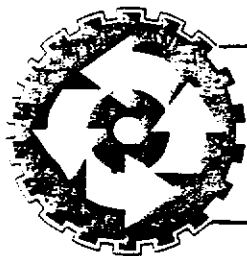
Item: Hydrated Lime slurry or paste - chemical analysis approximately
the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: Los Angeles, California

Code Identification: A10-19

Item: Hydrated Lime slurry or paste - chemical analysis approximately
the same as dry Hydrated Lime.
Availability: Open. Tonnage amounts in bulk.
Location: San Francisco, California

Code Identification: A10-20

Item: Rag Cook Liquor consisting of approximately 8% Sodium
Hydroxide, also contains dissolved Cellulose and traces of
Availability: 20-25,000 gallons/day.
5-6 days/week.
Location: Western New York State



ITEMS Available

Code Identification: A9-1

Item: Coarse Sawdust mixed with Wood Chips. Species:
1. Canadian Spruce - Pine and Fir
2. Douglas Fir
3. Hemlock
4. Mixed White Woods
Availability: 18 tons per week. Bulk.
Location: Missouri

Code Identification: A9-2

Item: Spent Nitric Acid with approx. 1 lb/gal Nickel and 1/2 lb/gal Copper.
Availability: Approx. 560 gals/6 months (drums).
Location: Wisconsin

Code Identification: A9-3

Item: Spent Aqueous Muriatic (Hydrochloric) Acid, HCl., 15% HCl, 0.5% NH₄Cl, approx. 84-85% H₂O (Water).
Availability: 15,000 gal/day. Bulk.
Location: Tennessee

Code Identification: A9-6

Item: Paint Sludge with Solvents and Thinners. Sludge with Flash Point (COC) 75° F. Non-volatiles 600°C, 15% w/w. Analysis of Ash: 54% Ti (Titanium); 3% Pb (Lead); 1% Fe (Iron).
Availability: Approx. 140 55 gal. drums available now.
Approx. 30 55 gal. drums/quarter (3 months)
Location: Missouri

Code Identification: A9-8

Item: Hydrated Lime Slurry in Water. Solids are greater than 95% Ca (OH)₂ on a dry weight basis. Contains virtually no organics and less than 5 ppm total of "priority pollutant" heavy metals. Slurry is available at up to 30% solids by weight or higher.
Availability: Quantities shown are on a dry weight basis.
Location: 1. 55 tons/month - St. Louis Area
2. 25 tons/month - Rapid City, South Dakota
3. 50 tons/month - Greensboro, North Carolina
4. 25 tons/month - Dallas, Texas
5. 125 tons/month - Memphis, Tennessee

Code Identification: A8-1

Item: Nitriding Salt (Solid Form) - .022% CN, 28% Na, 12% Cl, 2.4% Ba.
Availability: 4 Barrels/Year
Location: Missouri and North Carolina

Code Identification: A8-2

Item: Aluminum Anodizing Sludge - Wet sludge containing Al in appreciable amount.
Availability: 3,500 lbs/month each plant
Location: Missouri and North Carolina

Code Identification: A8-3

Item: Mixed Thermoplastic Resins. Percentage of mixture will vary in each container. Resins include P/P, P/S, P/E, ABS, etc.
Availability: Approximately 80,000 lbs/month
Location: Illinois

Code Identification: A8-4

Item: Sulfuric Acid Pickle Liquor, 2-4% H_2SO_4 , 19-27% $FeSO_4$.
Availability: 30,000 gal/day, Bulk
Location: Illinois

Code Identification: A8-5

Item: Waste Sulfate Pickle Liquor, 2-4% H_2SO_4 , 19-27% $FeSO_4$.
Availability: 10,000 gal/wk, Bulk
Location: Midwest

Code Identification: A8-12

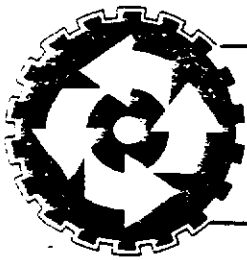
Item: Fly Ash and Cinders
Availability: 1.3 million lb/month - Bulk
Location: Missouri

Code Identification: A8-13

Item: Diatomaceous Earth filter cake with some Pentaerythritol.
Availability: 100,000 lb/month - Bulk
Location: Missouri

Code Identification: A8-14

Item: Carbon filter cake - 50% solids with some esters of organic alcohols.
Availability: 2,000 lb/day - Bulk
Location: Missouri



ITEMS Available

Code Identification: A8-16

Item: High Carbon - Brass plated steel wire. Size 0.0087 in/dia in a cable
0.043 inches in dia.
Availability: 2,500 lb/day - continuous
Location: Greater St. Louis Area

Code Identification: A8-19

Item: Spent Sulfuric Acid - approximately 16% H_2SO_4 - trace
amounts of PbO and $PbSO_4$. Balance water.
Availability: 120,000 gal/month/location
Location: 2 Plants West Coast, 1 Southwest, 1 Midwest, 1 Northeast

Code Identification: A6-1

Item: Antimony/Cadmium Flue dust containing approximately 37%
Antimony, 8% Cadmium, Chlorides 39% in bags.
Availability: 6,000 Lbs. per Month in bags.
Location: Pennsylvania

Code Identification: A6-2

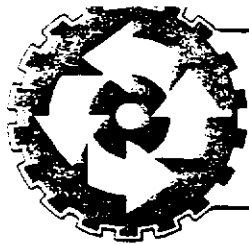
Item: Ore sludge containing approximately 48% Manganese Oxide, 30%
Iron Oxide, 3% Tungsten Oxide, 2% Aluminum Oxide all on dry
basis (Moisture content about 25%).
Availability: 30,000,000 Lbs stockpiled; 300,000 lbs. per Month.
Location: Pennsylvania

Code Identification: A6-3

Item: Calcium Phosphate Filter Cake 35% moisture. Contains Calcium,
Phosphorus, Antimony, Manganese, Cadmium, Fluoride.
Availability: 26,000 Lbs. per Month - Bulk.
Location: Pennsylvania

Code Identification: A6-4

Item: Ferric Hydroxide filter cake - 20% Solids. Contains Calcium
Magnesium, Nitrates & other impurities.
Availability: 320,000 Lbs. per Month - Bulk.
Location: Pennsylvania



ITEMS WANTED

Code Identification: W12-1

Item: Waste Ammonia, Aqua Ammonia or Caustic
Quantity Desired: 10,000 gallons/week
Location: St. Louis, Missouri

Code Identification: W12-2

Item: Waste Acids
Quantity Desired: No limit to quantity. Bulk only.
Location: Midwest

Code Identification: W12-3

Item: Waste Caustics
Quantity Desired: No limit to quantity. Bulk only.
Location: Midwest

Code Identification: W12-4

Item: Waste Oils and Sludges
Quantity Desired: No limit to quantity. Bulk only.
Location: Midwest

Code Identification: W12-5

Item: Oil-Visc 35-70 SSU @ 100°F (other ranges may be of interest) BS&W less than 1%
Quantity Desired: Continuous basis. Bulk - truck or rail.
Location: U.S. - Various locations

Code Identification: W12-6

Item: Stottard Solvent, Mineral Spirits Streams contaminated with oil, dirt and water. Must contain no aromatic solvents.
Quantity Desired: Continuous streams only. Bulk - truck or rail.
Location: U.S. Regional Receiving Centers

Code Identification: W12-7

Item: Waste industrial and lubricating oils. Prefer less than 20% BS&W, Flash +110°F. No Solvents.
Quantity Desired: Continuous basis. Bulk. (Quality and transportation cost are factors.)
Location: Upper Midwest

Code Identification: W12-8

Item: Waste Oil Products/Liquid Waste Solvents generated from inks, paints, oil resin, chemical, and lacquer manufacturing processes except Chlorinated Solvents.
Quantity Desired: No limit to quantity. Gallons. Drum and Bulk.
Location: 600-mile radius of East St. Louis, Illinois

Code Identification: W12-9

Item: Coal Ash or similar inert compactible material.
Quantity Desired: No limit to quantity. Desire long-term arrangement with large-quantity generator. Bulk.
Location: Greater St. Louis Area

Code Identification: W11-1

Item: Contaminated Methanol with no more than 20% water.
Quantity Desired: Bulk. 500,000 gallons/6 months.
Location: Illinois

Code Identification: W11-2

Item: By-Products from planing mills, cabinet shops, furniture manufacturers, or any other waste from the manufacture of wood products—hardwood or softwood.
Quantity Desired: Truckload or carload, bulk or bagged. Continuous.
Location: Throughout the United States.

Code Identification: W11-3

Item: Waste Oil Products and/or Organic Solvents.
Quantity Desired: Open. Drums or bulk
Location: 150-mile radius of Pittsburgh, Pennsylvania

Code Identification: W10-1

Item: Fuel oil and/or waste oil.
Quantity Desired: No minimum quantity - drums or bulk.
Location: Greater St. Louis area

Code Identification: W10-2

Item: Nonferrous and precious metals containing residues, grindings, spent catalysts, sludges, and waste by-products.
Quantity Desired: Any economic quantity.
Location: East



ITEMS WANTED

Code Identification: W10-3

Item: Waste or surplus oil.
Quantity Desired: No limit to quantity.
Location: Greater St. Louis Area

Code Identification: W10-5

Item: Metal waste and residues containing economic quantities of Magnesium metal scraps or turnings, Magnesium Chloride or Magnesium Oxide.
Quantity Desired: Open.
Location: User in Midwest (source no problem for significant concentration)

Code Identification: W10-6

Item: Metal Waste and residue sludges containing significant concentration of either/or Zinc Oxide, Calcium Chloride, ferrous Sulfate or Cobalt.
Quantity Desired: Open.
Location: User in Midwest - concentration of the particular metal will determine transportation considerations.

Code Identification: W10-7

Item: Chromium in any form, including acid.
Quantity Desired: Open.
Location: Midwestern user - concentration of the Chromium will dictate economic transfer distance.

Code Identification: W8-1

Item: Metal Sludges or residues & grindings with up to 75% water or oil or in mixture. Metal content interested in is Co, Mo, Ni or W.
Quantity Desired: 500 lbs minimum
Location: Midwest

Code Identification: W8-6

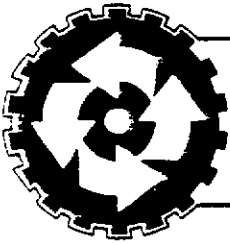
Item: Zinc Oxide (Baghouse dust - preferred dry) Zinc Oxide from electroplating operations or other intermediate processes.
Quantity Desired: any large amount on a continuous year round basis
Location: Midwest

Code Identification: W8-7

Item: Solvents - non halogenated - ring compound accepted except Benzene.
Quantity Desired: Bulk quantities or TL of drummed solvents
Location: Midwest

Code Identification: W7-7

Item: By products from planing mills, cabinet shops, furniture manufacturers or any other company that has waste from wood product.
Quantity Desired: Not specified.
Location: Local.



NEWS

NUMBER 5

SEPTEMBER 1980

WASTE EXCHANGE WORKSHOP TO BE HELD IN SEPTEMBER

A one-day workshop will be held in September to bring industry and government together to discuss how the Midwest Industrial Waste Exchange could better serve their particular needs. A joint effort of the Regional Commerce and Growth Association (RCGA) and the East-West Gateway Coordinating Council, the workshop is designed for state attorneys general, personnel of state environmental agencies and representatives of industrial associations.

During the workshop's first session, RCGA and the Gateway Council will present an overview of the Waste Exchange: how and why it was established, how it works, what it can and cannot do. The second session will present two viewpoints -- state and industrial -- of the Waste Exchange's future.

Following this background information, Edwin Stier, director of New Jersey's Department of Law and Public Safety, will discuss the Northeast Hazardous Waste Coordinating Committee. Composed of state attorneys general and funded by the Law Enforcement Assistance Administration (LEAA), the committee serves as a clearinghouse for hazardous waste information pertinent to the Northeastern states. Examples of this shared information include enforcement and investigative techniques and listings of disposal facilities and transporters. Because illegal dumpers crossing state lines prompted the committee's formation, it is hoped that this information-sharing activity will help states

to keep track of illegal activities and to prosecute violators.

During the last morning session, Chet McLaughlin of the U.S. Environmental Protection Agency (EPA) will present that agency's viewpoint on regulations under the Resource Conservation and Recovery Act.

The afternoon will be devoted to small group discussions on four topics related to the Midwest Industrial Waste Exchange: 1) how the Waste Exchange can serve industries and the states; 2) how the Waste Exchange should be financed; 3) whether the Waste Exchange will aid in implementing state or federal law; and 4) how the Waste Exchange can cooperate with existing exchanges in other states.

The workshop will close with reports from the discussion groups and their recommendations on how the Waste Exchange should be structured to better suit their needs.

The workshop's results will be reported in the November issue.

GOVERNOR CALLS SPECIAL SESSION ON HAZARDOUS WASTES

At the request of Missouri Gov. Joseph Teasdale, a special session of the state General Assembly will convene Sept. 3 to address hazardous waste management and disposal within the state. Gov. Teasdale's preliminary proposal, unveiled in late July, would amend the state's new hazardous waste management law

to provide for more waste recycling, stricter enforcement and penalties, and increased avenues for public participation in decision-making on hazardous waste matters.

One element of the proposal would create a tax on hazardous waste material placed in landfills. The tax would be levied on a per-ton basis to encourage industries to recycle or reprocess hazardous wastes, an alternative to the more common practice of dumping. Funds generated by the tax would support a special clean-up fund for abandoned hazardous waste sites as well as any hazardous waste spills which might occur.

The tax would also be used to finance a "state match" necessary for participation in a federal superfund system; enabling superfund legislation is currently pending in Congress. Other uses for the tax proceeds include grants for waste exchanges and support for a program of daily inspection of hazardous waste disposal sites.

Daily inspection of these sites is intended to strengthen enforcement of the existing law. A related proposal would allow inspectors to issue tickets for violations. The governor's proposal would also provide for harsher penalties for violations.

Proposed amendments to the current law's public participation provisions would require that an Environmental Impact Statement (EIS) be prepared for every proposed hazardous waste facility. The applicant would pay for the EIS through a filing fee on the site application.

Another public participation proposal would expand the state's Hazardous Waste Management Commis-

sion to include more general public and environmental group representation.

The governor's July 24 statement outlined a variety of elements designed to protect public health and welfare; a summary of the major points follows.

- 1) Amend the current state law to make it as stringent as the federal law.
- 2) Require that larger buffer zones surround landfill sites.
- 3) Eliminate "sunset" provisions from the existing law.
- 4) Make generators responsible for reducing the volume of hazardous waste placed in landfills.

Under the governor's preliminary proposal, post-closure requirements would be amended so that once a hazardous waste disposal facility closes, the operator would monitor the site for a specified period, after which the site would be deeded to the state.

The results of the special legislative session will be reported in the November issue.

CMA DESIGNS MODEL SITING LEGISLATION

The Chemical Manufacturers Association (CMA) has designed model state legislation for siting, constructing and financing new hazardous waste facilities, according to the July 11 Environment Reporter.

The CMA cited three reasons why it

developed the legislation: public outcry against hazardous waste facilities, recent action in many parts of the country preventing construction of hazardous waste facilities, and the lack of siting provisions in the Resource Conservation and Recovery Act.

The model legislation creates a Hazardous Waste Facility Siting Council to develop a long-range, statewide siting plan. However, the Council would first develop specific siting criteria as a basis for the long-range plan.

Council membership would include representatives of businesses which generate and transport hazardous wastes, as well as those involved in siting, constructing and operating hazardous waste facilities; representatives of the general public and civic and environmental groups; and individuals with experience in or knowledge of technical aspects of hazardous waste management.

Under the proposal, the Council would also monitor public and private opinion on siting issues and conduct hearings for each site application.

Applicants would be required to choose a site either included in the long-range plan or compatible with siting criteria. In addition, a certificate demonstrating environmental compatibility and public need would have to be awarded before a hazardous waste facility could be constructed.

If necessary, the Council could condemn land and annul local zoning ordinances to ensure implementation of the long-range plan.

For a copy of the model legislation, contact the Chemical Manufacturers

Association, Environmental Division, 1825 Connecticut Ave. N.W., Washington, D.C. 20009, or call (202) 328-4200.

EPA ENCOURAGES PRIVATE SECTOR TO ADMINISTER SITE SELECTION

Site selection of hazardous waste disposal facilities is the responsibility of the private sector, the U.S. Environmental Protection Agency (EPA) said in a policy statement July 24.

According to an article in the July 25 Environment Reporter, EPA suggested that separate organizations handle site selection because of the problems associated with making one agency responsible for regulating as well as siting hazardous waste facilities.

However, EPA advised that if government involvement in siting matters is needed, involvement should occur on a state level, either separately or through regional group cooperation. EPA will act in an advisory role, helping states in their siting activities through such means as handbooks, technical assistance and funding. (EPA assistance should be available by the end of 1980.)

EPA anticipates that as many as 50 to 125 new hazardous waste sites (treatment facilities, landfills and incinerators) will be needed within the next few years; the heaviest demand for those sites is in the Southeast, Northeast and Midwest.

EPA stressed that regional cooperation between states as well as active participation by local elected

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officials should help in establishing facilities which could serve the needs of more than one state.

EPA TO CLARIFY NEW HAZARDOUS WASTE REGULATIONS

According to a notice in the August 19 Federal Register, the U.S. Environmental Protection Agency (EPA) soon will begin issuing answers to questions on its hazardous waste regulations of Feb. 26 and May 19, 1980. EPA will issue amendments to and interpretations of the regulations as well.

For more information contact Filomena Chau, Office of Solid Waste (WH-562), U.S. Environmental Protection Agency, 401 M Street S.W., Washington, D.C. 20460, or call (202) 755-9173.

An information booklet on the regulations is also available; requests should be sent to Edward Cox, Solid Waste Information, U.S. Environmental Protection Agency, 26 W. St. Clair Street, Cincinnati, Oh. 45268.

CALENDAR OF EVENTS

The Center for Energy and Environmental Management (CEEM) is sponsoring a series of three-day seminars which will address strategic planning for disposal of solid wastes, EPA's regulation of new substances, and EPA's testing requirements under the Toxic Substances Control Act.

The seminar schedule is as follows:

Sept. 9-12, Pittsburgh, Pa.
Sept. 30-Oct. 3, Chicago, Ill.

Oct. 20-23, San Francisco, Ca.
Nov. 11-14, Houston, Tx.
Dec. 2-5, Atlanta, Ga.

For more information contact CEEM, P.O. Box 536, Fairfax, Va. 22030, or call (703) 250-5900.

Executive Enterprises Inc. will hold a conference on compliance with the RCRA Sept. 17-18 in Arlington, Va. For more information contact the conference registrar, Executive Enterprises Inc., 33 W. 60th St., New York, N.Y. 10023, or call (212) 489-2680.

The Legal Times of Washington and the Fordham University School of Law are sponsoring a series of two-day conferences on how to comply with new rules under the RCRA. The conferences will be held Sept. 22-23 in Chicago, Ill.; Oct. 6-7 in Washington, D.C.; and Oct. 20-21 in San Francisco, Ca. For more information contact Hazardous Waste Conference c/o Legal Times, 757 Third Ave., New York, N.Y. 10017, or call (800) 223-0231.

The Environmental Protection Agency will hold a national conference on management of uncontrolled hazardous wastes Oct. 15-17 in Washington, D.C. For more information contact the Hazardous Materials Control Research Institute, 9300 Columbia Blvd., Silver Spring, Md. 20910.

Vanderbilt University is sponsoring two seminars on hazardous waste engineering during September and October. The seminars will be held Sept. 15-17 in Washington, D.C., and Oct. 22-24 in Toronto, Canada. For more information contact Janet Vance, Vanderbilt University, Box 1525, Sta. B, Nashville, Tenn. 37325.



MIDWEST INDUSTRIAL WASTE EXCHANGE

Ten Broadway, St. Louis, Missouri 63102 Telephone (314) 231-3555/TWX 910-761-1080

CONFIDENTIAL LISTING FORM

Company Name: _____
Mailing Address: _____ MIWE Use Only
Code # _____
Company Contact: _____ Date: _____
Telephone Number: _____

PLEASE READ BEFORE SIGNING. All listings will be identified by code number only. A copy of all inquiries and replies will be forwarded to us for information and handling. Initiating contact with the interested party will, therefore, be left to our discretion. We recognize that detailed description and accuracy of the listing is our responsibility. We further understand that the MIWE will not be involved in negotiations between our firm and potential users or suppliers and will not determine what may constitute hazardous conditions or substances.

Date: _____ Signed: _____

LISTING INFORMATION

Check one: This is a listing for _____ material available _____ material wanted.

The following item should be listed in the next Clearinghouse Catalog and News published by the Midwest Industrial Waste Exchange. (Use separate forms for each item to be listed.)

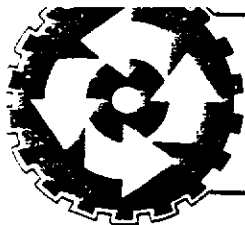
MATERIAL (Describe material as accurately as possible, keeping in mind what the reader of your listing may want to know.)

QUANTITY (Indicate amount per period of time, i.e., gals/wk, lbs/month, etc., and describe whether the material is offered/requested on a one-time or continuous basis.)

PACKAGING (Drum, bulk, etc.)

LOCATION (Give general area or state where material is available/wanted.)

Please enclose the \$10.00 fee for each item. This listing fee includes publication in three consecutive issues or until the waste is no longer available, whichever comes first. Checks should be made payable to the St. Louis Regional Commerce and Growth Association.



MIDWEST INDUSTRIAL WASTE EXCHANGE

Ten Broadway, St. Louis, Missouri 63102 Telephone (314) 231-5555/TWX 910-761-1080

NON-CONFIDENTIAL LISTING FORM

Company Name: _____
Mailing Address: _____

Company Contact: _____
Telephone Number: _____

MIWE Use Only

Code # _____

Date: _____

PLEASE READ BEFORE SIGNING

All listings will be identified by code number only. Our firm's identity will be furnished to the originator of any written inquiry regarding our code-numbered material. In addition, a copy of all inquiries and replies will be forwarded to us for information and possible action. By this method, either company may initiate contact with the other. We recognize that detailed description and accuracy of the listing is our responsibility. We further understand that the MIWE will not be involved in negotiations between our firm and potential users or suppliers and will not determine what may constitute hazardous conditions or substances.

SIGNED: _____

DATED: _____

LISTING INFORMATION

Check one: This is a listing for _____ material available.
_____ material wanted.

The following item should be listed in the next Clearinghouse Catalog and News published by the Midwest Industrial Waste Exchange. (Use separate form for each item to be listed.)

MATERIAL (Describe material as accurately as possible, keeping in mind what the reader of your listing may want to know.)

QUANTITY (Indicate amount per period of time, i.e., gals/wk, lbs/month, etc., and describe whether the material is offered/requested on a one-time or continuous basis.)

PACKAGING (Drum, bulk, etc.)

LOCATION (Give general area or state where material is available/wanted.)

Please enclose the \$10.00 fee for each item. This listing fee includes publication in three consecutive issues or until the waste is no longer available, whichever comes first. Checks should be made payable to the St. Louis Regional Commerce and Growth Association.

PLEASE SUBMIT A SEPARATE LETTER OF INQUIRY FOR EACH ITEM, IDENTIFYING IT BY
CODE NUMBER

SAMPLE LETTERS-OF-INQUIRY

Waste-Available Listing

Mr. Arthur G. Baebler
Midwest Industrial Waste Exchange
Ten Broadway
St. Louis, Missouri 63102

Dear Mr. Baebler:

We wish to obtain further information regarding the waste-available listing, identified by the code number _____, which appeared in a recent publication of the Clearinghouse Catalog and News.

Please notify the generator of this waste of our interest.

Sincerely,

Waste-Wanted Listing

Mr. Arthur G. Baebler
Midwest Industrial Waste Exchange
Ten Broadway
St. Louis, Missouri 63102

Dear Mr. Baebler:

We feel we have a material which will satisfy the needs of the lister of the waste-wanted ad, identified by the code number _____, which appeared in the August issue of your Clearinghouse Catalog and News. We produce approximately 25,000 gallons per month of _____, which is stored and shipped in drums. The generating plant is located at _____.

Please forward a copy of this reply to the advertiser of this wanted material.

Sincerely,

MEMO



TO: Oregon Media
FOR RELEASE: Upon receipt
DATE: August 27, 1980

For More Information, contact:

Dave Clark
WETA Project Manager
(503) 221-0357

Art Wickstrand, president of Western Environmental Trade Association (WETA) announced today that \$33,425 worth of energy has been saved through WETA's operation of the Oregon Industrial Waste Information Exchange (EXCHANGE).

Since WETA took over the clearinghouse function of the EXCHANGE in October 1979, companies and individuals have transferred waste items with a BTU (British Thermal Unit) equivalent of 955 barrels of oil. Successful transfers through the EXCHANGE have ranged from dirty solvents to a ton and one-half of plastic credit cards.

The purpose of the EXCHANGE is to encourage productive reuse of industrial waste that otherwise would be disposed of in the environment (i.e. landfill, incineration, or ocean dumping).

To promote reuse of wastes, WETA publishes and distributes - free of charge - a bi-monthly listing Bulletin of waste materials; refers responses to the listings; receives new listings; and fills information requests. Wastes listed include: acids, chemicals, solvents, metals, oils, wood and paper products, catalysts, etc.

Since taking on the clearinghouse function, WETA has improved EXCHANGE effectiveness in several ways; distribution of the EXCHANGE Bulletin has gone from 500 to over 1,200 recipients; listings have increased by 30%; and the quality of listings has been improved through a more intensive level of communication with listers and users.

Wickstrand stated, "The EXCHANGE has proved to be a cost effective method for conserving energy and improving the quality of the environment. WETA hopes more organizations will take advantage of this free service".

LISTING FORM

OREGON INDUSTRIAL WASTE INFORMATION EXCHANGE
Western Environmental Trade Association
Suite 618 -- 333 SW Fifth Ave.
Portland, OR 97204 (503) 221-0357

EXCHANGE Use Only

CODE# _____

DATE: _____

CONFIDENTIAL INFORMATION

Company Name: _____

Mailing Address: _____

Company Contact: _____

Telephone Number: _____

PUBLISHABLE INFORMATION

Check one: This is a listing for _____ material available.
_____ material wanted.

The following item should be listed in the next bulletin of the Oregon Industrial Waste Information Exchange.

CATEGORY* _____

MATERIAL (Describe accurately as to specifications, sizes, quality, color, shape and form, keeping in mind what the reader of your listing will want to know.)

QUANTITY (Indicate amount per period of time, i.e. gals/wk, lbs/month, etc. and describe whether the material is offered/requested on a one-time, regular or irregular basis.)

PACKAGING (Barrels, Loose, Bales, etc.)

LOCATION (Give general area of state where material is available/wanted.)

(see reverse)

*CATEGORIES:

1. Acids, Alkalis	7. Paper & Wood
2. Organic Chemicals & Solvents	8. Plastics & Rubber
3. Metals & Metal-containing Sludges	9. Catalysts
4. Minerals (incl. glass, sand)	10. Textiles & Leather
5. Oils & Waxes	11. Inorganic Chemicals
6. Food	12. Other (please specify)

EXCHANGE USE ONLY: CODE# _____ DATE: _____

PLEASE READ BEFORE SIGNING

In submitting this listing it is understood that the Western Environmental Trade Association, Inc. will not disclose our firm's identity. We also recognize that determining the content of the above mentioned material, and the description of it, is our responsibility. We understand that the Western Environmental Trade Association, Inc. will not be involved in negotiations between our firm and potential customers or suppliers, and will not make any determination as to prices or what may constitute hazardous conditions or substances. Additionally, we agree to hold the Western Environmental Trade Association, Inc. harmless for any damage which we may suffer as a result of any disclosure by any subscriber to the EXCHANGE.

SIGNED: _____

DATED: _____

The following points are optional. Your answers will help the EXCHANGE provide better service.

1. If known, give possible uses/sources for the material available/wanted (kinds of companies, processes, geographical locations).
2. Please outline your firm's primary reason for providing this listing.
3. Do you have any questions concerning the EXCHANGE? How can we better help your company?

OPERATIONS & PROCEDURES

Send the completed form to: WESTERN ENVIRONMENTAL TRADE ASSOCIATION, Suite 618 -- 333 SW 5th Ave., Portland OR 97204

Your listing will be published every other month for the period of one year or until you notify the EXCHANGE of a successful transfer. At the end of the year, please contact the EXCHANGE regarding the continuation or termination of your listing.

Any responses to your listing will be forwarded promptly and you should then contact the inquirer directly, to discuss transfer.

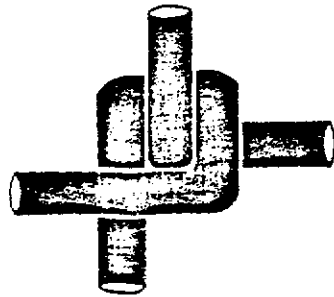
If you wish to list more than one waste item, please make copies of the form, or contact the EXCHANGE at the Western Environmental Trade Association offices by mail or phone (503) 221-0357 for additional forms.

Thank you for your participation.

THE EXCHANGE

a free business and
environmental service
to Oregon industries

OREGON
INDUSTRIAL
WASTE
INFORMATION
EXCHANGE



Oregon Industrial Waste Information Exchange

WESTERN ENVIRONMENTAL TRADE ASSOCIATION
Suite 618, 333 SW 5th, Portland Oregon 97204 -- (503) 221-0357

LISTINGS BULLETIN SEPTEMBER 1980

The Oregon Industrial Waste Information Exchange LISTINGS BULLETIN is published every other month by the Western Environmental Trade Association (WETA), and lists two types of items: Material Available (A) and Material Wanted (W). Each listing is identified by a code number and includes a description of the item, its quantity, packaging and location.

Anyone interested in a particular listing should write the EXCHANGE, referring to the item by code number. Inquiries will be promptly forwarded to the firm which made the listing - who is then responsible for any further efforts which may lead to negotiations and/or transfers and exchanges. The EXCHANGE serves only as a clearinghouse for information, and does not take part in any transfers or in negotiations that may lead to transfers, although notification of successful exchanges is requested.

Listing information has been printed as received from the supplier. The EXCHANGE is not responsible for the accuracy of the description or the usefulness or merchantability of any item listed.

We appreciate your interest in this program. If you need assistance, or desire more information, please contact us.

THE EXCHANGE

WESTERN ENVIRONMENTAL TRADE ASSOCIATION

Contact: Dave Clark, Project Manager
333 SW Fifth Ave. Suite 618
Portland, Oregon 97204
(503) 221-0357

ACIDS & ALKALIS

CATEGORY ONE:

AVAILABLE

- A48 - 1 Calcium Hydroxide Sludge (Slaked Lime): Potential uses in acid neutralization, or as a substitute for lime products. 10 tons (dry wt.) of slurry/day on a regular basis or limited tonnage of bulk materials. Slurry - 30% solids. N, Portland.
- A61 - 1 Toluene Sulfonic Acid: 200 55-gal. barrels now; less on a regular basis. Portland area.
- A 136 - 1 Pels (PPG) Brand Caustic Soda Beads: (Sodium Hydroxide) - technical grade. Two 55-gal. drums (500# each). One time only. Available Cottage Grove OR area.
- A142 - 1 Sulfuric Acid possibly contaminated with Cr⁺⁺⁺. 200-250 gal/year on irregular basis, but in minimum of 35 gallon lots. Packaged in 55 gal. drum which must be returned to lister. Acquirer must advise lister of end use, so as to comply with EPA and DEQ regulations. Eugene area.

ORGANIC CHEMICALS & SOLVENTS

CATEGORY TWO:

AVAILABLE A66 - 2

- A83 - 2 Used Lacquer Thinner: contains stains, pigments, particles. Approx. 50 gals. in 5-gal. drums. Portland.
- A86 - 2 Waste Solvents: paint and thinner mixed. Approx. one 55-gal. barrel/month, Portland.
- A87 - 2 Sludge Containing Formaldehyde, Phenol and Water. Approximately 10,000 gals. Portland.
- A89 - 2 Used Isopropyl Alcohol: diluted to 50%. Approx. 50 gals. now; greater quantities in the future. Portland.
- Wash Solution: amine soap in aliphatic petroleum solvent with co-solvents and 2% aqua-ammonia.
- Rinse Solution: aliphatic petroleum hydrocarbons and aromatic naphthas. Material Safety Data Sheet Available. 10 gallons each month of each solution. 30-40 gallons initially. 5 gallon runs. Portland.
- A113 - 2 Waste Solvents: from cleaning tanks. Tri-Chlorethylene. Spirits petroleum tank. Barrels. Available on an irregular basis. Portland.
- A128 - 2 Used Acetone. Has been used to wash polyester resin from equipment. One 5-gal. can/mo. Could be used in any operation needing low grade solvent for secondary cleaning or starting fires. Eugene OR.
- A132 - 2 Offset printing Blanket Wash ("Water Sol"). Three 5-gal. cans on a one-time basis. Unusable by lister's equipment but might be useful for other solvent uses or in letterpress printing. Portland.
- A143 - 2 Chlorinated Hydrocarbons - mixed Methylene Chloride, Carbon Tetrachloride, Perchlorethylene, possibly some solvents or water. 200-250 gal/year on irregular basis but in minimum of 55 gallons lots. Acquirer must advise lister of end use, so as to comply with EPA and DEQ regulations. Eugene area.
- A147 - 2 Flammable Paint Sludge: approx. 75-80% solids. 1 to 2 drums/month. Could be used for fuel or for training fire fighters. Eugene area.
- A148 - 2 Mixed Aliphatic & Aromatic Solvents from re-claim. 50,000 gal/month. Chicago IL metro area.
- A149 - 2 Re-distilled 1,1,1,1-Trichlorethane: 3,000 gal/month. Chicago IL metro area.

WANTED

W2 - 2	<u>Chlorinated Solvents</u> : Any volume, any format. (OR, WA, N.C.A, ID).
W5 - 2	<u>Waste Kerosene, Solvents & Thinners</u> : Any quantity, any packaging. OR, S.W. WA.
W30 - 2	<u>Sludge</u> : From Vapor Degreaser (i.e. Freon solvents). Any quantity; any quality. Pacific Northwest.
W37 - 2	<u>White Paint</u> : surplus or slightly contaminated in quantities of 50 gals. or more. Corvallis, OR.
W39 - 2	<u>Waste Chlorinated Solvent</u> for recycling (Sludge). (U,I,I Trichloroethane, Trichlorethylene, Methylene Chloride, Perchloroethylene). Drums or bulk on regular basis. Portland area.
W42 - 2	<u>Solvents</u> - (Wide Variety) - also chemicals & some acids & alkalis. Interested in large quantity of a cross-section of industrial solvents, to be reused as paint stripper & removers, also as various solvent blends in cleaning application. Wanted on regular basis; can take some bulk supplies and/or drum supplies. Clackamas county.
W49 - 2	<u>Usable Paints</u> : latexes or enamels - Interior or exterior. 1 gal. minimum in either 1 or 5 gal. containers. Will pickup quantities of 50 gal. or more; will receive 1 gal. or more. Regular, irregular or 1-time basis. To be reused in building projects for eligible clients of special program. Portland metro area.
<u>CATEGORY TITLE: METALS & METAL-CONTAINING SLUDGES</u>	
<u>AVAILABLE</u>	
A17 - 3	<u>Aluminum Rod & Tube</u> : all diameters from 1/4" to 1-3/4" X .058 wall in lengths of 6" to 30". Approx. 50 lbs./mo. Loose. Portland area.
A36 - 3	<u>Secondary Cons</u> : 303 x 406 (16 oz), 401 x 411 (27 oz), and 603 x 700 (gallon cons). Suitable for nursery plant pots and other uses. 10,000 cons/month on regular basis. Palletized. Portland
A71 - 3	<u>Aluminum Slag</u> (Very Hard, Solid Blocks 1' X 1.5' X 1.75'): composed of aluminum metal, sodium & potassium chloride, silica, aluminum oxide & inerts. 1000-2500 tons/mo., depending upon area, regularly available for disposal, recycling or processing. Potential uses: upgrading aluminum content by milling and recovering metal by melting. S. CA, NW Indiana & Alabama, Harrisburg, Toledo and St. Louis areas.
A72 - 3	<u>-20 Dust</u> (Generated from the Milling of Purchased Aluminum Slag): Contains -20 screened dust particles, aluminum metal, sodium & potassium chloride, silica, aluminum oxide & inerts. 4500 tons/mo. available for disposal, recycling or processing on a continuous basis. NW Indiana & Alabama.
A73 - 3	<u>Bag House Dust</u> (Very Fine Dust Particles): aluminum metal, sodium & potassium chloride, aluminum oxide & inerts. 200 tons/mo. available for disposal, recycling or processing on a continuous basis. NW Indiana & Alabama.
A99 - 3	<u>Steel Pipe</u> : 360'-3/4" in 10 ft. lengths. One time. Loose. SW Portland.
A100 - 3	<u>Plating Sludges</u> : Dewatered through filter press; Dry basis: 19.9 % Cu - 1.090 Cu - 0.04% Cr - .3490 Ni - .005 Cn. Approx. 3000 lbs/three months. On regular basis every 3 - 4 months. Portland area.
A112 - 3	<u>Reclaimed Chrome Plating Solution</u> (has a high Ph.). 330 gal/mo. in 55 gal. drums. Reasonably priced. Portland metro area.

A114 - 3

Low-Salt Aluminum/Alum. Oxide Mixture: Both materials will have aluminum metal content of approx. 10% - 30%, & aluminum oxide content of 65% - 85%. Salt content (incl. nocl) will be 4% for one prod. & 1% for the other. Easiest to supply wet. Can be dried if necessary. 500 cu.yds/mo. available soon, The Dalles OR area.

A115 - 3

Aluminum Dross Fines: Approx. composition: 25% Al Metal, 60% Aluminum oxide & 15% salts (25% KCl, 75% NaCl). Mill minus a #16 sieve, has uniform gray color & weighs approx. 1700#/cu.yd. Approx. 3000 cu.yds. now Portland area. 200 cu.yd/mo. regularly Portland area; 250 cu.yd/mo. projected for The Dalles OR area. Packaging: loose.

A116 - 3

Aluminum Dross - (secondary, from reverberatory furnace). Approx. composition: 10% Al metal, 70% Aluminum oxide (i.e. alumina or corundum) & 20% salts (25% KCL & 75% NaCl). Material is granular w/aggregate, uniform gray color. Weight: approx. 1700#/cu.yd. Packaging: loose. Approx. 5000 cu.yds. available now Portland area; 200 cu.yd/mo. regularly Portland area; 250 cu.yd/mo. projected for The Dalles OR area.

Possible uses for A114, 115, 116-3 above: Abrasive, refractory filler in ceramic or brick; inert filler in concrete; upgrading Al content for further metal recovery; Al₂O₃ source for cement clinker production; exothermic material for the high temp. reduction of iron oxide & other metal oxides (the aluminothermic or Goldschmidt process).

A122 - 3

356 Aluminum Alloy: chips & solid, very little impurities. Possible use in foundries. 2000#-500#/mo. Regular basis. Portland metro.

A126 - 3

Cold Roll Welded Steel Tube. 3-1/2" dia. x 11 gauge wall, 30' to 40' long. 4" dia. x 3/16" gauge wall, 30' to 40' long. 60 to 100 pcs. every 3 mo. Packaged loose. Portland area.

A134 - 3

Hot Rolled Plate. 3/16" thick X 74" dia. circle. 1/4" thick X 5x8, 5x4, or 3fx11" angular cutouts. 3000 lb/4th quarter. Packaged loose. Could be used for gusset mat in steel building mfg. or trailer mfg. or ornamental iron fabricators. S. Oregon - close to IS.

A 139 - 3

Steel Cable: 17 pieces - each 125 ft. long. 1" dia. Coated with 3/7 ton working strength. New - Never Used. Eye ends. Will load on flat bed truck. One time. SW Portland metro area.

A150 - 3

Zinc Bearing Powders: Approx. 97.5% zinc. 200 tons available now - 30-40 tons/month on on-going basis. Chicago IL metro area.

A151 - 3

Zinc Alloy Dross: 18.5 % zinc, copper, nickel, some silver. 500 tons available one time basis. Chicago IL metro area.

WANTED

W22 - 3

Scrap Iron & Non-Ferrous Metals: Usable Steel salvage materials Any quantity, packaging. Portland area.

W6 - 3

Any type of Scrap metals or Metal-containing Materials: Quantities vary with type, quality & destination of material. Barrels, loose, bales, etc. Anywhere.

W11 - 3

Non-ferrous material: aluminum, copper, brass, stainless steel, etc. in all sizes. All quantities on an unlimited basis in barrels, loose, bales, or boxed. Entire state.

W17 - 3

Any Metal Scrap or Metal-bearing Sludge/Residue: quantities as available. Scrap can be loose; sludges should be packed in steel drums. Anywhere available.

W20 - 3

Scrap Tinplate & other Tin-bearing Materials: any quantity; packaging dependent upon material. WA, OR, N.C.A.

W36 - 3 5" to 1" Plate Steel Scraps: pieces over 1' sq. Large iron or steel pipe or conduit scrap. Material is needed on a regular basis, depending on shapes and sizes available. 1000 lbs. monthly. Loose. Portland area.

CATEGORY FOUR:

MINERALS

AVAILABLE

A6 - 4 Gypsum Plaster: $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$; (80%) Chips: 2 - 3" sq. X 1/8" thick; (15%). Formed Molds discarded, average 12X12X6 inches; (5%) Powder. Color: White. 3000 lbs/wk. In unsealed 100 lb. sacks. Portland.

A64 - 4 Silician Sludge in powder form when suspended in 70% water. Hardens like concrete when water is removed. Approx. 10,000 lbs/mo. beginning in late 1979. Stored in plastic-lined tanks. Portland area.

A101 - 4 Scrap/Broken Glass: 1 ton/wk. on a regular basis. Loose. Portland metro area.

CATEGORY FIVE:

OILS & WAXES

AVAILABLE

A1 - 5 Waste from Chlorinated Solvent Recovery: Still bottoms from distillation. Contains heavy & light oils, cutting fluids, wax, paint pigments & metal flakes. Has BTU value; possible use for soil stabilization or waste oil recovery. Steady 2000 gal/mo. in drums. Portland area.

A90 - 5 Wax Extender: 8000 lbs. available in kegs weighing about 100 lbs. each. Portland.

A146 - 5 Stove Oil (has some water in it). Three 50-gal. barrels. Available on one-time basis. Portland metro area.

WANTED

W53 - 5 Used Oil: any type, any quantity, any packaging. OR or SW Wash.

CATEGORY SIX:

FOOD AND FOOD PROCESSING MATERIALS

CATEGORY SEVEN:

PAPER & WOOD

AVAILABLE

A7 - 7 Non-reusable Wooden Pallets: Misc. sizes, varying quantities. Loose. Portland.

A8 - 7 Assorted Cardboard Boxes: in good reusable condition. Small to medium sizes; many are 10X14X18", 15X11X18", and 8X10X17". Ideal for shipping or delivery. Available on a regular monthly or semi-monthly basis. Bottom cut for flat storage. Portland.

A25 - 7 Falldown from Sawmill Logs & Veneer Peeler Logs: Dark Fine Bark Mulch - heavy moisture content; Dark Sawdust, 80-90% Douglas Fir, heavy moisture content. Potential uses as Fuel, Garden Mulch, Decorative for yards, Briquets. 5 trucks/day @ 48,000 lbs/truck; 2 yrs. supply @ 222 days/yr. Loose in truck load lots - 10 units/truck S.W. OR.

A38 - 7 Wood & some Sawdust: new, kiln dried. Sizes: 1X3, 1X4, 1X6, 2X4, 2X6; from 2" to 3" and 4" long. Available loose on a regular weekly basis. W. Portland area.

A55 - 7 Scrap Wood: various sizes. 200 lbs/mo. offered on an irregular basis. Loose. Portland area.

A67 - 7 Re-usable Wooden Pallets: 40-50/month on a regular basis. Loose. Portland.

Sawdust: developed from cutting and machining plywood & particleboard 3 - 5 units/day regularly in metal drop boxes. Albany.

A69 - 7 Wood Wastes from Shingle Manufacture: (Larch or Tamarack). Potential use as plant mulch, soil stabilizer, stock bedding, gardening. Regular supply up to 5 tons/day offered. Bulk, bale or unit. Umatilla County, Oregon.

A95 - 7 Redwood: random lengths of lath up to 47" X 1 1/2". Varying quantities available loose or palletized. Corvallis, OR.

A123 - 7 Scrap Plywood: 3/4", 1/2", 3/8". Irregular shapes, generally 11" - 15". Approx. 20 yrt (Dump Truck Type)/mo. Central OR.

A124 - 7 Softwood & Hardwood Rippings: various sizes. Softwood & Hardwood Plywood Pieces: various sizes - mostly 3/4" thick. Approx. one small truckload/mo. rippings in large bundles. Approx. one pickup load/mo. plywood pieces, loose. Eugene OR.

A129 - 7 Pelletized Wood Fuel: no additives. Approx 8500 BTU/lb. Pollution free. Approx 80% cost of coal/BTU. Can be used as fuel in coal, oil or gas fired boiler, veneer dryer, etc. Available bulk - 25 ton 11. day, wk., mo. Mid & South Willamette Valley.

A131 - 7 Pulp Sludge: Characteristics similar to paper mache. FOR Live Bottom truck: 30-36 yards per load. Use as dairy or livestock bedding. Delivered for trucking expense. 60-70 yards available on regular daily basis. Mid-Willamette valley.

A135 - 7 Wood Glass Crates: constructed of 1x4's, 2x4's, and 2x6's - Douglas fir. 25 to 30 crates/week - available regular basis - fully assembled. Could be used for building materials, wood shelves, decorative designs or firewood. SE Portland.

A137 - 7 Pulpboard & Paper Stock Carton Trim with 0035 foil on one side. Paper Stock Carton Trim: polycoated two sides.

Pulpboard Carton Trim: Polycoated one side.

Pulpboard & Paper Stock Waxed Cartons

All available on irregular basis. Minimum 5 tons at a time. Packaged in bales. Could be used for roofing filler material or recycled on an irregular basis. Portland area.

A138 - 7 Paperboard Cores: 12" dia. Length from 24" to 45". 3/8" thick. Approx. wt. 10#/ each. Could be reused for paper cores or for concrete forms. 750 cores/wk. on a regular basis. Packaged loose. Portland area.

A141 - 7 Green dimension Lumber End Cuts. Up to 10' long (approx. 60%) - mixed with sawdust (approx. 40%). Approx. 1 ton/wk or more, on a fairly regular basis. Could be used as boiler fuel by public or private utility, or by public or private building using wood waste for energy. Packaged loose. Wilsonville OR area.

A145 - 7 Empty Kraft Paper Bags: each containing a few ounces of residue of clays, titanium dioxide, silica, calcium carbonate, talc. Approx. amount 1-3 tons/month. Salem area.

WANTED

W28 - 7 Soft or Hardwood Pallets: 4-way entry, 40X48, rebuilt or in good condition. Clean and suitable for shipping consumer products. Up to 750/month desired. Shipping can be arranged. Grants Pass.

W27 - 7 Cardboard Shipping Cartons: small to medium sizes needed for shipping bicycle parts nationwide. 100 boxes every 2-3 months. Portland.

W13 - 7 Newspaper: up to 30 tons/mo. on a regular basis. Bundled or loose. Greater Medford area (S. Rogue Valley).

W14 - 7

Scrap Office Paper, Computer Print-Out, & Computer Lab Cards: up to 10 tons/mo. on a regular basis. Boxes or fiber barrels, not necessarily sorted by type. Greater Medford area (S.Rogue Valley).

W7 - 7

Reusable Wood Pallets: misc. sizes that a standard hand pallet jack can pick up. 200/wk. Loose. Portland.

W12 - 7

All sorts of Building Materials: especially wood products, in small or large lots - not one-of-a-kind items. With some exceptions, at least 8' in length. Regular, irregular or one-time-only basis. Maximum hauling - truckload; minimum - 1-ton flat bed. Loose or bundled. Must be sorted from non-lumber products. Minimum 6-8' length. Mid-Willamette Valley.

W41 - 7

Large-sized Pallets: approx. 6' high and 7' long. Not to be used as pallets so can be in less-than-good condition. 140 sq. ft. wanted. Portland area.

W44 - 7

Hogged Fuel - principally fir. Delivered or will pick up. 50-150 units/day. Regular basis. West Linn County.

W45 - 7

Hogged Fuel - heavily barked pieces, principally fir. 50-150 units/day. Regular basis. Mid to South Willamette Valley.

W48 - 7

Usable Dimensional Lumber & Plywood: 6' & over in length, & half sheets or greater. 2x4's in particular - will dismantle for recovery. On regular, irregular or one-time basis; loose or bundled. Will pick up truck loads, or will receive any amount. To be reused as building materials for eligible clients of special program. Portland metro area.

CATEGORY EIGHT:

PLASTICS & RUBBER

AVAILABLE

A9 - 8

Closed Cell Sponge Rubbers: from soft to firm density in web form. Black primarily, with some tan. No large full-sized pieces. Potential energy source. Approx. one dumpster load/wk. Stored loose in bins. Portland.

A39 - 8

Polyester Soft Drink Containers: material - polyethylene terephthalate (PET). Color: clear & green. 10-20 tons/mo. to start a growing market. Packaging to suit market. Oregon

A59 - 8

"Ethfoam", made by Dow Chemical Co. Scraps from toy-making: 1X2X36", 1X2X24", & smaller strips. Designed for use as packaging material. Small pick-up load once/mo. on a regular basis. Portland.

A97 - 8

Clear Vinyl Sheet: trim wastes from storm window weatherization. Quantity varies. Packaging not specified. Multnomah County area.

A103 - 8

Buterates: 1/4" recut, clear plastic. Medium hard. 1000 lbs. available. Packaged in barrels weighing about 200 lbs. each. Portland area.

A105 - 8

Acrylic Scrap: approx. 10,000 lbs. available in mixed sizes. Packaged on gaylords which would need to be returned. East Multnomah County, Oregon.

A119 - 8

PVC Clear Plastic: scrap. Approx. 100#/mo. Packed in boxes. Possible use to re-grinders of plastics. Milwaukie OR area.

A144 - 2

All Major Plastics: Extrusion, blow mold, & injection mold grades; regrind or pelletized (reprocessed) available. Colors/additives to order. Available from plastic recycler on one-time, regular or irregular basis. Quantities vary with availability (1,000-40,000 lbs). Packaged gaylords or barrels. Oregon.

A152 - 8

Polypropylene Fines: some lumping but mostly free flowing. All white. Approx. 100#/month on on-going basis. Chicago Il metro area.

WANTED

W9 - 8

Injection Grade Polyethylene: for use in misc. plastic items. 1000 lbs. shipment or more, on a regular basis. Barrels or Gaylords. Portland area.

W21 - 8

Plastic & Rubber Waste Materials: presently sent to land-fill disposal. Approx. chemical composition or organic family must be known. Potential use for energy recovery. Quantity not critical - only approx. time schedule & amounts when available. Metro-Portland area to Corvallis - Albany area.

W35 - 8

Polyester Soft Drink Containers: Materials: polyethylene terephthalate (PET). Color: clear and green. Variable quantities acceptable in any suitable packaging. OR.

W46 - 8

Clean Plastic Waste normally sent to landfills. ANY size, ANY color of polyethylene, polypropylene, polystyrene, polyvinylchloride, or ABS. Will be used for regrind. Any suitable packages on one time basis, or weekly or monthly. Eugene area.

W50 - 8

Plastic Scrap: any amount, size, kind or color. Film or solids accepted. Scrap from manufacturers, industry, warehouses, the public on one-time, regular or irregular basis in any suitable packaging. OR, WASH, ID or N. CAL.

W51 - 8

Polyester Soft Drink Containers: (PET), Bottles, green or clear. Any amount considered on one-time, regular or irregular basis by plastic recycler. Any suitable packaging. OR, WASH, ID or N. CAL.

CATEGORY NINE:

CATALYSTS

WANTED

W18 - 9

Any Metal-bearing Spent Catalyst: quantity as available. Either in bulk form or in steel drums. Anywhere available.

CATEGORY TEN:

TEXTILES & LEATHER

A110 - 10

Vinyl/Nylon & Vinyl/Polyester Laminates. Strips 3"-6" wide; some wider & some irregular shapes. 10 oz.-18 oz.sq.yd. Assorted colors. 2 - 4 bushels/wk. Packaged loose. Possible use by craft shop, handicraft or senior citizen workshops. Albany OR.

A121 - 10

Leather scraps. 1/16" to 3/16" thick (mostly about 1/8" thick). Sizes vary from approx. 5 sq. in. to about 25 sq. in., in odd shapes. Mostly natural buff colored - some black. Lister can split to thickness. Could be used for craft work, novelties. 1000# available now. 200-300# of pieces smaller than above, available/wk. Downtown Portland.

CATEGORY ELEVEN:

INORGANIC CHEMICALS

A117 - 11

Baghouse Dust: Approx. composition: 70% water soluble salts (mostly NaCl & NaNO_2), 2.8 total fluorine (.7 water soluble, probably fluoride), remaining fraction is inert oxides. Complete analysis available. Material is fine powder w/low bulk density. 33#/cu.yd. White in color. 30 cu.yd/mo. Portland area. 30 cu.yd/mo. The Dalles OR area. Packaging: plastic baghouse bags. Possible uses: source of salts for leather tanning; various chemical mfg. processes; freezing point depressant in aqueous solution.

A118 - 11

Potassium Chloride & Sodium Chloride Salt Solutions: slightly basic with some fluoride. Concentration ranges from 10g salt/100g water to a saturated solution. 200,000 gal/mo. maximum (estimate for most dilute solution). Packaging: uncontained liquid. The Dalles OR.

CATEGORY TWELVE: OTHER TYPES OF MATERIALS

- A57 - 12 Residue from Car Shredding Operations: contains mostly natural & synthetic fibers, paint chips & glass particles. Might substitute for peat moss as a soil conditioner or used as a fuel in a hog fuel type of boiler. 200 cu-yd/day on a fairly regular basis. Loose. 14W Willamette Valley.
- A111 - 12 Cardboard Cores: from fabric rolls. 1"-3" diameters; 54"-72" long. 6-10/wk. Packaged loose, but could be banded. Albany OR.
- A133 - 12 Organic Sludges: 10% solid. Potential use as fertilizer for agricultural or forestry land. 10% nitrogen content. 30 cu. yds/wk on regular basis. Packaged bulk. North Willamette valley.

WANTED

- W23 - 12 Fiber Barrels: approx. 50 gal. size, without toxic residues. Would be willing to rinse out water-soluble residues. Lids not required. Will be used for paper recycling operations. Can use 70 or more on one-time basis, or approx. 60/mo. on a regular basis. Loose. Willing to pick up in Portland area.
- W40 - 12 55 Gallon Metal Drums: At least 100 drums can be used monthly. Portland metro area.
- W47 - 12 Film or Fix: Want new or used PMT, Litho, Medical X-Ray Film from hospitals, medical clinics, chiropractor centers, veterinarian clinics, etc. Want used Fix from print shops, medical clinics, etc. To be used to recover silver from the fix and film. Will pick up any amount at any time. Barrels, boxes or bales preferred. Portland area.
- W52 - 12 Water Soluble or Oil Soluble Waste Liquor (type) Liquid - that would have some slight sticking ability or film-forming capability. Needed as binder or carrier for pigmented marking compounds. Possible sources: paper or kraft mills. Acceptable in 50 gal. drums or bulk delivery. Salem area.

MULTIPLE CATEGORIES

AVAILABLE

- A40 - 3, 7 Steel Beams, Lumber & Piling: long lengths; larger dimensional size materials. Used condition but good. Material assortment available. Oregon & Washington
- A125 - 3, 7 Rejected Zinc Die Castings, plated. 1000#/mo. in boxes Scrap Aluminum Rod & Small Springs: 100#/mo. in boxes Cardboard Boxes: 500#/wk. Loose. Used Pallets. 15/mo. Loose. All Salem OR area.

WANTED

- W1 - 1, 2, 8, 11 Dry or Liquid Chemical Wastes: any volume; any format - can bag loose dry chemicals or drum-off liquids. OR, WA, N.CA, ID.
- W15 - 3, 7 Steel Beams, Lumber, Piling: long lengths; larger dimensional size materials. Used condition but good. Any amount desired for recycling used materials. 5 pcs. or more of steel beams & larger timbers. OR & WA.
- W29 - 4, 6, 12 All Material of Animal or Plant Origin: In whatever form, for use in fertilizer/composting materials. Any quantity in truckload capacities on an irregular basis. Portland Metro-area and west.
- W43 - 3, 12 Ferrous (Iron) or Non Ferrous (Metals) Material: wire, copper, brass or scrap iron. To be recycled. Will take any amount, any time. Material can be available any way as company has own drop boxes. Portland metro.

WASTE EXCHANGE NEWSLETTER
SEPTEMBER 1980

Dear EXCHANGE Participant:

The Western Environmental Trade Association (WETA) has operated the EXCHANGE for nearly one year. In that time, we have improved the EXCHANGE to make it more useful to you. Starting with this month's issue, a short newsletter will be included with each EXCHANGE Bulletin. The purpose of this newsletter is to: explain in more detail EXCHANGE procedures; update participants on government regulations affecting waste disposal; and to supply information about special waste utilization methods.

If you have any questions about this newsletter, the EXCHANGE Bulletin, or a waste transfer, please give me (Dave Clark) a call at (503) 221-0357.

Dave Clark

Project Manager

EXCHANGE SAVES \$33,425

Since WETA took over the clearinghouse function of the EXCHANGE in October 1979, companies and individuals have reported transfers of waste items with an energy equivalent of 5,540.29 X 10⁶ BTU (British Thermal Units). This equates to 955 barrels of oil. At \$35 per barrel, that is an energy savings of \$33,425! The EXCHANGE has certainly proved to be cost effective.

OWENS-ILLINOIS EXPANDS GLASS PROCESSING PLANT

Owens-Illinois, Oregon's only glass container recycling plant, will now accept glass containers with metal rings and caps still attached. Corks, plastic, and paper are also allowed under the new specifications. The plant uses magnets, crushers, screens, augers and vacuums to remove all of the common contaminants from the cullet.

The processor is the first of its kind at any of the Owens-Illinois plants across the United States. To find out how you may be able to utilize this service, contact Del Rose of Owens-Illinois at (503) 234-7331 for more information.

EPA RELEASES HAZARDOUS WASTE RULES

Hazardous waste rules have been issued by the Federal Environmental Protection Agency. These requirements control hazardous substances from "cradle to grave" and concern their classification, generation, treatment, transportation, storage and disposal.

Generators producing less than 1000 kilograms per month of most hazardous wastes are exempt from the notification and transportation rules, although they must dispose of such wastes in a hazardous waste, or state-licensed, landfill. EPA says that 99% of all hazardous wastes will thus be covered by the new rules. Notification to EPA was due by August 18.

In most ways, EPA's national manifest system parallels the program which has been operating in Oregon since August, 1979. The state Department of Environmental Quality has applied to EPA to manage the federal hazardous waste program within state boundaries after November of this year. It is the DEQ's intent that generators, transporters and those who store, treat or dispose of hazardous waste will have to operate under a single set of rules.

A discussion paper evaluating a state-run versus a federally-run program is available from the DEQ Solid Waste Division. A task force is also being formed by the DEQ to advise the agency and the 1981 Legislature on this issue. Administrative and statutory changes would be necessary, for EPA to approve DEQ operation of the hazardous waste control program. Contact Valerie Lee at 229-6044, or toll free 1-800-452-7813, if you are interested in the discussion paper or the task force.

An EPA Hazardous Waste Hot-Line has been established for questions regarding the rules. In Oregon, call 1-800-426-0663. Inside Washington state, call 1-800-542-0861.

EXCHANGE SURVEY RESULTS

In the July issue of the EXCHANGE Bulletin, there was a survey sent to all participants, so that WETA could receive feedback on what you thought about the EXCHANGE. Those responding were very supportive of the EXCHANGE; in fact, they would like to see expanded distribution, and even more listings included.

The survey pointed out some concerns and questions about the EXCHANGE that should be addressed. Among these was the opinion that transfers would be more expedient if direct contact between the inquirer and the lister was possible. This is probably true, but, the confidential nature of the EXCHANGE is a very important aspect. Many industries and businesses want to protect their process operation from competitors. The confidential aspect insures that listers contact only those people they want to contact.

Several respondents said the price of items (if any) should be indicated in the listings. This is an excellent idea, and WETA encourages future and current listers to include the price (if any) of an item when listing it.

FOLLOW-UP PROCEDURES

You send in a request about a waste item and you never get a reply. Why does this happen? This is a concern expressed by several EXCHANGE participants. First of all - WETA forwards all requests to the appropriate lister; however, it is the lister's responsibility to contact the requesting party. There may be several reasons why listers don't respond to requests: due to process and/or competitive reasons, a lister may not want to contact a particular business or individual; the item may no longer be available and the lister neglects to inform WETA; or, the lister may have just forgotten or misplaced the request.

WETA has instituted periodic follow-up of listers, but our organization is financially limited in the level of support that we can provide. WETA would like to follow-up each waste item inquiry within a short period of time. This would greatly facilitate potential transfers. However, until additional funding is obtained, the present level of follow-up will be the maximum that WETA can provide.



A

PENNSYLVANIA WASTE INFORMATION EXCHANGE

PWIX LISTING FORM

ITEMS AVAILABLE • ITEMS SOUGHT

PLEASE PRINT

COMPANY

ADDRESS

CITY

STATE

ZIP

A/C

TELEPHONE

CONTACT PERSON

TITLE

- ☐ Enclosed is \$_____ for _____ listings in the PWIX Catalog.
- ☐ Please bill us.
- ☐ We are a member of the Pennsylvania Chamber of Commerce.
- ☐ We are not a member of the Pennsylvania Chamber of Commerce.

PWIX FEES

The PWIX Catalog is free. It will be issued a minimum of two times annually. Additional issues will depend on volume and turnover of listings.*

	Chamber Member	Non- Member

One listing of a waste available or sought in two consecutive issues of the PWIX Catalog.

\$50	\$75

Each additional listing of a waste available or sought.

\$10	\$10

*Should there be more than two PWIX Catalogs published within one year from the date of your first listing(s), there will be a \$10 charge for each listing of waste available or sought per Catalog.

CHAMBER USE ONLY

Code Number _____
Date Billed _____
Date First Listing _____

N.B. Please add 6% sales tax to the amount of your order, and mail to:

PWIX
c/o Pennsylvania Chamber of Commerce
222 North Third Street
Harrisburg, PA 17101

- ☐ Please check if you would like us to contact you about joining the Pennsylvania Chamber of Commerce.

MAKE CHECK PAYABLE TO PENNSYLVANIA CHAMBER OF COMMERCE.

PLEASE COMPLETE ATTACHED FORM.



PWIX CATALOG LISTING FORM **FOR ITEMS AVAILABLE OR ITEMS SOUGHT** **(ONLY INFORMATION SUPPLIED ON THIS FORM** **WILL BE REPRODUCED IN THE PWIX CATALOG.)**

Is this waste material? ☐ Available
☐ Sought

Identify each waste item to be listed, according to the appropriate number classification (below). Please use a *separate* copy of this form for each waste product. If a waste product falls into several categories, so indicate.

1. Acids	6. Fuel Value Hydrocarbons	15. Salts
2. Caustics	7. Chlorinated Hydrocarbons	16. Filter Cakes
3. Alkalis (lime, kiln dust)	8. Spent Catalysts	17. Fly Ash, Clinders, etc.
4. Solvents	9. Metal Treating Bath Sludges, etc.	18. Municipal Sludges
5. Oils	10. Non-ferrous Metals	19. Wood and Paper Products
a. Water Soluble	11. Ferrous Metals	20. Sand and Glass
b. Lubricating	12. Sulfides	21. Textiles, Leather and Rubber
c. Heat Transfer	13. Minerals	22. Other (describe: _____)
	14. Plastic Scrap	

CLASS (Specify by number from above list, or describe: _____)

MATERIAL (Describe as accurately as possible, considering what the buyer/seller may want to know)

QUANTITY (Include amount, period of time available or needed; e.g., gallons, pounds, etc./week; and whether material is available/sought on a periodic or continuous basis)

PACKAGING (Drums, bulk, etc.) _____

LOCATION (Optional; the PWIX service is *not* limited to Pennsylvania)



N.B. PLEASE REVIEW the NON-CONFIDENTIALITY OPTION and sign the DISCLAIMER on the reverse side.

PWIX CATALOG LISTING FORM (Continued)

FOR ITEMS AVAILABLE OR ITEMS SOUGHT

NON-CONFIDENTIALITY OPTION

If you prefer to be contacted *directly*, please provide the following information for inclusion in the PWIX Catalog:

PLEASE PRINT

COMPANY			
ADDRESS			
CITY	STATE	ZIP	A/C TELEPHONE
CONTACT PERSON		TITLE	

DISCLAIMER

(To be completed by *all* applicants)

It is understood that the Pennsylvania Chamber of Commerce will not be involved in negotiations between the listing firm and potential users or suppliers, nor will it make any determination as to prices of waste materials or what may constitute hazardous substances. We recognize that a detailed description and the accuracy of the listing we furnish is the responsibility of the companies involved, and that all listings will be identified *by code number only*, unless otherwise indicated.

(Signature)

Name (please print)

Company

Date



PWIX CATALOG LISTING FORM
SERVICES NEEDED
(Listings are FREE)

PLEASE PRINT

COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____ A/C TELEPHONE _____
CONTACT PERSON _____ TITLE _____

- ☐ We are a member of the Pennsylvania Chamber of Commerce.
☐ We are not a member of the Pennsylvania Chamber of Commerce.
☐ Please send us a complimentary copy of the PWIX Catalog.

**(ONLY INFORMATION SUPPLIED ON THIS FORM
WILL BE REPRODUCED IN THE PWIX CATALOG.)**

PLEASE PRINT

SERVICE/PROCESS (Briefly describe the service/process you seek)

MATERIAL (Indicate material involved, if applicable)

LOCATION (Optional; the PWIX service is *not* limited to Pennsylvania)

Return to: PWIX
c/o Pennsylvania Chamber of Commerce
222 North Third Street
Harrisburg, PA 17101

CHAMBER USE ONLY

Code Number _____
Date First Listing _____

N.B. PLEASE REVIEW the NON-CONFIDENTIALITY
OPTION and sign the DISCLAIMER on the reverse side.

NON-CONFIDENTIALITY OPTION

If you prefer to be contacted *directly*, please provide the following information for inclusion in the PWIX Catalog:

PLEASE PRINT

COMPANY			
ADDRESS			
CITY	STATE	ZIP	A/C TELEPHONE
CONTACT PERSON		TITLE	

DISCLAIMER

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It is understood that the Pennsylvania Chamber of Commerce will not be involved in negotiations between the listing firm and potential users or suppliers, nor will it make any determination as to prices of waste materials or what may constitute hazardous substances. We recognize that a detailed description and the accuracy of the listing we furnish is the responsibility of the companies involved, and that all listings will be identified *by code number only*, unless otherwise indicated.

(Signature)

Name (please print)

Company

Date



PWIX CATALOG LISTING FORM DIRECTORY OF GENERAL SERVICES

(Listings are FREE)

Please include our company name, address, telephone number and the additional information we have provided, in the PWIX CATALOG's Directory of General Services. We understand that only this information will be included under the indicated category or categories.

PLEASE PRINT

COMPANY

ADDRESS

CITY

STATE

ZIP

A/C

TELEPHONE

CONTACT PERSON

TITLE

- ☐ ENGINEERS/CONSULTANTS ☐ TREATMENT FACILITY
☐ TRANSPORTATION/HAULING ☐ DISPOSAL/STORAGE FACILITY
☐ LABORATORIES (Indicate types of tests performed)

☐ OTHER (Describe: _____)

Description of service(s) offered: _____

☐ Please send us a complimentary copy of the PWIX Catalog.

Return to: PWIX
c/o Pennsylvania Chamber of Commerce
222 North Third Street
Harrisburg, PA 17101



PENNSYLVANIA WASTE INFORMATION EXCHANGE

SAMPLE

CLASSIFICATION: 3

Item:

Code #A-4

Hydrated Lime Slurry or paste-
chemical analysis, approxi-
mately the same as dry hy-
drated

Quantity:

Tonnage amounts in bulk

ITEMS
AVAILABLE

CLASSIFICATION: 4

Item:

Code #S-3

Mixture of Paints and Solvents

Quantity:

50 to 75 55-gal. drums/month

ITEMS
SOUGHT

Code #N-2

Services/Process:

Solvent Regeneration

SERVICES
NEEDED

ENGINEER/CONSULTANTS

Green Valley Engineering Associates
10 Cedar Drive
Dillsburg, PA 17019

Contact: Jane Doe, Director - Technical Services
Telephone: 717/555-1212

Service: Solid and hazardous waste management, including testing, and
assistance with regulatory compliance.

DIRECTORY OF
GENERAL
SERVICES



PENNSYLVANIA WASTE INFORMATION EXCHANGE

If your firm (check ☒ one or more):

- ☐ PRODUCES INDUSTRIAL WASTE ☐ TREATS INDUSTRIAL WASTE
☐ TRANSPORTS INDUSTRIAL WASTE ☐ DISPOSES OF INDUSTRIAL WASTE
OR ☐ ALL OF THE ABOVE

then PWIX IS FOR YOU!

PWIX is the State Chamber's new Pennsylvania Waste Information eXchange, providing a confidential, profitable means of transferring wastes from generators to potential users, thereby encouraging the conservation of valuable resources through recycling and reuse. PWIX is open to *all* waste markets, in and out of Pennsylvania, regardless of the classification of the waste material as a hazardous or non-hazardous substance.

In addition to fostering resource recovery, you may increase your profits by making money from otherwise discarded materials. You can also establish useful business contacts, learn about new resource recovery and management technologies, and boost your firm's corporate image with the public.

PWIX functions as a clearinghouse for information about available types, quantities, and locations of waste materials. Generators or potential users may register products being offered and/or sought. Companies which have a specific service to provide, or those in need of a service, may also use PWIX.

Listings Confidential

Upon receipt of the enclosed registration form, the Chamber assigns a code number to your company. This is the only means of identification used in the Catalog listings and will assure confidentiality. Response to these listings may be made by writing PWIX a letter of inquiry, with reference to the specific listing by *code number*. A copy of this inquiry will then be promptly sent to the listee firm.

It is the responsibility of the listee firm to initiate contact and begin negotiations for sale and transfer. The Chamber will not participate in negotiations.

The option to include the company's name, address, and telephone number is available to those firms which feel that such identification would be beneficial. Only upon receipt of written permission, however, as indicated on the proper form, will PWIX include such information in the Catalog.

Specific waste information is supplied by the listee. PWIX will not determine the content, legality of transfer, storage, handling, or disposal of the waste, nor will PWIX determine what may constitute a hazardous substance.

Government Not Involved

There is no government participation, and firms listing materials available are not required to divulge any "trade secrets" or information as to their methods of disposal. PWIX is operated on a non-profit basis as a service of the Pennsylvania Chamber of Commerce.

PWIX Catalog

The PWIX Catalog includes listings of Items Available, Items Sought, Services Needed, a Directory of General Services, and a Waste Management News section, covering items of interest to PWIX Catalog users.

The PWIX Catalog is *free*. It will be issued a minimum of two times annually. Additional issues will depend on volume and turnover of listings.

While firms are not required to be members of the Pennsylvania Chamber of Commerce, the listing fee varies. One listing of a waste available or sought in two consecutive issues of the PWIX Catalog is \$50 for Chamber members, \$75 for non-members, plus 6% state sales tax.

Each additional listing of a waste available or sought is \$10 for members or non-members.

Should there be more than two PWIX Catalogs published within one year from the date of a company's listing(s), there will be a \$10 charge for each listing of waste available or sought per Catalog.

Listees should recognize that inquiries will come slowly at first, since the program is in its initial stage, but will multiply with increased circulation and publicity. Individual listings should be as detailed as necessary to clearly identify waste being sold or sought, or services provided or sought.

Each PWIX Catalog contains a directory of companies which offer a general service. Listing is available free of charge to firms involved in consulting (including waste testing), treatment, transport, or disposal.

Let's hear from you

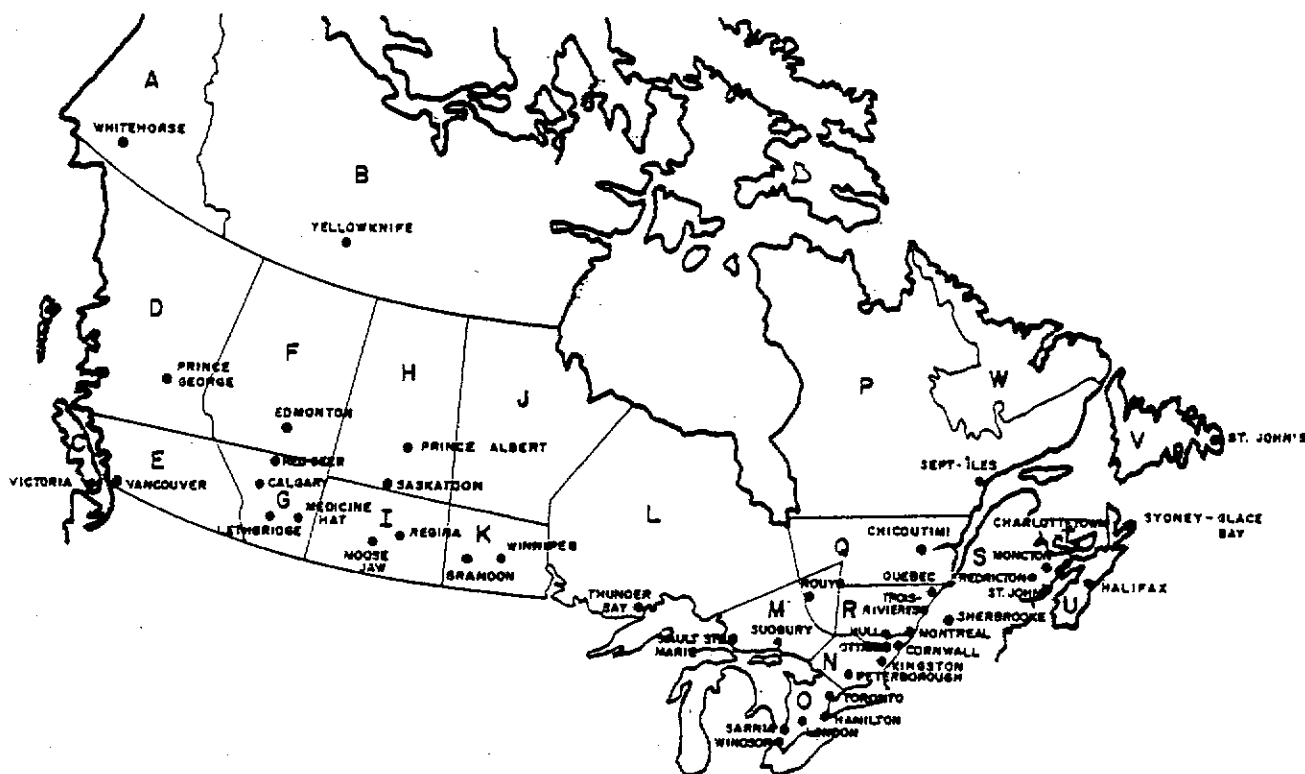
So if your company generates waste material, or is looking for an alternate and possibly less expensive source of raw material, if you require a service, or can provide a specific process you'd like to advertise, complete the proper form.

Then forward it, with your check to PWIX, c/o Pennsylvania Chamber of Commerce, 222 North Third Street, Harrisburg, PA 17101 (*check should be made payable to the Pennsylvania Chamber of Commerce*).

PLEASE ADD 6% STATE SALES TAX TO THE AMOUNT OF YOUR ORDER.



BULLETIN NO. 17

SEPTEMBER
SEPTEMBRE 1980

The letters of this map are used to identify the geographic region in which waste materials are available or wanted. The letter appears as the last letter in the waste code number.

Wastes are listed in the bulletin under 10 categories:

1. Organic Chemicals and Solvents
2. Oils, Fats and Waxes
3. Acids
4. Alkalis
5. Other Inorganic Chemicals
6. Metals and Metal Containing Sludges
7. Plastics
8. Textiles, Leather and Rubber
9. Wood and Paper Products
10. Miscellaneous

Listings will appear in the language submitted.

Les lettres inscrites sur cette carte indiquent la région géographique dans laquelle des déchets sont disponibles ou demandés. Cette lettre apparaît comme dernier caractère du code de déchet.

Les déchets sont inscrits au bulletin sous l'une ou l'autre des 10 catégories suivantes:

1. Produits chimiques organiques et solvants
2. Huiles, graisses et cires
3. Acides
4. Alcalis
5. Autres produits chimiques inorganiques
6. Métaux et boues contenant des métaux
7. Plastiques
8. Textiles, cuir et caoutchouc
9. Produits du papier et du bois
10. Divers

Les inscriptions paraîtront dans la langue de leur soumission.



Dear Participant:

Cher participant

We were pleased to learn over the summer that the provinces will be supporting the activities of the Waste Exchange. Ontario and Nova Scotia have already committed funds to the programme, and the other provinces are considering support. We now have a very diversified funding base for the Waste Exchange: Federal and Provincial governments and industry all sharing in the cost of the programme. Since waste utilization and resource conservation are responsibilities shared by all, it is appropriate that all should participate in funding this programme. I would like to record my appreciation of Environment Canada's past and continuing support of the Waste Exchange and of Ontario's and Nova Scotia's commitment to support our programme.

I would like to bring to your attention two publications which I think may be of interest to you. ECO/LOG Week is a weekly publication by Corpus covering the entire spectrum of environmental control in Canada. A description of this newsletter is enclosed with this issue of the bulletin.

The second publication, RESILOG, is put out by the Waste Management Branch of Environment Canada, every two months. This is published "to foster an exchange of views and information on waste management topics across Canada". It contains very brief updates (20 - 100 words) on diversified waste management topics. One very useful aspect, in my opinion, is that the brief description is followed by a name, address and telephone number for a contact for further information.

If you are interested in receiving RESILOG, please write to:

George Rivoche
Waste Management Branch
Environment Canada
Ottawa, Ontario K1A 1C8

We are still open for suggestions for this editorial section. If you have any information on waste utilization which you would like to share with other participants, we'd love to hear from you.

Yours very truly,

Nous avons eu le plaisir d'apprendre au cours de l'été que les administrations provinciales appuieront les activités de la Bourse; l'Ontario et la Nouvelle-Ecosse ont déjà engagé des fonds en ce sens, et les autres gouvernements envisagent de faire de même. Actuellement, notre financement provient de sources très diverses: le gouvernement fédéral, les administrations provinciales et l'industrie. Comme l'utilisation des déchets et la conservation de l'énergie sont des responsabilités qui doivent être assumées par tous les organismes compétents, il importe que tous prennent part au financement du programme. J'aimerais profiter de l'occasion pour remercier Environnement Canada, de l'appui qu'il continue de nous accorder, et les gouvernements de l'Ontario et de la Nouvelle-Ecosse, pour l'aide financière qu'ils se sont engagés à fournir.

J'aimerais aussi attirer votre attention sur deux publications qui pourraient vous intéresser. ECO/LOG Week est un bulletin hebdomadaire, publié par Corpus, traitant de tous les aspects de la protection de l'environnement au Canada. Un feuillet descriptif d'ECO/LOG est joint au présent bulletin.

La deuxième s'intitule RESILOG; elle est produite tous les deux mois par la Direction de la gestion des déchets, d'Environnement Canada. Elle a pour but de favoriser l'échange d'opinions et de connaissances quant à la gestion des déchets au Canada. Elle comporte de courts articles (de 20 à 100 mots) d'actualité portant sur différents sujets touchant à la gestion des déchets. Je considère comme un atout majeur que ces courts articles soient suivis du nom, de l'adresse et du numéro de téléphone d'une personne à contacter pour obtenir des renseignements supplémentaires.

Pour recevoir RESILOG, écrire à cette adresse:

George Rivoche
Direction de la gestion des déchets
Environnement Canada
Ottawa (Ontario)
K1A 1C8

Nous acceptons toujours les suggestions touchant à l'éditorial. Si vous possédez sur l'utilisation des déchets des renseignements que vous aimeriez partager avec les autres participants, je vous prie de ne pas hésiter à communiquer avec nous.

Bien à vous,

R. G. W. Laughlin
Manager/Gérant

WASTES AVAILABLE : DECHETS DISPONIBLES

Use Form 3 to enquire about these wastes
if you think you could use them.

Veuillez utiliser la formule 3 pour obtenir des
renseignements sur les déchets que vous pourriez
utiliser.

Region/Région Quantity/Quantité

1. ORGANIC CHEMICALS AND SOLVENTS : PRODUITS CHIMIQUES ORGANIQUES ET SOLVANTS

A 006	O	---	Crude Naphthenic Acid still bottoms (Toronto)
A 029	O	3 ton/week	Organic hatchery waste (Brantford)
A 058	O	60 gal/month	Toluol with silicone paint
A 170	O	5000 lbs/week	Slush from solvent processing
A 201	O	12,000 gal/year	90% Toluol; 10% phenolics (Scarborough)
A 221	O	2000 gal/week	Light solvents, sludge (Toronto)
A 298	R	80,000 gal/week	Molasses Stillage (Montreal)
A 375	U	3000 lbs/year	Activated charcoal and Oils and Phenols
A 415	G	---	Mixed rubber cure accelerators
A 416	N	12,000 gal/year	Methylene chloride & water & animal fat lubricant
A 528	O	1000 gals/month	Spent solvent ketones, alcohols, etc. (Hamilton)
A 547	O	100 lbs	U.C.L.-77 silicone (Toronto)
A 594	R	2000 gals/mois	Latex usé (Drummondville)
A 627	N	2 tons/week	1,2 Diamino cyclohexane/Hexamethylene diamine mixture (Maitland)
A 689	O	11,000 lbs	Calcium acetate powder
A 690	O	500 lbs	Calcium formate powder
A 708	O	20-25,000 U.S.gal/week	Mixed pentanes/pentenes/isobutylenes
A 783	G	2000 gals/month	Fusel Oil (Calgary)
A 852	N	4 drums/year	Thermally degraded polyalkylene oxide H.T. fluid
A 878	O	1800 gal/year	Insulating varnish
A 918	R	---	Obsolete solvent based paints suitable for baking
A 929	O	5000 gal/month	Resin plant wash solvent
A 930	O	1000 gal/month	Water - resin plant solvent mixture
A 931	O	1000 gal/month	Resin and paint plant sludge
A 932	O	1000 gal/month	Defective resins and paints
A 938	N	6250 Kg/month	Filter press cake containing 50% plasticizers & 50% Carbon and filtera
A 939	N	17,500 Kg/3 months	Distillation residue, phthalic anhydrides and higher acids
A 945	O	3000 lbs.	Trichloroacetic acid contaminated with Fe + H ₂ O (Sarnia)
A 962	O	2000 lbs.	High heat silicone resin (DC803-50X)
A 966	E	9000 gal/day	Aqueous organic acids (5% acetic 1% formic + trace proprionic)
A 974	O	6500 lbs	Trichlorobenzene dielectric grade, new, pure (London)
A 984	O	797 gal	Baked on enamel paint
A 989	O	1500 gal/month	Waste solvents, paint, plant sludge (Burlington)
A 991	O	1100 lbs	Oil of sassafras (Fort Erie)
A 992	O	10,000 lbs	Alkali strippable polyester floor finish resin (Fort Erie)
A 995	O	1000+ gal/month	Reclaimed baking enamel
A 1012	N	4500 gals/year	60% Di-Z-Ethylhexyl phthalate 40% Trichlorobenzene trace Dicyclo-diepoxy carboxylate
A 1033	O	~710,000 lbs	Solid naphthalene + anthracene (Toronto)
A 1034	O	~260,000 lbs	Solid naphthalene (Toronto)
A 1035	O	~360,000 lbs	Naphthalene + bakelite resin (Toronto)

→ Indicates the start of new listings in each category

→ Indique le début des nouvelles inscriptions pour
chaque catégorie

WASTES AVAILABLE : DECHETS DISPONIBLES

<u>Region/Région</u>		<u>Quantity/Quantité</u>	
A 1036	O	~2,000,000 lbs	Gummy naphthalene residue (Toronto)
A 1037	O	~30,000 lbs	Carbolate resin residue (Toronto)
A 1043	O	50 gal/week	Spent acetone (Barrie)
A 1045	U	100 galls	Styrene solvent cement (Dartmouth)
A 1046	O	646 Kg	Benzyl chloride (Burlington)
A 1047	O	1800 Kg	Methoxypropylamine (Burlington)
A 1050	O	1600 lbs.	Ethylene Di-Chloride
A 1078	O	5000 quarts	Acrylic lacquer, asst. colours, 30¢/ quart (Toronto)
A 1086	U	470 pints	Styrene solvent cement (Dartmouth)
A 1087	U	117 quarts	Styrene solvent cement (Dartmouth)
A 1095	R	1500 gal/week	65% Naphtha, 35% Toluol solvent blend

2. OILS, FATS AND WAXES : HUILES, GRAISSES ET CIRES

A 380	O	~15 drums/month	Petroleum acid pitch
A 406	O	5 tons/week	Pitch coke (Niagara district)
A 410	O	600,000 gals/year	Oily biox sludge 19% organics 2% solids (Oakville)
A 417	N	2,000 gal/month	Animal fat aqueous emulsion
A 659	O	450 gals/week	Alkaline process oil (10% water) (Rexdale)
A 675	O	5000 gal	Linseed oil (20% water)
A 688	G	400 lbs/day	Carbon black powder and pellets
A 752	N	200 tons	Graphite scrap
A 846	O	25 tons/week	Metallurgical coke 1/2" x 1/32" ash 18-35% sulphur 1.6%
A 853	M	20,000 gal	Waste oil
A 877	F	10 tons/year	Activated carbon with oils and phenols
A 884	R	90 drums/month	Polyethylene wax (Montreal)
A 898	O	3000 lbs.	Acryloid 615
A 899	O	2300 lbs.	Acryloid 909
A 912	O	1000 lbs/month	Petroleum based wax
A 917	O	3.2 tons	Petroleum based wax and some rainwater
A 979	N	250 lbs/week	Used mold wax
A 1001	R	2-3 tons/week	Waste petroleum based wax (Montreal)
A 1008	O	30-45 gal drums/month	Oil and sludge
A 1017	O	4500 gal/6 months	Sodium base soap lubricant
A 1048	O	3600 lbs.	Pure creosote oil
A 1053	O	600 drums	Petroleum acid pitch
A 1082	R	25 tons/month	Coconut shell charcoal powder (Montreal)

WASTES AVAILABLE : DECHETS DISPONIBLES

Region/Région Quantity/Quantité

3. ACIDS : ACIDES

A 049	R	1500 ton/year	88% sulphuric acid (Montreal)
A 303	E	20,000 litres/week	6-12% H ₂ SO ₄ ~100 g/litre iron sulphate (Surrey)
A 304	E	3,000 litres/month	20% HCl & lead, iron and zinc (Surrey)
A 305	E	10,000 litres/month	5-10% H ₂ SO ₄ plus 5-10% HCl ~100 g/litre metals (Surrey)
A 311	O	---	Phosphoric Acid + FePO ₃
A 312	O	1000 gal/month	20% H ₂ SO ₄ + Fe and Zn sulphates
A 313	O	1500 gal/month	30% HCl + Fe and Zn chlorides
A 353	R	5000 gal/day	15% H ₂ SO ₄ (Montreal)
A 360	O	4 - 5,000 tons/year	12 - 15% H ₂ SO ₄ possible lead contamination (Toronto)
A 529	O	700 gals/month	Chromic acid sol ⁿ + impurities (Hamilton)
A 567	O	10,000 gals/year	10% H ₂ SO ₄ sol ⁿ (6% Fe + Cu sulphate) (Toronto)
A 660	O	5000 gals/two weeks	Pickle acid 12% with 30-35% FeSO ₄ (Rexdale)
A 748	O	---	Sulphuric acid (Toronto)
A 904	M	5 - 10,000 gal/week	Iron sulphate/sulphuric acid solution
A 906	O	5000 gal/year	15% H ₂ SO ₄
A 954	O	500 gal/month	7% nitric acid (Toronto)
A 955	O	500-600 gall	10% HCl in 5 gall containers (Toronto)
A 956	R	30,000 ft ³ /month	6% H ₂ SO ₄ (Montreal)
A 980	E	6000 tons/year	93% sulphuric acid + 3% organics (Port Moody)
A 1040	R	8500 gal/day	20% Phosphoric Acid

4. ALKALIS : ALCALIS

A 078	O	2 - 300 gal/week	45% KOH & 6% Aluminum (Hamilton)
A 137	V	9.6 ton/day	Calcium Hydroxide Slurry pH 13
A 138	U	18 ton/day	Calcium Hydroxide Slurry pH 13
A 139	S	15.8 ton/day	Calcium Hydroxide Slurry pH 13
A 140	R	32.2 ton/day	Calcium Hydroxide Slurry pH 13
A 141	O	8.3 ton/day	Calcium Hydroxide Slurry pH 13
A 143	L	4.3 ton/day	Calcium Hydroxide Slurry pH 13
A 144	K	20.2 ton/day	Calcium Hydroxide Slurry pH 13
A 146	F	28.7 ton/day	Calcium Hydroxide Slurry pH 13
A 147	G	17 ton/day	Calcium Hydroxide Slurry pH 13
A 149	C	7.2 ton/day	Calcium Hydroxide Slurry pH 13
A 150	D	1.9 ton/day	Calcium Hydroxide Slurry pH 13
A 175	F	20 ton/month	Calcium carbonate sludge (Edmonton)
A 181	K	1000 ton	Limestone sludge (Winnipeg)
A 489	E	15.2 tons/week	Calcium hydroxide slurry pH 13
A 490	F	9.0 tons/week	Calcium hydroxide slurry pH 13
A 491	G	7.2 tons/week	Calcium hydroxide slurry pH 13

WASTES AVAILABLE : DECHETS DISPONIBLES

	<u>Region/Région</u>	<u>Quantity/Quantité</u>	
A 492	H	5.0 tons/week	Calcium hydroxide slurry pH 13
A 493	K	23.6 tons/week	Calcium hydroxide slurry pH 13
A 494	L	2.7 tons/week	Calcium hydroxide slurry pH 13
A 495	M	14.8 tons/week	Calcium hydroxide slurry pH 13
A 496	J	2.1 tons/week	Calcium hydroxide slurry pH 13
A 497	O	7.0 tons/week	Calcium hydroxide slurry pH 13
A 498	P	9.1 tons/week	Calcium hydroxide slurry pH 13
A 499	Q	9.9 tons/week	Calcium hydroxide slurry pH 13
A 500	R	13.5 tons/week	Calcium hydroxide slurry pH 13
A 501	U	7.9 tons/week	Calcium hydroxide slurry pH 13
A 502	V	11.7 tons/week	Calcium hydroxide slurry pH 13
A 639	O	3500 gals/day	Spent caustic 18% Na Sulphite; 14% Na Sulphate
A 701	U	7000 lbs/day	Spent caustic (10% NaOH, 0.3% phenols) (Dartmouth)
A 890	E	20 tons/week	Carbide lime slurry 30% solids
A 891	C	20 tons/week	Carbide lime slurry 10% solids
A 892	D	40 tons/week	Carbide lime slurry 10% solids
A 893	F	60 tons/week	Carbide lime slurry 10% solids
A 894	I	20 tons/week	Carbide lime slurry 10% solids
A 895	O	400 tons/week	Carbide lime slurry 10% solids
A 896	R	60 tons/week	Carbide lime slurry 10% solids
A 937	O	2000 gals/day	30% caustic; 5% NaCl and 1% organics
A 1014	O	600 gal/month	Calcium Hydroxide slurry pH 13 (Toronto)
A 1015	O	4500 gal/6 months	Alkaline cleaning sol ⁿ 2% caustic
A 1018	O	4500 gal/month	8.4% NaOH sol ⁿ saturated with sodium soap lubricants
A 1020	R	700,000 litres/year	Spent caustic (~39% spent) 54g/L. NaOH 29g/L. Na ₂ S (Montreal)
A 1021	O	480,000 litres	Spent caustic (~35% spent) 35g/L. NaOH 83g/L. Na ₂ S (Sarnia)
A 1022	O	170,000 litres/year	" " " " " " " (Sarnia)

5. OTHER INORGANIC CHEMICALS : AUTRES PRODUITS CHIMIQUES INORGANIQUES

A 017	O	120 tons/year	Diatomaceous earth
A 040	O	25 tons/day	Cement precipitator dust 40% CaO 7% K ₂ O (Mississauga)
A 063	O	5600 tons/week	Coal fly ash (Mississauga)
A 064	O	14,000 tons/week	Coal fly ash (Nanticoke)
A 065	O	4,700 tons/week	Coal fly ash (Sarnia)
A 066	L	380 tons/week	Coal fly ash (Thunder Bay)
A 117	O	90 tons/week	Carbon dust 20 - 40% ash
A 153	N	---	Photographic Hypo (Iroquois)
A 163	N	1 ton/day	Crushed fired surface clay
A 168	R	20 ton/day	SiO ₂ /TiO ₂ Sludge <200 mesh (Sorel)
A 176	O	1800 lbs/week	Talc
A 228	O	1750 lbs	Lead thiosulphite powder (London)
A 254	N	10 tons/day	Magnesium-Calcium-Fibre sludge (Huntsville)
A 275	N	2.6 MM gal	10% Ammonium sulphate 4% sodium sulphate (Lindsay)
A 279	N	1.6 MM gal	19% Ammonium sulphate 9% sodium sulphate 1.4% H ₂ SO ₄ (Lindsay)
A 280	N	0.8 MM gal/year	19% Ammonium sulphate 9% sodium sulphate 1.4% H ₂ SO ₄ (Lindsay)
A 281	U	100 tons/year	Spent polyplant catalyst ~15% P ₂ O ₅ (Dartmouth)

WASTES AVAILABLE : DECHETS DISPONIBLES

	<u>Region/Région</u>	<u>Quantity/Quantité</u>	
A 283	U	12,750 lbs	Magnesium chloride in methyl cellulose (Dartmouth)
A 363	O	5000 tons/year	Sodium chloride slag with 10% Al/Al ₂ O ₃ (Toronto)
A 378	N	10,000 tons/year	Gypsum (Cornwall)
A 383	O	2000 gal/month	Calcium sulphate + some lead oxide (Scarborough)
A 452	O	10 tons/month	Sludge CaF ₂ , Ca(OH) ₂ , Na ₂ CO ₃
A 503	G	1 ton/week	Wet charcoal (pea sized pieces) (Lethbridge)
A 543	N	500 ton/year	CaSO ₄ (anhydride) sludge 30% solid
A 544	N	1200 ton/year	CaSO ₄ 85% CaCO ₃ (15%) sludge 30% solid
A 545	R	7000 ton/year	12% CaCl ₂ solution
A 546	R	3000 tons/year	Brine sludge mainly CaSO ₄ , some CaCO ₃ + Mg(OH) ₂
A 605	U	1200 Kg/day	Oil fly ash (Halifax)
A 606	U	250 Kg/day	Oil bottom ash (Halifax)
A 607	U	133 tonne/day	Coal fly ash (Trenton)
A 608	U	57 tonne/day	Coal bottom ash (Trenton)
A 609	U	27 tonne/day	Coal fly ash (Glacé Bay)
A 610	U	82 tonne/day	Coal bottom ash (Glacé Bay)
A 626	R	500 tons/week	Dolomitic magnesium carbonate silicate
A 682	R	11 tons	Fluorspar 1" x dust in bags (Beauharnois)
A 700	U	8000 lbs/3 weeks	Spent polyplant catalyst (15% P ₂ O ₅) (Dartmouth)
A 709	O	1850 lbs	Pure vanadium trichloride (powder)
A 710	O	1800 lbs	Pure zinc chloride (granular)
A 789	N	350 tons	Zinc chloride
A 790	N	60 tons	Chromium oxide
A 810	R	65 tons/week	Phosphate rock dust
A 814	R	23 tons/week	Precipitator dusts (30% P ₂ O ₅)
A 843	O	12,000 gal/week	24% NH ₄ Cl soln. + 4% organics
A 845	O	8,000 gal/week	20% NaHSO ₃ 4% Na ₂ SO ₃ 13% NaCl trace organics
A 870	O	27,000 lbs/month	Spent diatomaceous earth (Toronto)
A 871	O	20,000 lbs/month	Spent diatomaceous earth (Kitchener)
A 872	O	23,000 lbs/month	Spent diatomaceous earth (London)
A 887	O	1000 lbs/day	25% AlCl ₃ in water (2% organics)
A 889	R	2.5 tons/year	Spent vanadium pentoxide catalyst (Valleyfield)
A 902	E	---	Scrubber sludge (B.C. Interior)
A 903	E	---	Burned ash and cinder (B.C. Interior)
A 907	O	15 tons/year	Al(OH) ₃
A 915	O	3 tons	Spent Vanadium pentoxide catalyst
A 916	N	500 gal/month	HF + HNO ₃ + AlNO ₃ + traces of Zr in water
A 936	O	10,000 lbs/day	Sodium chloride 89.7%, tars 0.3%, H ₂ O 7%, NaOH 3%
A 960	R	40 tons/month	Diatomaceous earth (20% oil)
A 1002	O	3 - 5 tons	Sodium bisulphate (Toronto)
A 1016	O	4500 gal/3 months	4.5% Borax 0.5% Sodium Nitrite Soln
A 1041	R	11 tons/day	Calcium phosphate
A 1049	O	1200 lbs.	Globular sodium bisulphate
A 1056	R	13,000 lbs.	Arsenate de plomb (Montreal)
A 1057	R	13,150 lbs.	Carbonate de Pb et Ca (Montreal)
A 1079	O	125 lbs.	Pure copper sulphate crystals
A 1080	O	125 lbs.	Pure sodium bicarbonate pharmaceutical grade
A 1088	Q	23,000 lbs	Vanadium pentoxide catalyst (Chicoutimi)
A 1089	N	80,000 lbs/yr	Sodium nitrate/potassium nitrite salt mixture

WASTES AVAILABLE : DECHETS DISPONIBLES

Region/Région Quantity/Quantité

6. METALS AND METAL CONTAINING SLUDGES : METAUX ET BOUES CONTENANT DES METAUX

A 008	O	14,500 lbs	Galvanized angle 1½" x 1¼" x 130" (Cambridge)
A 071	G	2000 lb/month	Knitted stainless steel wire mesh (Calgary)
A 173	I	500 lb/day	Aluminum scrap (Regina)
A 246	K	200 tons/month	Steelmaking dust High Fe, Zn, Mn values (Winnipeg)
A 343	H	1½ tons/month	Heavy gauge galvanized steel scrap
A 387	R	4000 gal/week	0.5% H ₂ SO ₄ + 6 - 9% iron + zinc (Montreal)
A 394	L	3.5 million tons	Fine iron ore tailings 40% Fe (Atikokan)
A 395	L	200,000 tons	Iron ore tails -1" +100 mesh 36% Fe (Atikokan)
A 396	L	40,000 tons	Pyritic iron ore 50% Fe 7% S (Atikokan)
A 418	N	24,000 gal/year	Slurry of Zr(OH) ₄ , Ca(OH) ₂ , CaF ₂ , Mg(OH) ₂
A 536	O	9000 U.S. gal/month	Sodium chromate sol ⁿ (chrom 6.4%) (Hamilton)
A 552	R	2000 tons	Metal mill scale (Montreal)
A 562	F	1500 tons/year	Baghouse steel dust (Edmonton)
A 566	O	2000 gals/year	Non CN— nickel stripping sol ⁿ (8 oz Ni/gal) (Toronto)
A 619	R	60 tons/month	Zinc die cast dross + ash (La Prairie)
A 620	R	5-7 tons/month	Zinc die cast cyclone dust (La Prairie)
A 621	R	3 tons/month	Zinc die cast baghouse dust (La Prairie)
A 628	O	450 pieces	Boiler tubes A 192 1¼" O.D. x .135 min. wall 6½' - 7' long (Port Colborne)
A 635	O	900 tonne/week	Ash residue silicon calcium, iron, aluminum + 0.66 oz. silver/ton (Toronto)
A 667	O	10 tons/month	Zinc oxide (Toronto)
A 724	E	7 tons/week	Sludge 7.2% Fe 1.47% Zn (hydroxides)
A 725	E	2.5 tons/week	Sludge 20% Fe 80% Zn (metal)
A 726	E	7 tons/week	Sludge 51% NH ₄ Cl 39% Zn (oxide or chloride)
A 727	E	1 ton/month	Sludge iron phosphate 40% Zinc phosphate 30%, 10% Na
A 745	O	1800 tons now (several hundred tons/year)	Granular material containing Fe, Cr, Mg, Ca, Mn, Si oxides
A 751	O	300/week	Carbon steel 14 gauge 16" x 16½" with cut outs on corners
A 765	O	18,000 ft.	Galvanized steel tubing 19 gauge 1" x 2" sections (Kitchener)
A 766	O	4000 ft.	Galvanized angle 18 gauge 72°, 85°, 95°, 108° angle (Kitchener)
A 801	O	1500 lb/month	Iron phosphate sludge
A 866	O	1000 lbs/year	Fine bare copper wire
A 867	O	1000 lbs/year	Fine bare stainless steel wire
A 879	O	1000 gal/year	Copper bearing sludge
A 885	R	10-20 tons	Magnesium turnings and chips
A 908	O	approx. 2 tons/year	Magnesium turnings 94% Mg, 2.5% Zn, 3.5% Thorium
A 909	S	350	25 lb ou 2½ gal contenants en metal (Sherbrooke)
A 927	O	700 pcs.	1" steel black pipe 34" long (Waterloo)
A 928	O	200	1" steel black pipe 60" long (St. Jacobs)
A 947	R	100 tonne	Poussières de sels de plomb
A 948	R	3 tonne/mois	Poussières de sels de plomb
A 972	O	80-100/month	Stainless steel disks, 7½ - 12" dia., 16 ga.
A 981	O	6000/month	16 and 19 gauge 7-13/48" dia. circular blanks
A 987	O	35 tons/week	FeO powder
A 997	O	500 tons/month	Slag 60-80% iron oxide, 10-20% SiO ₂ , some lead & sulphur
A 999	O	2½ tons	5/8" x 2" SPS bars in mill lengths (Toronto)
A 1000	O	40 lb/week	Zinc oxide dust
A 1010	N	136 gal	Water 10% Mercury sulphide precipitate + 150 ppm Hg (Cornwall)

WASTES AVAILABLE : DECHETS DISPONIBLES

	<u>Region/Région</u>	<u>Quantity/Quantité</u>	
A 1013	O	300 lbs/day	metal salts 20-25% nickel; 2.5% copper
A 1019	O	450 lbs	lead-tin solder paint 30-70 (Windsor)
A 1051	O	6 x 45 gal/week	Sludge 30% solids (32% Cu, 15% Zn, 1% Pb as sulphates)
A 1067	R	...	Steel pipes
A 1074	K	25,000/day	Steel washer blanks various O.D.s 5/16" to 1-5/16"
A 1092	O	100 sheets	Perforated aluminum 36" x 96" x 0.032" (Barrie)
A 1093	O	600 ft.	1.25" x 1.25" 6101-T6 aluminum square bar (Barrie)
A 1098	R	...	Plating waste 1240 mg/litre nickel (Montreal)
A 1100	O	400 lb/week	Dust ~67% Zn, 4-5% Pb, ~2% Cu (London)

7. PLASTICS : PLASTIQUES

A 068	O	...	ABS sheet scrap 10% PVC coating (Toronto)
A 104	S	20 lb/day	Mylar base plastic film (St. John)
A 361	O	4000 tons/year	Bakelite waste (Toronto)
A 362	O	2 - 6000 tons/year	Polypropylene contaminated (at least 92% PP) (Toronto)
A 365	O	40,000/month	Phenolic paper base washers 0.6" thick 0.95 O.D., 0.43 I.D. (Toronto)
A 382	N	8000 ft/day	Polyurethane foam trimmings (Port Hope)
A 420	K	1000 lbs/month	High impact PVC cuttings (Winnipeg)
A 510	N	1 ton/month	Acrylic scrap 3/16" (Peterborough)
A 648	R	Tonnage	0.22 - .040 mm polyester monofilament on spools
A 677	K	5 tonnes/week	Laminated polyamide, polyolefin edge trim
A 687	O	5 ton/month	PVC mixed with mylar tape car outside mouldings (Toronto)
A 705	R	1 ton/day	Polypropylene
A 717	O	100 lb/month	Waste cellophane strips
A 718	O	1 ton/month	Waste plastic film
A 749	O	50 tons/week	Polypropylene & rubber battery cases (Toronto)
A 795	S	2 tons/week	Polypropylene mixed filaments (St. Jean)
A 860	R	9000 ft/month	Fibreglass reinforced duct
A 861	R	8000 cu.ft./week	Fibreglass residues
A 888	O	25,000 lb/week	Phenolic foam dust containing some paper
A 951	O	20 ton/month	Granulated scrap PVC mixed colours
A 952	O	20 ton/month	X-linked P.E. extruded scrap, granulated
A 977	O	20 - 30 lbs/week	Plastifoam waste
A 982	R	1152 rolls	Polyester tape 1/4"
A 994	O	...	Plastic hose remnants
A 1028	K	50 lbs/year	Microfiche transparencies (Winnipeg)
A 1030	K	100/year	24:00' computer tapes (Winnipeg)
A 1038	O	200-400 lbs/week	Acrylic sheet trimmings, assorted sizes & thicknesses
A 1052	India	...	LDPE-EVA Extruded scrap
A 1058	N	large quantities	PVC combined with polyester
A 1060	O	8000 lb/month	Cubed flexible PVC compound
A 1061	O	3000 lb/month	Rigid PVC compound powder and crumb
A 1063	N	...	3-4 lb density cross linked P.E. foam scrap
A 1073	R	...	High density polyethylene
A 1085	O	...	Offcuts of polystyrene foam
A 1091	R	500 tons/year	Polypropylene crusted battery cases, clean and white

WASTES AVAILABLE : DECHETS DISPONIBLES

Region/Région Quantity/Quantité

8. TEXTILES, LEATHER AND RUBBER : TEXTILES, CUIR, ET CAOUTCHOUC

A 004	O	3500 lbs/week	Scrap non-wovens, wood pulp, gauze (Brantford)
A 019	O	750 lbs/week	Leather scrap (vegetable tanned) (Toronto)
A 056	O	½ ton/day	Carpet ends (Collingwood)
A 062	O	4 tons/week	Cloth cuttings 65% polyester/35% cotton (Kitchener)
A 087	R	4 tons/month	Fabric clippings (Montreal)
A 088	O	2 tons/month	Nylon 6 tire cord waste (Woodstock)
A 089	O	1 ton/month	Nylon 6.6 tire cord waste (Woodstock)
A 090	O	500 lb/month	Polyester tire cord waste (Woodstock)
A 091	O	1000 lb/month	Fibreglass tire cord waste (Woodstock)
A 092	O	1000 lb/month	Rayon tire cord waste (Woodstock)
A 094	N	2 tons/week	Rayon fibre with acrylic binder (Trenton)
A 095	N	200	Used truck tires (Kingston)
A 252	S	½ tonne/sem.	Rebut de salle de tailage (Cotton)
A 260	R	1000 lbs/week	Empty textile yarn cones and tubes (Montreal)
A 261	R	500 lbs/month	Polyester knitted fabric (Montreal)
A 309	N	200 ft.	Used conveyor belting 20-24" wide (Kingston)
A 350	O	500 lbs/week	Rags (Toronto)
A 384	O	200 - 300 /month	Commercial tires (Toronto)
A 408	R	1000 lbs/week	Leather waste (Montreal)
A 413	G	600 lbs/month	Rubber coated polyester fabric
A 414	G	1000 lbs/month	Rubber coated nylon fabric
A 422	R	5 tons/day	Automotive carpet cuttings nylon & PE backing (Lacolle)
A 423	S	35 tons/month	Waste rubber trimmings (Sherbrooke)
A 461	U	1000 lb/week	Narrow woven bulk seconds (elastic) (Bridgetown)
A 538	O	5 ton/month	Fibreglass yarn waste
A 542	N	1000 lb/week	Fabric cutting waste (Pembroke)
A 553	R	0.75 tonnes/sem	Filaments continus teints (Drummondville)
A 554	R	2 tonnes/sem	Trimage de tapis (Drummondville)
A 576	R	2000/jour	Shearing cotton waste (Montreal)
A 593	K	500 - 1000 lbs/week	Fabric waste (Winnipeg)
A 634	O	90 tonnes/week	Scrap tires (Toronto)
A 637	O	5 tons/week	100% cotton shearings (Cambridge)
A 638	O	350 lbs/day	Textile waste cuttings
A 641	U	140 Kg/month	Various yarn waste
A 642	U	1 tonne/month	Woven elastic fabric waste
A 643	U	150 Kg/month	Covered rubber waste
A 676	N	9 ton/month	Edgetrim from rayon and polyester non-woven fabric
A 681	O	1000 lbs/week	Defective latex gloves and scrap
A 712	O	300 lbs/day	Fabric and foam rubber trim (Markham)
A 716	O	150 lb/month	Waste nylon yarn (phenolic coated) (Markham)
A 741	S	5000 lbs	Viscose staple
A 742	S	30,000 lbs	Mixed yarns
A 770	O	4200 lb/month	Neoprene rubber offcuts
A 776	O	3500 lb/month	Textile waste (synthetics) (Cambridge)
A 796	O	50,000 lbs	Rubber hose (Toronto)
A 798	O	5 ton/month	Cotton fabric, padding and coated fabric (Toronto)
A 802	R	25 ton/month	Scrap auto tires (Montreal)

WASTES AVAILABLE : DECHETS DISPONIBLES

	<u>Region/Région</u>	<u>Quantity/Quantité</u>	
A 868	R	200 lbs	Textile clippings
A 875	R	---	Fabric waste/clippings
A 882	N	500 lb/week	Cotton backed vinyl waste
A 905	G	---	Rubber coated fabric
A 910	O	1000 lbs/week	Scrap leather
A 922	R	---	Conveyor belting remnants
A 924	E	---	Polyester batting some quilted to nylon
A 942	R	2000 m/month	Fabric short ends <10m Nylon/Lycra and polyester (Montreal)
A 957	O	3000 lb/month	Tire buffings
A 958	O	6000 lb/month	Uncured rubber
A 959	O	Unlimited	Tire ends
A 967	O	4200 lbs	Wool yarn 1-ply mixed colours
A 968	O	3750 lbs	Wool yarn 2-ply mixed colours
A 969	O	1700 lbs	Wool Nylon 2-ply & 1-ply mixed colours
A 970	O	3000 lbs	Monacrylics mixed colours
A 971	O	3600 lbs	Mixed Nylon yarns mixed colours
A 975	USA	---	Yellow tennis ball felt fabric
A 990	O	100,000 yard/year	1" cotton webbing, different colours
A 1006	O	5000 lbs/month	100% cotton cuttings
A 1007	O	1000 lbs/week	Scrap leather
A 1024	O	21,000 ft.	Closed cell neoprene 1/2 x 7/8 x 1" trapezoid cross section (Simcoe)
A 1025	O	42,000 ft.	Closed cell neoprene 1/2 x 3/4" rectangle cross section (Simcoe)
A 1039	O	10-20 tons/month	Car tires (Mississauga)
A 1044	R	5000/month	Bags wide mesh, coconut fibre rope (Montreal)
A 1059	N	large quantities	Synthetic cloth clippings and fibres
A 1062	O	---	Polyester waste
A 1064	R	10,000 lin.ft.	Rubber hose all sizes
A 1070	R	---	15" - 30" conveyor belting
A 1075	N	4000 cu.yds/year	Carpet selvages yarn, jute, polypropylene & latex
A 1076	O	300-500 lb/week	Rubber scrap 1/8" - 2" thick punchings & offcuts
A 1081	O	12,000 lbs/year	Cured rubber scrap (ground) (London)
A 1083	R	400 lb/week	Fabric clippings and selvages (Montreal)
A 1084	R	1,000,000	Used tires
A 1094	O	large quantity	Vinyl coated fabric various colours and embossing
A 1096	S	100 lbs/week	Scrap upper leather (Fredericton)
A 1097	R	200-300 lbs/month	Mop cotton waste and trimmings (Montreal)
A 1101	Q	5 tons/week	Leather: blue shavings and trimmings

9. WOOD AND PAPER PRODUCTS : PRODUITS DU PAPIER ET DU BOIS

A 018	O	10,000 ft/month	Kiln dried wood edgings 1" x 7/8" to 1-3/4"
A 032	O	9 tons/week	Walnut wood shavings and sawdust (Toronto)
A 047	N	20 ton/day	Softwood sawdust (Pembroke)
A 048	N	20 ton/day	Softwood bark (Pembroke)
A 050	N	7 tons/week	Wax impregnated paper clippings (Pembroke)
A 067	L	500 lbs	Paper and carbon paper
A 082	R	3 ton/week	Cartons (Montreal)
A 085	N	---	Mahogany offcuts (Napanee)
A 099	R	3 van/jour	Ecorces de bois mou
A 100	O	2 tons/month	Chipboard and chipboard dust
A 102	O	20 - 30 tons/year	Kraft and Kraft cotton paper board (Hamilton)

WASTES AVAILABLE : DECHETS DISPONIBLES

<u>Region/Région</u>		<u>Quantity/Quantité</u>	
A 105	N	12 ton/day	Hogged veneer waste (hardwood) (Tweed)
A 120	S	---	Hardwood sawdust and bark (Boiestown)
A 122	O	25 tons/day	Papermill waste (Thorold)
A 123	O	1000 lbs/week	Used paper bags (Woodstock)
A 133	Q	1000 tonnes/an	Bran de scie résineux (Quebec)
A 134	Q	1000 tonnes/an	Ecorce/résineux (Quebec)
A 171	R	10 tonnes/jour	Bran de scies et planures (Gaspésie)
A 189	F	500 ton/day	Sawmill waste (High Level)
A 190	D	300 ton/day	Sawmill waste (Fort St. John)
A 213	F	40 cu.yds./week	Sawdust
A 255	R	1000 cu.yds./year	Wood patterns and trimmings (Lachine)
A 265	D	100 BDU/day	Hog fuel, screenings, shavings, sawdust (Prince George)
A 266	D	50 BDU/day	Hog fuel, screenings, shavings, sawdust (Hixon)
A 267	D	100 BDU/day	Hog fuel, screenings, shavings, sawdust (Bear Lake)
A 271	R	3 tons/day	Kiln dried popsicle sticks
A 286	O	30 cu.yds/week	Hardboard waste (Toronto)
A 295	N	70 tons/week	Hardwood and softwood bark
A 300	Q	1½ barils/sem.	Bran de scie
A 322	U	8000	Wooden grape lugs (Truro)
A 327	O	1 ton/day	Waste wood/paper/cardboard (Welland)
A 335	S	15 ton/day	Bran de scie et écorce (Québec Beauce)
A 351	O	500 lbs/week	Paper waste (Toronto)
A 352	O	10/week	Heavy duty 8" I.D. construction cores (Toronto)
A 374	S	250 tons/year	Pole peeler waste wood and bark chips (New Brunswick)
A 381	O	---	Particle board offcuts plus sawdust
A 392	O	12 - 14 tonnes/sem.	Paper rebut (journaux et revues) (Quebec)
A 402	Q	31 t./semaine	Ecorce de cèdre
A 404	Q	150 t./semaine	Bran de scie bois mous
A 405	Q	85 t./semaine	Bran de scie, coeurs, éboutures de cèdre
A 427	R	20 tonnes/jour	Fibre et glaise de décantation
A 441	O	6 ton/day	Kiln dried hardwood sawdust (Durham)
A 454	R	15,000 picubes/an	Retailles Masonite (Montreal)
A 524	N	10 tons/week	Hardwood shavings (Eastern Townships)
A 539	O	5 ton/month	Cartons
A 555	R	1 tonn/sem.	Cartons (Drummondville)
A 568	S	May to October	Sawdust & bark (Moncton)
A 631	S	100/month	3" cardboard cores 3" - 40" long (Sherbrooke)
A 632	S	50/month	5" cardboard cores 36" - 60" long (Sherbrooke)
A 633	O	60 tonne/week	Demolition and scrap lumber (Toronto)
A 685	N	---	Corrugated cartons, paper bags
A 723	O	~100 ton/month	Mixed sawdust, offcuts, cardboard wastes
A 767	R	7 tons/week	Newspaper (Montreal)
A 771	O	7 cu.yds/week	Kiln dried wood shavings (Weston)
A 780	R	20 tons/week	Shavings & sawdust (Montreal)
A 784	S	1 van/jour	Ecorces de bois mou (Lac Frontière)
A 785	S	2 vans/jour	Bran de scies et planures (résineux) (Lac Frontière)
A 799	O	5 ton/month	Paper with wet strength (Toronto)

WASTES AVAILABLE : DECHETS DISPONIBLES

Region/Région Quantity/Quantité

A 815	N	20,000/month	Pine dowells random lengths to 20" dias. 15/16" - 1 1/2"
A 819	S	---	Brin de scie de bois dur (Luceville)
A 824	O	250 cu.yds/week	Woodshavings (London)
A 855	S	15 ton/jour	Rebutts, rippe, ecorse et croute de cèdre (St. Martin Beauce)
A 858	O	213 tons/month	Carbon paper
A 859	K	large quantities	Shavings wood and sawdust
A 863	S	11,000	5" x 3" x 14" printed bags with wax coated interior (Beauce)
A 873	N	400 tons/year	Hardwood shavings
A 874	N	100 tons/year	Softwood shavings
A 876	G	1000 cu.yds/month	Scrap lumber mill ends sawdust (Calgary)
A 881	R	1 tonne/mois	Carton (St. Jean)
A 886	Q	3 vans/semaine	Bran de scie de bois franc
A 901	E	---	Burned chips (B.C. Interior)
A 925	K	5000/week	Empty yarn cones 2/3" dia. x 7" length
A 940	R	10 tonnes/sem.	Journal déchiqueté en sacs de 50 lbs (Valleyfield)
A 941	O	50 ton/month	Wallpaper waste baled
A 943	N	1500 r feet	Elm, poplar, locust, maple lumber 3' - 10', 12" - 24" dia. (Cobourg)
A 944	O	1500	Wooden boxes with lids 20" x 17" x 16" (Toronto)
A 946	M	40 ton/day	Wood chips (white pine)
A 964	Q	1635 t/sem.	Ecorse (Chapais)
A 965	Q	1090 t/sem	Sciure et planure (Chapais)
A 976	O	3.5 tons/week	Wallpaper trim (baled)
A 986	R	2000 sacs/sem	Sacs de 100 lbs de farine en papier multi-plis (Montreal)
A 998	O	tonnage quantities	Sawdust and shavings (Toronto)
A 1009	Q	100 tonnes/sem.	Divers papiers, wallpaper, absorbants towelling.
A 1011	O	2 tons/month	Plain pulp board 40" wide paper and cartons (Aurora)
A 1026	S	3 trailers/jour	Ecorces (St-George, Bce)
A 1031	Q	50 tons/month	Wallpaper raw stock rolls various widths (Quebec)
A 1042	S	3 trailers/jour	Bran de scie et rippes (St-George, Bce)
A 1054	O	2000 lbs/month	Clean cardboard cartons (Newmarket)
A 1055	O	7.25 tons	24" x 30" x 0.024" whitefaced clay coated boxboard (Barrie)
A 1090	R	40 cu.yds./day	Particle board waste sawdust and pieces
A 1099	F	50 tons/month	Plywood sander dust (Grand Prairie)

10. MISCELLANEOUS : DIVERS

A 016	O	4 - 5 tons/day	Buttermilk (Brantford)
A 026	O	---	Glass and mirror scrap (Toronto)
A 041	O	2 tons/day	Spent cement (Toronto)
A 042	O	6 tons/day	Sand and gravel (Toronto)
A 074	R	2 tonnes/semaine	Orange pelures (Montreal)
A 080	U	20,000 gal/day	Molasses stillage
A 081	U	20,000 gal/day	Grain stillage
A 097	N	25	45 gallon drums (Kingston)
A 106	N	120 tons (Sept/Nov)	Apple pommace (~55-60% moisture)
A 179	U	100/month	45 gallon drums
A 191	O	80 tons/day	Residue from metal recovery from car bodies (Toronto)

WASTES AVAILABLE : DECHETS DISPONIBLES

<u>Region/Région</u>		<u>Quantity/Quantité</u>	
A 212	F	200 lb/week	Putty
A 224	Q	3 - 5 tonnes/semaine	Enerais d'animaux (furrier)
A 320	U	50 tons	Grape pomace (Truro)
A 365	O	40,000/month	Phenolic paper base washers 0.06" x 0.95" O.D., 0.43" I.D. (Toronto)
A 377	E	2 tons/day	Broken concrete slabs (ideal for breakwaters) (North Vancouver)
A 470	R	~70.4 cu.ft.bags/day	Vermiculite dust (Montreal)
A 483	G	Unlimited	Mixed coloured cullet glass (Calgary)
A 561	G	---	Paunch and pen manure (Red Deer)
A 572	Q	500,000 tonne/an	Bloc de granit 6" x 6" x 12" à 4' x 4' x 4' vert foncé
A 573	S	500,000 tonne/an	Bloc de granit 6" x 6" x 12" à 4' x 4' x 4' gris pale
A 575	N	10 per month	Used grinding wheels 10 - 11" dia. 1½" face, 1½" bore
A 577	O	250 lbs/week	Sponge toffee powder (Toronto)
A 578	O	30/month	45 gall steel drum \$3.50 each (Toronto)
A 579	O	250/month	Sugar bags (polybag 80 - 100 lbs.) (Toronto)
A 586	R	---	CIS Board Strips (Montreal)
A 618	R	5 - 10 tons/week	Burned clay products (Quebec)
A 640	O	80 tons/day	0.01" - 0.2" dia. 40% silica, 38% CaO sand
A 661	O	17 x 45 gal	Naval jelly available at no charge (Toronto)
A 683	N	7½ ton/week	Scrap plaster moulds
A 684	N	6 ton/week	Scrap glazed china
A 747	O	4 cu.yds/week	Popcorn (Toronto)
A 784	O	27.5 ton/month	Borosilicate glass (Toronto)
A 768	R	250/month	24 ounce jars (Montreal)
A 769	R	1000/month	Wine bottles (Montreal)
A 833	O	---	Brake lining stock various sizes
A 919	N	6,000 tons	Dolomite sand minus 12 mesh
A 920	I	650 tons/year	Glass reclaimed from bottles (clear and coloured) (Swift Current)
A 949	O	---	Waste sugar products suitable for cattlefood (Maple)
A 963	E	1500 gallons/week	Raw cows blood
A 978	N	25 tons	Crushed glass
A 983	R	2448 rolls	Glass filament tape 1/4"
A 985	R	20 tons/sem	Pâte, farine et produits finis endommagés (Montreal)
A 988	O	15,000 tons/year	Automobile shredder residue
A 996	R	600 ton/year	Battery casings, 80% coalfines, 15% rubber, 5% binder
A 1003	O	70 tons/month	Broken borosilicate glass (Cakville)
A 1004	O	5400 tons/week	Fine silica sand (Port Burwell)
A 1005	O	30,000 gallons	Hydrolyzed animal collagen
A 1023	O	200-300/month	Fibre drums (100 lbs. capacity)
A 1032	Q	400 tons	Roofing felt rolls (Quebec)
A 1065	R	---	700 H.P. English Electric motor
A 1066	R	---	Blueprint copying machine
A 1068	R	---	Galt refrigeration system
A 1069	R	---	Valves
A 1071	R	2	1200 sq.ft. condensers S.S. tubes
A 1072	R	---	Calender rolls
A 1077	O	150 cu.yds/3 weeks	Mushroom compost

WASTES WANTED : DECHETS DEMANDES

Use Form 3 to enquire about these wastes if you think you can supply them. Return Form 3 to the Waste Exchange

Veillez utiliser la formule 3 pour demander des renseignements au sujet des déchets que vous pensez pouvoir fournir.

Region/Région Quantity/Quantité

1. ORGANIC CHEMICALS AND SOLVENTS : PRODUITS CHIMIQUES ORGANIQUES ET SOLVANTS

W 022	R	30,000 tonnes	Recyclage Beton Bitumineux (Valleyfield)
W 064	G	30 gals/month	Rubber cement (naphtha - polymer)
W 085	R	large quantities	Waste solvents, all kinds
W 185	O	Unlimited	Paint overstock etc.
W 190	O	Unlimited	Waste chlorinated solvents (Toronto)
W 191	R	45 gall/week	Resin wash solvent
W 235	O - V	unlimited	Chlorinated solvents

2. OILS, FATS AND WAXES : HUILES, GRAISSES ET CIRES

W 065	G	45 gal/week	Waste lubricating oil
W 196	O	50,000 gal/month	Waste oil max. BSW 8%, 100-200 vis.sus., sulphur 0.5 max.
W 232	West	200 ton/month	Petroleum coke
W 234	O	5 - 6000 ton lots	Graphite waste
W 240	O	500 lb/week	Waste graphite or carbon electrodes (Toronto/Hamilton)
W 248	R	---	Scrap graphite
W 256	R	6000 tons/year	Graphite electrode waste
→ W 257	All	large quantities	Scrap graphite and electrodes

3. ACIDS : ACIDES

W 099	E	15,000 gal/month	HCl pickling waste (Pb<2gpl Fe>200 gpl)
W 201	O	~20 million gal/year	Contaminated sulphuric acid 10-90% H ₂ SO ₄

4. ALKALIS : ALCALIS

W 188	E	10 tons/week	Caustic (Vancouver)
W 189	E	10 tons/week	Quicklime (CaO) (Vancouver)
W 202	O	Unlimited	Dirty or clean caustic wastes 10-50% caustic

WASTES WANTED : DECHETS DEMANDES

Region/Région Quantity/Quantité

5. OTHER INORGANIC CHEMICALS : AUTRE PRODUITS CHIMIQUES INORGANIQUES

W 034	O	---	Solutions containing sodium nitrate (Hamilton)
W 205	R	2500 tons/year	Precipitated calcium carbonate (may be impure) (Valleyfield)
W 208	O	large tonnages	Nitrogen and phosphorous containing materials for activated sludge
W 225	N-USA	Tonnage quantities	Magnesium chloride
W 226	"	" "	Calcium chloride preferably dry
W 227	"	" "	Iron sulphate preferably dry
W 233	O	10 tons - sample	Olivine or other iron + Mg containing minerals
W 242	All	large quantities	Gypsum and phosphogypsum
W 245	O	---	Spent alumina
W 255	R	---	Vanadium pentoxide
W 261	O	20-30 tons/week	Powdered sulphur

6. METALS AND METAL CONTAINING SLUDGES : METAUX ET BOUES CONTENANT DES METAUX

W 016	O	---	Liquid or solid containing tin (Hamilton)
W 042	K	Unlimited	Used photofix liquid or sludge
W 043	K	Unlimited	Photo X-rays
W 047	all	Unlimited	Metal containing residues solids and liquids
W 130	All	Unlimited	Electrolytic silver recovery
W 131	All	Unlimited	Scrap or exposed X-ray film
W 132	All	Unlimited	Silver chip and residue
W 133	All	Unlimited	Scrap tungsten carbide inserts
W 153	O	Unlimited	Insulated copper wire or lead covered copper cable
W 154	O	Unlimited	Non ferrous metals
W 171	O	3 tons/week	Cast aluminum
W 182	F	15 tons/day	Nickel salts or residues
W 183	F	10 tons/day	Cobalt salts or residues
W 186	O	20 tons	316 Stainless scrap
W 187	G	Unlimited	Scrap carbide
W 198	O	3 million ft ² /month	Perforated metal sheet 10-15 mil with 0.5-2" dia. holes, 48-52" roll
W 221	R	Unlimited	Mercury and Mercury containing sludges (Shawinigan)
W 222	N-USA	Tonnage quantities	Chrome or cobalt containing compounds
W 224	"	" "	Magnesium metal turnings & scrap
W 228	"	" "	Zinc oxide

WASTES WANTED : DECHETS DEMANDES

	<u>Region/Région</u>	<u>Quantity/Quantité</u>	
W 246	R	---	Non ferrous metals
W 247	R	---	Ferrous metals
W 249	R	---	Structural steel
W 250	R	---	Mercury sludge
W 251	R	---	Steel shot new and used
W 253	R	---	Mercury

7. PLASTICS : PLASTIQUES

W 010	K	Unlimited	Photonegatives
W 036	R	Unlimited	All thermoplastic waste
W 054	O	20,000 lbs/month	Rigid clear PVC scrap
W 055	O	Several tons/month	E.V.A. plastics
W 056	R	Large quantities	Vinyl scrap, seats pool liners, etc. (Boucherville)
W 058	R	10 tons/month	Tire cord any type (Laval)
W 086	O	15 tons/day	Low density polyethylene scrap
W 155	I	500 tons/month	Low density P.E.
W 156	I	500 tons/month	ABS
W 157	I	Unlimited	High density P.E.
W 199	O	3 million ft ² /month	Perforated plastic sheet 10-15 mil with 0.5"-2" dia. holes, 48-52" rolls
W 210	O	25 tons/year	PVC scrap (Mississauga)
W 214	E	large tonnages	Plastic waste and polyester cloth (Vancouver)
W 244	N	large quantities	Recycled polyethylene
→ W 258	G	40 tons/month	Thermoplastic waste

8. TEXTILES, LEATHER AND RUBBER : TEXTILES, CUIR ET CAOUTCHOUC

W 001	O	100,000 lbs.	Wool cutting waste (Elmira)
W 002	O	---	Wool yarn waste (Elmira)
W 011	R	Unlimited	Tire buffings or shreddings or peelings (Montreal)
W 048	all	Unlimited	Textile waste cloth cuttings
W 066	G	200 lbs/day	Rubber buff dust
W 075	R	---	Scrap rubber tire buffings, shreddings, peelings
W 184	Q	1 ton/month	Terrycloth scrap
W 193	R	Unlimited	All kinds of wool or wool blend waste (Montreal)
W 194	R	5 tonnes/mois	Chiffons, guenilles, coton fromage (Montreal)

WASTES WANTED : DECHETS DEMANDES

	<u>Region/Région</u>	<u>Quantity/Quantité</u>	
W 207	O	1000 lbs/month	Acetate and Nylon selvages ½" to 1½" wide (Niagara Falls)
W 209	O	large quantities	Synthetic cloth clippings and fibres (Toronto)
W 212	all	Unlimited	Tire buffings, shreddings and peelings
W 213	O	10,000 yds/year	Orlon pile
W 231	Q	5 tonnes/mois	Cotton cutting waste 15" wide +
W 236	O - V	unlimited	Scrap urethane foam
W 237	O	50 cu.yds/week	Scrap foam (London)
W 239	N	---	Fabric and textile waste (Napane)
W 243	O	large quantities	Shredded rubber tires (Windsor)

9. WOOD AND PAPER PRODUCTS : PRODUITS DU PAPIER ET DU BOIS

W 015	O	50/month	Clean cartons approx. 4.5 cu.ft. & 1.5 cu.ft. (Scarborough)
W 017	R	20 tons/day	Sawdust and shavings (Richelieu)
W 045	R	---	Corrugated sheets, cartons, job lots (Montreal)
W 052	R	5 tons/mois	Rebus papier électrostatique
W 057	R	25 tons/mois	Rebus papier gommé et non gommé
W 098	O	Unlimited	New or used corrugated cartons (Hamilton)
W 108	R	----	Paper (Montreal)
W 123	O	up to 5000 tonnes	Sawdust (Windsor)
W 168	K	5000 lin. feet	¾" x 2" x min. 16" long lumber
W 181	O	Unlimited	Hard or softwood offcuts (Toronto and district)
W 192	S	20,000/month	Corrugated boxes approx. 23" x 18" x 18"
W 200	O	3 million ft ² /month	Perforated paper sheet 10-15 mil with 0.5"-2" dia. holes 48"-52" roll
W 203	R	5 tonne/sem	Journaux (Valleyfield)
W 204	R	10 tonne/sem	Papier couleur (Valleyfield)
W 206	R	100 ton/week	Newsprint (Pont Rouge)
W 211	N	Car or truck loads	Ponderosa or white pine mill ends
W 216	Q	100 tons/week	All types job lots papers
W 217	O	Continuous supply	Large paper bags
W 218	N	30 ton/day	Sawdust (Ottawa)
W 219	O	50 ton/day	Sawdust (Mississauga)
W 220	R	all	Used cartons
W 229	R	Unlimited	Used cartons
W 230	R	Unlimited	Hardwood or softwood offcuts scrap lumber mill ends aboutures bois
W 238	O	300 cu.yds/week	Sawdust or notchings (London)
W 254	R	---	Cardboard paper
→ W 259	R	---	Used corrugated cartons (Montreal)

WASTES WANTED : DECHETS DEMANDES

Region/Région Quantity/Quantité

10. MISCELLANEOUS : DIVERS

W 122	O	Up to 5000 tonnes	Apple or wine pommace (Windsor)
W 125	O	Large quantities	Used buffing wheels, felts, etc.
W 175	R	---	Scrap glass
W 223	N-USA	Tonnage quantities	Magnesium oxide refractory bricks
W 241	P - S	illimitée	Equipement contaminé au PCB
W 252	R	---	Demolition materials
W 260	O	large quantities	Anything suitable for livestock feed

SERVICES AVAILABLE : SERVICES DISPONIBLES

These are listed on a non-confidential basis;
if you wish to make use of any of these services,
please contact the person identified in the listing.

Cette liste n'est pas confidentielle. Si vous désirez vous
prévaloir de l'un quelconque de ces services, veuillez
communiquer avec la personne dont le nom apparaît
sur la liste. •

Region Served/ Région desservie Wastes Handled/ Déchets manipulés Address/ Adresse

TRANSPORTATION/REPROCESSING : TRANSPORT/RECYCLAGE

All	All liquid wastes, drums, solids, radioactive wastes, transformers	D & D Disposal Services Limited P.O. Box 372, Smithville, Ontario L0R 2A0 (416) 957-3323 - T.W. Drew; Gord Evans
N, O	All liquids and sludges	Eastons Disposal Services, P.O. Box 344, Port Hope, Ontario L1A 3W4 (416) 885-8838 or 797-2380 - Alan Easton
O	All non-radioactive liquids and sludges	Mac's Liquid Waste Disposal Ltd., 2128 River Road, London, Ontario N6A 4C3 (519) 451-6630
L,M,N,O	All types of liquid waste. Lined tank trucks to 9000 gal.capacity. Vacuum trucks to 3300 gal.cap.	Harold Marcus Ltd., RR 3, Bothwell, Ontario NOP 1C0 (519) 695-2721. All calls from 519 area: 1-800-265-5243 - Harold Marcus
Ontario	All non-radioactive liquid wastes and sludges	Thomas Waste Removal Ltd., 432 Hensall Circle, Mississauga, Ontario (416) 277-2187. After hours emergency: 298-4040, pager no. 8419 - Alec Thomas
O	All non-radioactive liquids and sludges	Palro Liquid Waste Removal Ltd., RR 1, Burford, Ontario (519) 449-2464 - Les Pallagi (416) 481-0830 - Allen Sroka
All plus NE-US	Treatment of organic liquid waste and recycling of waste oil	Tricil Ltd/Ltée., 101 Queensway West, Suite 400, Mississauga, Ontario L5B 2P7 (416) 270-8280 - Charles A. Laionde
Q,R,N	Waste oils, motor industrial lubricating and all kinds of used hydrocarbons. Huiles usées, à moteur, indust- rielle, lubrifiantes, et hydrocar- bures usées de toutes sortes	Normandie Oil Co. Cie d'Huile Normandie 230 Norman Street 230 rue Norman Ville St. Pierre, P.Q. H8R 1A2 (514) 489-8182 - S. Abracen
L,M,N,O,R,S	Industrial oils, oily waste water treatment	Chem Ecol Ltd., Cobourg, Ontario (416) 372-2251 - B.J. Milner
L,M,N,O,P,Q,R	Industrial lube oils, reclaimed bought or sold	Petroleum Recycling Services Ltd., 27 Harlech Ct., Thornhill, Ont. L3T 2A1 (416) 881-9880 - Mei Ash
All	Industrial oils, coolants and cutting fluids, oily waste treatment	Scandex Chemical Services 29 Trillium Park Place, Kitchener, Ontario N2E 1X1 (519) 393-0840 - J. Braks; T.Forstmanis

SERVICES AVAILABLE : SERVICES DISPONIBLES

<u>Region Served/Région desservie</u>	<u>Wastes Handled/Déchets manipulés</u>	<u>Address/Adresse</u>
O,M,R,Q O,N	Used lubricating oils Used solvents & fuels	Breslube Enterprises Breslau, Ontario (519) 648-2291 - Joe Chalhoub
All	Waste oils, chemicals, water recovery & purification systems	Klein Engineering Ltd., Suite 1113, 1339 Meadowland Dr. E, Ottawa, Ontario K2E 7B4 (613) 229-4294 - S.H. Klein, P.Eng.
O	Solvents	Oakside Chemicals Ltd., White Oak Road, London, Ontario (519) 681-1103 - S. Kelly
O,N and Q,R,S,T,U,V	Hydrocarbons, alcohols, glycols, esters, ketones, chlorinated solvents, freons	Anachemia Solvents Ltd., 3549 Mavis Road, Mississauga, Ontario L5C 1T7 (416) 279-5122 - George Wentlandt Anachemia Ltd. 500 Second Avenue, Lachine, P.O. H8S 4A7 (514) 484-5711 - Gee Quenneville
N,O	Chlorinated solvents & urethane foam waste	Van Waters and Rogers Ltd., 62 Arrow Road, Weston, Ont. M9M 2L9 - Ken Cook
Q,R,S,T,U,V	Recyclage de solvents chlorinés	Van Waters and Rogers Ltd., 2700 J.B. Deschamps Lachine, P.Q., H8T 1E1 (514) 631-9451 H. Walser/J. Rochan
P,Q,R,S	Equipement contaminé par le PCB	Toxitec Ltée, 276 St-Jacques, Suite 725 Montréal P.Q. H2Y 1N3 (514) 468-2313 or (514) 845-6537 - Denis Paré
Q, R	Gras animal, huiles végétales débris d'abattoirs	Alex Couture Inc., C.P. 2130, St. Romuald, Lévis, P.Q. G6W 5M5 (418) 832-4641 - M. Murray Couture Jr.
Ontario Quebec Michigan	Ferrous scrap/non-ferrous metals	Zalev Brothers Ltd., 100 Grand Marais Road East, P.O. Box 609, Windsor, Ont. N9A 6N5 (519) 968-0620 - Dean S. Zalev
L,M,N,O	Liquid, sludge or solid materials containing tin	Metal Recovery Industries 670 Strathearne Ave. N., Hamilton, Ont. L8H 7N7 (416) 549-9894 - Ed Rogers
F,G,H,I,J,K,L	Scrap ferrous and non-ferrous metals	General Scrap & Car Shredder Ltd., Box 26, Group 509, RR 5, Winnipeg, Man. R2C 2Z2 (204) 222-4221 - Jack Lazarek or Navajo Metals, Calgary, Alberta (403) 252-7787 - Peter Guenther
All	Ferrous, non-ferrous scrap including aluminum foil, paper back foil and aluminum turnings & grindings	Mostel Metals Co. of Canada Ltd., 371 Comstock Road, Scarborough, Ontario M1L 2H3 (416) 755-9211 - Charles Agro

SERVICES AVAILABLE : SERVICES DISPONIBLES

Region Served/Région desservie	Wastes Handled/Déchets manipulés	Address/Adresse
All	Scrap X-ray film, litho film, litho aluminum steels, silver flake and residue	Comtaux Ltée 6 Ronald Drive, Montreal West, Quebec H4X 1M8 (514) 481-8191 - Len Fagan
M,N,O,Q,R,S,T,U	Scrap tungsten carbide inserts Used 45 gallon drums	Elizabeth Dowsley Arshinoff & Co. Ltd., 2079 Pigeon Street, Lasalle, Que. H8N 1A8 (514) 366-7700 - J.C. Pellerin
N,P,Q,R,S	Used 45 gal & 25 gal steel drums	D & B Barrels & Drums Inc. 639 De la Ferme St., Montreal, P.Q. H3K 2E2 Donald Bonder (514) 935-1820
M,N,O,P,Q,R,S	Metal turnings and grindings	Magnetic Reclaimers Ltd., P.O. Box 564 Welland, Ont. L3C 2T4
All	Photographic Chemicals, X-ray film, litho films, scrap precious metals	CMR Recycling Industries Ltd., 27 Manitou Drive Units 2F/2H, Kitchener, Ont. N2C 1K9 (519) 893-2530 - Paul Chown
F,G,H,I,J,K,L	Metals and metal products - steel, scrap autos & railway cars	Mandak Metal Processors Ltd., P.O. Box 332, Selkirk, Manitoba R1A 2B3 (204) 482-6701 - Irwine Permut or Ed Smith
Ontario	Non-ferrous metals, all types scrap steel cast iron, etc.	Intermetco 1 James North, Hamilton, Ontario (416) 528-1191 - I. Swartz
R & all other regions	Scrap rubber tire buffings Shreddings and peelings	Dura Undercushions Ltd. 8525 Delmeade Rd., Montreal, Quebec (514) 737-6561 - David Beal
O,N,M,R,Q,E,G,F,I	Cryogenic recycling technology primarily for rubber & plastic	Air Products, 2090 Steeles Avenue, Brampton, Ont. L6T 1A7 (416) 791-2530 - Mr. A. Gaspar
All	Cryogenic grinding technology for recycling of rubber and plastic	Union Carbide Canada Ltd. 123 Eglinton Avenue East, Toronto, Ont. M4P 1J3 (416) 487-1311 - D.W. Kirkwood
E,G,I,K,L,M,N,O,R, Q,S,U,V	Plastics	Phoenix Blending Ltd., 2665 Marcel St., Ville St. Laurent, P.Q. and 325 Flint Road, Downsview, Ontario
R	Pallettes usagées Used pallets	Bois Laurentiens Inc., 550 Côte St. Louis Est, Blainville, P.Q. J7E 4H5 (514) 430-7780 - M. Levert
N,O	Used pallets	Instant Pallet Locust Hill, Ontario (416) 294-6227 - M. Hatfield
O	All types of waste paper	Domtar Recycling Operations 451 Front St. East, Toronto, Ont. M5A 1G9 (416) 364-6226 - Steve Wilson

SERVICES AVAILABLE : SERVICES DISPONIBLES

<u>Region Served/Région desservie</u>	<u>Wastes Handled/Déchets manipulés</u>	<u>Address/Adresse</u>
All	Buying reject buttrolls of paper, reject misprint boxboard and corrugated	G.A.M. Enterprises RR 5, Colborne, Ont. K0K 1S0 (416) 344-7635 - Moses Schacter
N,O	Removal of food, brewery and distillery by-products	Shantz Bros. Limited 107 Manitou Drive, Kitchener N2C 1L4 Don Hemmerle

CONSULTING LABORATORIES : LABORATOIRES DE CONSULTATION

All	Solidification and related technology for industrial waste	Canadian Waste Technology Inc., 160 Torbay Road, Markham, Ont. L3R 1G6 (416) 495-9502 - David Krofchak
All	Consulting analytical services in waste treatment & disposal	Enviroclean Ltd., 320 Adelaide Street S, London, Ont. N5Z 3L2 (519) 686-7558 - Dr. Roy Whitehead
All	Recycling process for scrap tires, rubber and plastic waste	EWID Ltd., 299 Adelaide Street West, Toronto, Ont. M5V 1P7 (416) 364-8333 - O.R. Staroba
All	Consulting and analysis services for reclaim treatment and disposal of wastes	Pollutech Ltd., 1090 Speers Road, Oakville, Ont. L6L 2X4 (416) 844-1900 - Dr. J.D. Norman
All	Solid and liquid waste disposal consulting and design	Underwood McLellan Ltd., 17007 - 107 Avenue, Edmonton, Alta. T5S 1G3 (403) 483-7722 - A. R. Pasini
L,M,N,O	Spill cleanup consultants. Distributor of sorbent products for cleanup of petroleum distillate products	Sorbco 432 Hensall Circle, Mississauga, Ont. (416) 277-2187 - Alec Thomas
R,N,O	Organics, solvents, oils and all filterable liquid handling	Klein Eng. Ltd. 695 Richmond Road, Ottawa, Ont. K2A 0G6 S. Klein
M,N,O,P,Q,R,S,T,U	Analytical services; Toxic level determination; Consultant in waste treatment Services analytiques; Détermination de la toxicité; Conseillers en traitement des déchets	Eco-Research Ltd. : Eco-Recherches Ltée 121 Hymus Blvd., Pointe Claire, Québec H9R 1E6 (514) 697-3273 - M. Bienvenue
All	Plastic wastes utilization. Use of wastes in construction. Recovery of metal values, waste disposal. Lab. & analytical facilities.	Ontario Research Foundation Sheridan Park, Mississauga, Ontario L5K 1B3 (416) 822-4111 - Bob Laughlin

SERVICES AVAILABLE : SERVICES DISPONIBLES

<u>Region Served/Région desservie</u>	<u>Wastes Handled/Déchets manipulés</u>	<u>Address/Adresse</u>
All	Hazardous Waste Management - Process design	W.L. Wardrop and Associates Ltd., 77 Main Street, Winnipeg, Man. R3C 3M1 (204) 956-0980 - Dr. Hadi Husain
All	Industrial wastes	Scandex Chemical Services 29 Trillium Park Place, Kitchener, Ont. N2E 1X1 (519) 893-0840 - J. Braks; T. Forstmanis
All	Treatment & disposal technology for Industrial Waste Effluents and sludges - analytical laboratory	King Water Treatment Technology Ltd., 20 Morrow Road, Barrie, Ontario L4N 3V8 (705) 737-4455 - E.W. Latal
All	Chemical engineering services dedicated to affordable process designs for waste control	Ladge Engineering Inc. 179 Lansdowne Ave., Kingsville, Ont. N9Y 3J2 (519) 733-3122 - John Bercik
A,B,C,D,E,F,G	Industrial wastes, all industries. Consulting and process design.	Vortex Engineering Ltd 1805-1225 Cardero St., Vancouver, B.C. V6G 2H8 (604) 682-3979 - Conrad Winkelman
All	Utilization of industrial waste and by-products in construction	E.E. Berry Technical Consultants P.O. Box 6148, Station J, Ottawa, Ont. K2A 1T2 (613) 828-9247 - Ed. Berry
L,M,N,O	Waste treatment consulting & analytical services	Canviro Consultants Ltd. 279 Weber Street North, Waterloo, Ont. N2J 3H8 (519) 886-9120 - Hugh Monteith

Company Name:	Contact:
Address:	Telephone:
	Telex/TWX:

Confidential information will not be disclosed

yes ☐

no ☐

Code Number	Quantity/Timing	Description	*Geographic Location
exchange use only			

Code Number	Quantity/Timing	Description	*Geographic Location
exchange use only			

Formule française au verso



FORM 2

Services Available

Please use this form if you wish to list waste transportation, reprocessing or consultation services available on a non-confidential basis.

I would like to be listed under the following category(ies) at \$100 per category per year:-

Transportation

☐

Reprocessing

☐

Consulting

☐

I enclose a cheque for \$ _____ to cover the cost of this listing in 6 issues of the bulletin.

*Geographic Region(s) served	Material(s) handled	Company name; address; telephone number; contact

Please be brief. This is not intended as an advertising service. The exchange reserves the right to edit entries.

*Use letter identifiers from the map at the front of the bulletin.

Formule française au verso

canadian waste materials exchange



la bourse canadienne des déchets

FORM 3

I am interested in item number _____ listed in the waste materials
exchange. I think I might be able to use/supply _____
quantity/timing
of this material and I would be interested in discussing this possibility with the
company listing the item. Please forward this inquiry to them.

Date _____

Signature _____

Name _____

Title _____

Company _____

Address _____

Telephone _____

Telex/TWX _____

Formule française au verso

APPENDIX B:
WORKSHOP AGENDA
WORKSHOP RESPONSES TO DISCUSSION TOPICS
WORKSHOP PARTICIPANTS

FLORIDA WASTE EXCHANGE WORKSHOP

December 2-3, 1980

Presented jointly by

FLORIDA CHAMBER OF COMMERCE

INSTITUTE OF SCIENCE AND PUBLIC AFFAIRS
FLORIDA STATE UNIVERSITY

Schedule of Activities: Tuesday, December 2

8:00-9:00	Registration
9:00-9:15	Opening Remarks Roy C. Herndon, Director Hazardous Waste Management Program Florida State University
9:15-9:50	Waste Exchanges: Past and Present Edward Isenberg, President Project Director: U.S. EPA Waste Exchange Study (1980) Water Technology Corporation
9:50-10:25	Reflections on a Successful Waste Exchange Arthur G. Baebler, Executive Vice President St. Louis Regional Commerce and Growth Association Midwest Industrial Waste Exchange
10:25-10:40	Break
10:40-11:05	Industrial Picture of Florida Frank M. Ryll, Jr. Staff Vice-President Florida Chamber of Commerce
11:05-11:15	Victoria J. Tschinkel Assistant Secretary Florida Department of Environmental Regulation
11:15-11:30	Panel-Participant Discussion and Questions
11:30-1:00	Lunch
1:00-1:35	Waste Exchange Concept: Federal Position Rolf P. Hill Hazardous Waste Management Division U.S. Environmental Protection Agency

1:35-2:05	Opportunity for Florida's Hazardous Waste as a Waste Exchange Commodity Douglas N. Behrman, College of Business Project Director: Florida Hazardous Waste Market Survey (1980) Florida State University
2:05-2:30	Panel-Participant Discussion and Questions
2:30-2:45	Break
2:45-4:15	Workshop Sessions
4:15-4:30	Workshop Results and Presentations
4:30	Adjourn for the Day
<u>Schedule of Activities: Wednesday, December 3</u>	
9:00-9:10	Summary Remarks Concerning Previous Day's Activities Roy C. Herndon, Director Hazardous Waste Management Program Florida State University
9:10-9:40	Waste Exchange Concept: State Position L. Raoul Clarke Environmental Specialist Florida Department of Environmental Regulation
9:40-10:00	Waste Exchange Operating Strategies Christopher M. Teaf, Assistant Director Hazardous Waste Management Program Florida State University
10:00-10:15	Panel-Participant Discussion and Questions
10:15-10:30	Break
10:30-11:30	Workshop Sessions
11:30-12:00	Closing Remarks, including Conference Summary, Follow-up Procedures, and Recommendations
12:00	Adjourn

WORKSHOP SESSION I

1. Should the waste exchange (WE) accept listings of all wastes, or only chemical wastes, or only hazardous chemical wastes?
 - a. Perhaps initially only hazardous wastes should be considered to assure a reasonable sized undertaking at first;
 - b. Although other wastes might be easier to exchange, the problem is with hazardous waste so they should be considered first;
 - c. Some waste exchanges (i.e., MIWE) do not distinguish in listings between hazardous and non-hazardous;
 - d. EPA favors listings of all types of wastes although it does not have a set policy;
 - e. Audience vote was unanimous for listing all types of wastes.
2. Who should sponsor and who should operate the WE? An existing trade association, a trade promotion group, or an extension of a public agency?
 - a. DER, while willing to advise, etc., does not wish to operate the exchange and notes that state funding for new programs may be limited;
 - b. MIWE has had success with private sector funding through appropriation by SLRCGA and through \$10 fees charged to listers;
 - c. audience consensus was to run through the private sector and that funding at least at first could come from a chamber of commerce-like agency.
3. Should the confidentiality of the ads be preserved? By what mechanism?
 - a. audience consensus was yes;
 - b. MIWE experience has been to have a confidential and a non confidential section. This has had no problems
 - c. mechanism as through coding mechanism used in other exchanges.
4. How should the operation be financed? a) By subscription? b) By advertising fees? c) By a sponsoring group as part of its member services? d) Other?
 - a. the financing method will depend on the entity which operates the exchange;
 - b. possibilities include: subscriptions to the regular publication; constant listing fees; variable listing fees based on either a degree of hazard or other system; advertising for transport, disposal, consulting services in the regular publication; funds allocated by operating agency for purpose of operation only; donations from successful exchangers.

5. What type of publication should be developed? A flyer containing just the listings? Or one with pertinent commentary on statistics and legal matters?
 - a. initially the publication should stick to basics and have listings only, no supplementary sections;
 - b. it is unclear how badly the increase of only 1 or 2 pages to the overall document would increase the costs substantially. Therefore, perhaps a supplemental section would be desirable;
 - c. three characteristics should be considered when putting the publication together: it should be identifiable, it should be eye-catching, it should be free (Arthur Baebler from MIWE)
6. How often should the publication be issued: monthly, bimonthly, or quarterly?
 - a. monthly is too often, so is bimonthly; quarterly would probably be best;
 - b. an update of a single sheet on a monthly basis sent to recipients of the publication would refresh their memories, because most exchange activity occurs immediately after mailouts;
 - c. strong publicity shortly before and during initiation phases of exchange would help a lot;
 - d. DER could assist by including some information on the operation of the exchange in DER publications;
 - e. initial mailing list can come from DER Waste Watcher, chamber of commerce manufacturing listings, chamber of commerce memberships, addresses of exchanges from other states.
7. Should the subscription to the flyers be free?
 - a. to increase distribution, it should be free at least in the beginning;
 - b. subscription fees might tend to eliminate participants by some of the smaller firms; as a rule, unless the fee is substantial, it cannot do much to defray the costs associated with operation of the exchange, hence it probably should not be done this way initially;
 - c. it will depend on the policy of the organization which runs the exchange.
8. Should the ads be free or by rate schedule?
 - a. probably by rate schedule to encourage participation by smaller firms;
 - b. should be on a fixed rate to avoid feeling of inequity on part of some other firms;
 - c. will be determined by organization operating the exchange.
9. Should an ad be published once or more than once? What time limit might be set on listings?
 - a. advertisements should certainly be separated more than once due to probability they will be overlooked;
 - b. after a finite time limit (i.e., 6, 9, 12 months) set a maximum number of listings and drop off oldest listing;

- c. dropping off listings as in (b) would alienate people; you must give them warning about when they will no longer appear;
- d. contact companies after a fixed time limit and ask if they want to relist, rather than just drop. Relisting requires repayment;
- e. three listings, quarterly (total 9 months) without repayment will probably be sufficient initially to move all but problem or unusual wastes;
- f. perhaps the process should not be limited in time but regular contact maintained with the lister to avoid continuing to list items of no value;
- g. the problem of too many listings is not really realistic and limits should be set only to maintain some listing fee income (i.e., new listing fee assessed every 9 months).

WORKSHOP SESSION II

1. Should the proposed Florida WE exchange ads with WE's of other states?
 - a. Audience consensus was a unanimous yes.
 - b. Panel response suggested some problems with volume of listings and possibility of merely exchanging ads for fundamentally non-exchangeable items.
2. Should the WE accept ads from out-of-state? Listings only? Inquiries only?
 - a. It would be more logical to "learn to walk before trying to run" in this situation.
 - b. The operation should not be too ambitious initially; let it expand to cover these areas as it grows.
 - c. If ads are sent from firms in other states, the exchange should list them. However, it should not solicit ads from firms in other states.
 - d. The exchange should accept only "Materials Wanted" ads, but not list "Materials Available" from out-of-state firms.
3. Should the WE refer certain inquiries to other established trade channels, such as used motor oils or metals?
 - a. This will just naturally occur and will not require much prompting, except occasional referrals from inexperienced parties.
 - b. Yes.
4. How shall mailed-in samples be handled?
 - a. If the exchange is to be an information clearinghouse, no mail in samples should be accepted; if it is to be a materials exchange, some samples will be necessary.
 - b. No chemical samples should be accepted at all.
 - c. Technical background and sections in the catalog-publication devoted to corporate advertising might list firms capable of laboratory analysis of samples.
 - d. DOT regulations will govern options concerning mailing and transport of samples. A Regulatory Interpretive Memorandum (RIM) should address the EPA position on this situation soon.
5. Should the WE staff actively solicit new markets for listed wastes?
 - a. Yes, to the maximum extent possible considering clerical, technical, and administrative time required.
 - b. Yes, often the industrial community must be coaxed to do "what it knows is proper."

6. What should be the space and manpower requirements?
 - a. This will be determined by the level at which the WE is to operate.
 - b. Clerical, technical and administrative costs will be expanded or curtailed to fit needs of normal operating load as these are established after a few months.
 - c. Part-time staff or delegation of percentage of time from permanent existing staff should be sufficient for start-up.
 - d. Computer software for storage and retrieval can greatly decrease administrative costs. Perhaps Florida could pioneer such an effort.
7. How should requests for technical assistance on chemical processing or proper disposal be handled?
 - a. The exchange should only make referrals in responding to technical questions, due to potential liability questions.
 - b. A clear distinction should be defined between advice and referral.
 - c. One company deals with its waste management decisions through consultation with a Florida licensed P.E. for technical questions.
8. Does the WE run a liability risk? If so, what legal protection is recommended?
 - a. This cannot be determined except through legal counsel.
 - b. If a carefully worded disclaimer is included in each publication, and if the distinction between advice and referrals is clear, then there should be no real problems.
 - c. Perhaps in cases of negligence there is always a risk.
9. What mechanism is recommended to change or dissolve the WE, if the need arises?
 - a. This question is premature and should be reserved for future discussions.
 - b. This will be apparent the need arises.
10. Should a mechanism be developed to follow up and record successful transfers? What possible forms might this take?
 - a. Yes.
 - b. This evaluation should be carefully developed and refined at the start to track the areas of successful transfer or failure of the exchange; it will be difficult to do without risking alienation due to suspicion of invasion of privacy.
 - c. Quantifiable data will be required when evaluating the exchange and this is the only way to collect these data.
 - d. Tracking the materials at the outset can save a tremendous amount of trouble the second time around.

WASTE EXCHANGE WORKSHOP PARTICIPANTS

December 2-3, 1980

<u>Name</u>	<u>Company</u>	<u>Location</u>
Vernon Adams	Georgia-Pacific P.O. Box 919	Palatka, Florida 32077
Tod Allen	Institute of Science and Public Affairs Florida State University	Tallahassee, Florida 32306
Carlos F. Aybar	Alachua County Research and Development Authority	Gainesville, Florida 32602
Art Baebler	Midwest Waste Exchange 10 Broadway	St. Louis, Missouri 63102
Ken Barnes	Fla. Wire & Cable Co. P.O. Box 6835	Jacksonville, Florida 32073
Doug Behrman	FSU School of Business	Tallahassee, Florida 32306
Darrell R. Bell	International Laser Systems 3404 N. Orange Blossom Trail	Orlando, Florida 32804
J.C. Bowers	Union Camp Corporation P.O. Box 6170	Jacksonville, Florida 32205
Harvey H. Bush, Jr.	AB ₂ MT Consultants P.O. Box 341235	Coral Gables, Florida 33134
Tom Cardinale	Hills County Environmental Protection Commission	Tampa, Florida
Raoul Clarke	DER Solid Waste Section 2600 Blairstone Rd.	Tallahassee, Florida 32301
Jud Curtis	Post, Buckley, Schuh & Jernigan, Inc. 217 S. Adams St.	Tallahassee, Florida 32301
Mary Dickinson	Boeing Services International P.O. Box 21185	Kennedy Space Center Orlando, Florida 32815 (Mail Code FC-56)

<u>Name</u>	<u>Company</u>	<u>Location</u>
Lois Friedman	Leon Iron and Metal P.O. Box 5874	Tallahassee, Florida 32301
Wilkin J. Gunter	Anchor Hocking P.O. Box 6932	Jacksonville, Florida 32205
Bonnie Hamm	Jacksonville Chamber of Commerce P.O. Box 329	Jacksonville, Florida 32201
Bob Hawfield	DER Solid Waste Section 2600 Blairstone Rd.	Tallahassee, Florida 32301
Roy C. Herndon	Institute of Science and Public Affairs Florida State University	Tallahassee, Florida 32306
Rolf P. Hill	U.S. EPA 401 M St. S.W.	Washington, D.C. 20460
Ed Isenberg	Water Technology Corp. 122 Jeanmoor Rd.	Tonawanda, N.Y. 14150
Thomas J. Knox, Sr.	McKenzie Tank Lines P.O. Box 1200	Tallahassee, Florida 32302
Wally LaMountain	Brunswick Corp. 2000 Brunswick Lane	Deland, Florida 32720
Robert McVety	DER Solid Waste Section 2600 Blairstone Rd.	Tallahassee, Florida 32301
Ane Merriam	Institute of Science and Public Affairs Florida State University	Tallahassee, Florida 32306
Jack Merriam	Staff Director House Natural Resources Committee 214 House Office Building	Tallahassee, Florida 32301
Ray Moreau	DER Resource Recovery Program 2600 Blairstone Rd.	Tallahassee, Florida 32301
Betsy Robertson	Tallahassee Democrat 277 N. Magnolia	Tallahassee, Florida 32301
Frank Ryll	Florida Chamber of Commerce 136 S. Bronough	Tallahassee, Florida 32301

<u>Name</u>	<u>Company</u>	<u>Location</u>
Fred Shoaff	Inland Chemical Corp. 2007 Casey Key	Nokomis, Florida 33555
Christopher M. Teaf	Institute of Science and Public Affairs Florida State University	Tallahassee, Florida 32306
Tony Tripi	S.E. Resource Recovery Commission P.O. Box 1268	Orange Park, Florida 32073
Jake Varn	Secretary DER 2600 Blairstone Rd.	Tallahassee, Florida 32301

APPENDIX C: COVER LETTER AND QUESTIONNAIRE
TO FLORIDA MANUFACTURERS

January 29, 1981

XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXX

Dear XXXXXXXXXXXXXXX:

The Florida Chamber of Commerce in cooperation with the Institute of Science and Public Affairs of Florida State University is conducting a study to determine the feasibility of establishing a waste exchange in the state of Florida. The purpose of this mailing is to determine the interest in such an exchange program by seeking responses from industry to a brief but very important questionnaire.

The logic for establishing a waste exchange program lies in the assumption that a waste generated by one company may be a useful material to another company. When this exchange is possible, a costly disposal problem may be avoided.

The basic element of an information waste exchange is a central listing service. This service periodically publishes a list of waste materials available from and desired by listing industries. Responses from firms to a listing are forwarded by the listing service to the firm submitting the listing. Firms are coded to maintain confidentiality. Further negotiations are then at the discretion of the firms involved. Considering the recent hazardous waste legislation and the cost of compliance with that legislation, this waste exchange concept as proposed by the Chamber of Commerce may aid Florida industry in meeting these new regulations.

A number of exchanges are currently in operation throughout the United States and in Europe. They are normally operated by non-governmental agencies such as a chamber of commerce. The cost to operate the exchange is small with listings costing in the neighborhood of \$10.

We would appreciate your response to the enclosed questionnaire concerning your company's attitude towards a waste exchange for Florida industry. This will assist us in determining the feasibility of initiating such a service. Your response, of course, implies no commitment on your company's behalf should a waste exchange program be established.

In order to have your preferences included in the final results, we need your response no later than February 20, 1981.

Thank you for your participation and cooperation in this important study.

Sincerely,

Frank M. Ryll, Jr.
Staff Vice-president

FLORIDA WASTE EXCHANGE FEASIBILITY STUDY

General Instructions: The information provided through this survey of Florida industry will be used to (1) assess the desire of Florida's industry to have a waste exchange, (2) get an idea how industry feels the service should operate, and (3) gauge the type of listings that might occur.

Remember your responses are anonymous and will be combined with those of over 500 other firms participating in this survey.

	Definitely Yes	Definitely No	Don't Know
1. My company would participate by listing with the waste exchange.	___	___	___
2. My company would participate by inquiring about waste through the waste exchange.	___	___	___
3. I feel that the waste exchange concept is a good idea for Florida industry to support.	___	___	___
4. Who do you feel should sponsor the Florida Industrial Waste Exchange? <u>Private Sector:</u> Trade Assn. ___ Chamber of Commerce ___ Other ___ <u>Public Sector:</u> Govt. Agcy. ___ <u>Comment:</u> _____			
5. Please indicate the types of wastes your company might <u>request</u> through the waste exchange (check appropriate categories). solvents ___ acids ___ alkalis ___ catalysts ___ waste oils ___ heavy metal sludges ___ other (please describe): _____			
6. Please indicate the types of wastes your company might <u>list</u> through the waste exchange (check appropriate categories). solvents ___ acids ___ alkalis ___ catalysts ___ waste oils ___ heavy metal sludges ___ other (please describe): _____			
7. Are you currently participating in any type of waste transfer either intercompany or intracompany? ___ yes ___ no If yes, could you please describe. _____ _____			
8. What do you feel are the major concerns your firm would have in making a decision to participate in a Florida Industrial Waste Exchange? _____ _____			

THANK YOU FOR YOUR COOPERATION AND PARTICIPATION
IN THIS IMPORTANT SURVEY.

PLEASE RETURN THE QUESTIONNAIRE IN THE ENCLOSED, PRE-ADDRESSED,
POSTAGE-PAID ENVELOPE AND MAIL PRIOR TO FEBRUARY 20, 1981.

APPENDIX D: COVER LETTER AND QUESTIONNAIRE
TO FLORIDA MATERIAL RECLAIMERS

January 29, 1981

XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXX

Dear XXXXXXXXXXXXXXXX:

The Florida Chamber of Commerce in cooperation with the Institute of Science and Public Affairs of Florida State University is conducting a study to determine the feasibility of establishing a waste exchange in the state of Florida. The purpose of this mailing is to determine the state of reclamation operations that exists in Florida.

The logic for establishing a waste exchange program lies in the assumption that a waste generated by one company may be a useful material to another company. As a reprocessor your firm is already participating in the reclamation of wastes.

The basic element of an information waste exchange is a central listing service. This service periodically publishes a list of waste materials available from and desired by listing industries. Responses from firms to a listing are forwarded by the listing service to the firm submitting the listing. Firms are coded to maintain confidentiality. Further negotiations are then at the discretion of the firms involved. Considering the recent hazardous waste legislation and the cost of compliance with that legislation, this waste exchange concept as proposed by the Chamber of Commerce may aid Florida industry in meeting these new regulations.

The enclosed questionnaire and the information provided are to assist us in determining the extent, the type and the capacity of existing operations for reprocessing waste in Florida.

Of particular importance is the fact that a waste exchange service would assist you in identifying suppliers as well as buyers for your business.

Please return the enclosed questionnaire before February 20, 1981 so that we may meet our study deadline.

Thank you for your cooperation and participation in this most important study.

Sincerely,

Frank M. Ryll, Jr.
Staff Vice-president

FLORIDA MATERIAL RECLAIMER SURVEY

General Instructions: The information provided through this survey will be used to determine: (1) the extent of current waste reclamation in Florida, (2) the ability of existing Florida reclaimers to accommodate an increase in volume in the short run, (3) the types of waste acquired, and (4) the types of customers purchasing reprocessed wastes.

Remember your responses are completely anonymous and will be combined with those of other firms participating in the study to get a broad view of current waste reclamation operations in Florida.

1. Please indicate the type of companies that supply your reclamation facility with wastes products.

manufacturers _____	gasoline stations _____
waste collectors _____	private individuals _____
other (please describe): _____	

2. Please indicate the type of arrangement you have with your primary supplier (check one from column A and one from column B).

<u>A</u>	<u>B</u>
long term _____	sporadic _____
short term _____	continuous _____

3. Please indicate your method of payment for these wastes.

no charge _____	transportation costs only _____
negotiated charge _____	

4. What type of wastes do you currently process?

waste oils _____	waste acids _____	waste solvents _____
waste alkalis _____	other (describe): _____	

5. What end product(s) do you currently produce?

oils _____	acids _____	chemicals: organic _____
solvents _____	catalysts _____	inorganic _____
sludges _____	other (describe): _____	

6. What is the approximate monthly quantity of waste currently processed by your company? _____ gals./mo.

7. What is the maximum monthly reprocessing capacity for your company?
 _____ gals./mo. (or _____ gals./yr.)

8. What type of companies purchase the end product from your company?
 final users (i.e., consumers) _____
 intermediary users (i.e., manufacturers) _____
 Please explain: _____

9. At present, how many production employees are there in your company? _____ employees

10. When does your company assume legal (by law) liability for waste materials received?
 At time of payment _____
 At time of receipt of material _____
 After waste is on premises _____
 Other (please explain): _____

THANK YOU FOR YOUR COOPERATION AND PARTICIPATION
IN THIS IMPORTANT SURVEY.

PLEASE RETURN THE QUESTIONNAIRE IN THE ENCLOSED, PRE-ADDRESSED,
POSTAGE-PAID ENVELOPE AND MAIL PRIOR TO FEBRUARY 20, 1981.

APPENDIX E: WASTE EXCHANGE WORKSHOP
PARTICIPANTS SURVEY

Name _____

Address _____

Company Name _____

Major Products _____

Phone No. _____

WASTE EXCHANGE WORKSHOP PARTICIPANTS SURVEY

This is a preliminary survey to determine the extent and potential of exchanging and processing hazardous waste in the state of Florida. We will greatly appreciate your cooperation in completing this survey. All responses will be absolutely confidential, and will be used for purposes of the study.

- I.
 1. Do you currently exchange, sell, or give any portion of your hazardous waste output to another firm for reprocessing or use in the production of a final product?
 2. If so, what quantity (annual tons)?

What type of waste?

3. To whom do you exchange, sell, or give this waste?
 4. How is this waste transported and in what kind of container?
 5. For what purpose is the waste then used, if you know?
 6. What is the estimated annual operating cost of this procedure to your company?
 7. Is the demand for your waste product a steady one? Do you perceive it growing in the future?

- II.
 1. Do you currently buy, exchange, or receive hazardous waste output from other firms to use in production processes or for recycling?
 2. If so, what type of waste do you accept and how much (annual tons)?

3. How is this waste transported and in what kind of containers?
 4. How do you use this waste? What is your final product?
 5. How much does this operation annually cost your firm?
 6. Is the supply of waste a steady one? Do you perceive it growing in the future?
- III. Do you know of any other firms which are currently engaged in the exchange of hazardous waste in Florida? If so, would you give us their names and where they can be contacted?
- IV. 1. If you do not exchange, sell, or give any wastes, what is your current method of disposal?
2. What is the estimated annual operating cost of this procedure?
- V. Would your firm participate in a waste exchange program given the opportunity to do so?

THANK YOU FOR YOUR COOPERATION

