WASTE EXCHANGES

Background Information

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U.S. ENVIRONMENTAL PROTECTION AGENCY
1980

This report was prepared by Water Technology Corporation, Tonawanda, New York under contract no. 68-01-5797. Project Officer in the Office of Solid Waste was Rolf P. Hill.

An environmental protection publication (SW-887) in the solid waste management series.

ABSTRACT

This study and report provides background information on waste exchanges. Its function, in addition to the information provided, is for use at educational seminars on the subject.

The United States Environmental Protection Agency wishes to conduct educational seminars to stimulate waste information exchanges as one means of waste reduction. Studies relating to the reduction of the amount of solid wastes and un-salvageable waste materials (by recycle, reuse and salvage) are mandated under provisions of Section 8001(a) of the Resource Conservation and Recovery Act (RCRA).

The report describes all of the known waste exchanges currently in operation both in and outside the United States. All of the available information on materials that were transferred is reviewed and summarized.

The coding systems used by waste exchanges, and other aspects of confidentiality are discussed. Criteria for the effectiveness of exchanges and the factors affecting their operations are also evaluated.

Potential areas of the country thought suitable for seminars on waste exchanges, as well as a candidate list of seminar speakers have been provided in this background report.

ACKNOWLEDGEMENTS

This project was performed under the direction and guidance of EPA Project Officer, Mr. Rolf Hill.

The project was carried out by Mr. Edward Isenberg, President of Water Technology Corporation; assisted by Dr. J. B. Berkowitz, Messrs. Robert Terry and Andrew Somogyi of Arthur D. Little, Inc., Cambridge, Massachusetts. Ms. M. B. Maws, Executive Director of Center for Management Research Inc. also assisted in preparation of the seminar program.

Appreciation is also extended to the Directors of the Waste Exchange Programs and their staffs who have provided the basic information on the subject.

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1.0 INTRODUCTION

1.1 Objective

Under the provision of Section 8001(a) of the Resource Conservation and Recovery Act (RCRA) (P.L. 94-580), the United States Environmental Protection Agency (EPA) is mandated to conduct public education programs relating to the reduction of the amount of solid wastes and unsalvageable waste materials by recycle, reuse and salvage. Waste exchange offers an attractive method of waste reduction.

Significant quantities of waste materials are not being recycled, reused or salvaged. In many instances, their disposal has been haphazard, and for the most part, unregulated. Since all or significant proportions of some waste materials are toxic and hazardous, the environment is becoming contaminated by unregulated mishandling and improper disposal of wastes.

The exchange and reuse of waste materials, in addition to protecting the environment, result in important, often neglected, savings. These savings are in disposal costs; saving and conservation of raw materials, along with energy to process the raw materials; and the reuse of energy-rich waste materials such as waste oils and wood wastes.

Nearly a decade of waste exchange experience has demonstrated its usefulness. The United Kingdom Waste Material Exchange, during 5 years of operation, has enabled the successful continual exchange of about 156,000 tonnes of waste material per year, plus about 196,000 tonnes of waste as single transactions. The number of transactions totalled nearly 500, with an estimated "as-new" value of (8,146,000 £ U.K.) or over 18 million dollars (U.S.).

In like manner, after only two years of operation, the Canadian Waste Materials Exchange was instrumental in the annual transfer of 80,000 tons of wastes through 141 transactions. The value of these transferred wastes was estimated at $3.45 million (Can.).

A 1976 study by Arthur D. Little indicated that, in the United States, about 6 million metric tons of industrial wastes per year have potential value for exchange and reuse.

As a crude measure of dollar value, the 6 million metric tons of reusable waste materials is worth approximately $300 (U.S.) million dollars annually, using similar standards of value as the United Kingdom and Canadian experience.

The purpose of this report is the preparation, for presentation by EPA, of a waste exchange seminar program. This report consists of background information for a seminar program on waste exchanges.

1.2 Types of Waste Exchanges

Two distinct types of waste exchanges are in operation in the United States and in foreign countries. These are Waste Information and Waste Materials Exchanges. The major differences concern, first, what each transfers, and second, the role each plays in the basic transfer system. The European organizations, for the most part, sponsored by industry associations or governments, transfer only information. Properly speaking, these are "waste information exchanges", or clearinghouses, because they receive and refer only information about wastes. By contrast, a few companies in Europe and the United States actually receive and handle the scrap waste materials themselves; these organizations are therefore, "waste materials exchanges".

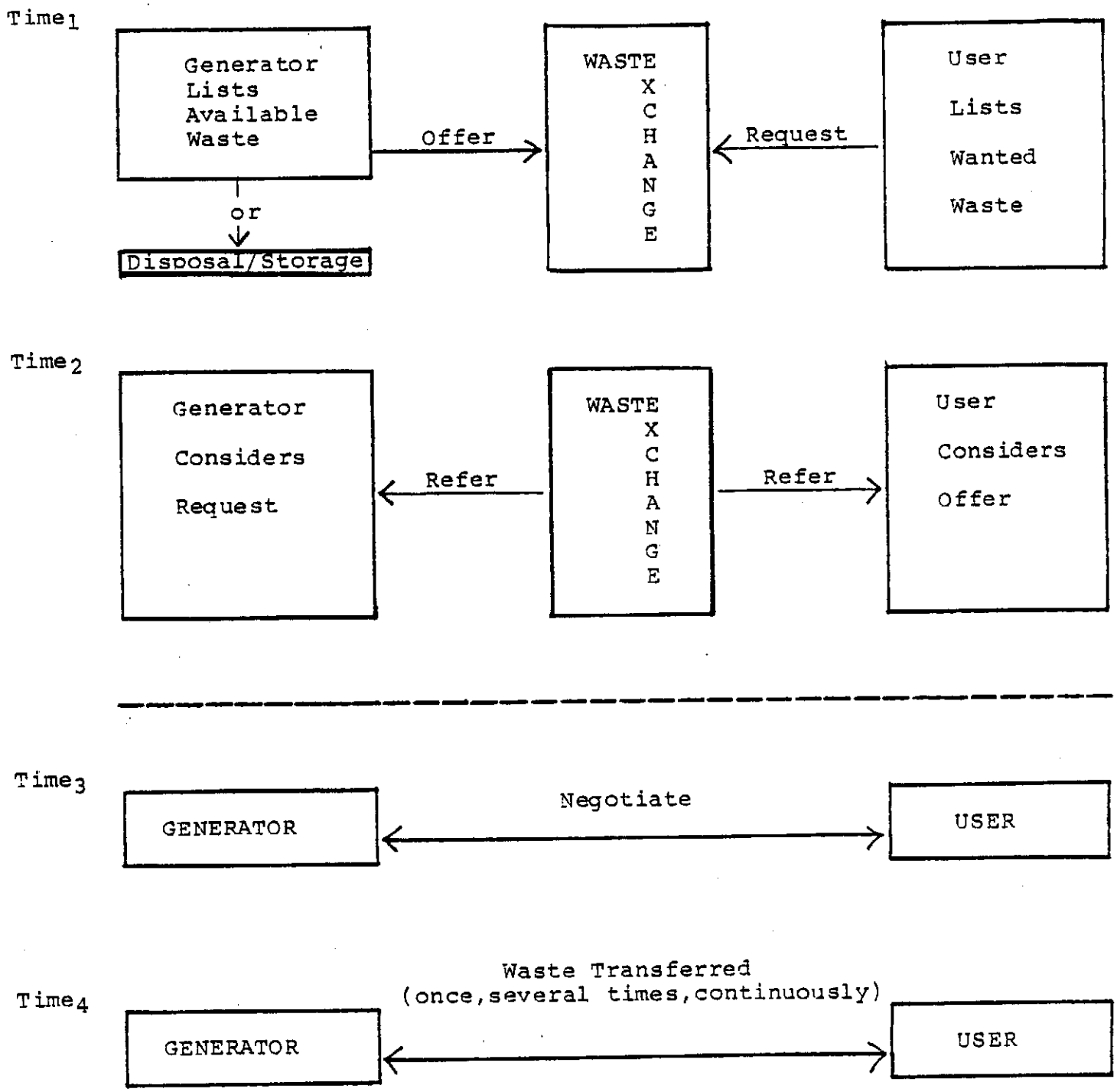
Examples of both types of exchanges are presented in this report, and details about their organization and other differences are described. At this point, it is necessary only to understand the different functions which they perform in the basic transfer system to facilitate transfers of scrap wastes.

The Information Exchange

The limited role of the information or clearinghouse is shown schematically in Figure 1.2-1. Action is initiated at $time_1$ when a Generator sends to the Clearinghouse its offer of a waste which it thinks may have scrap value, or a User sends its request for a needed material. (Note that Generator and User are probably turning to an Exchange only after exhausting other obvious options, both within their own organizations and among their informal network of professional contacts.) At $time_2$, Clearinghouse publishes Generator's offer and User's request among others in its regular publication which allows Generator and User to identify each other's need. Because listings are identified only by coded number, interested parties must ask Clearinghouse to forward request for information. As Clearinghouse refers Generator and User to each other, it completes its function and satisfies one of the essential requirements for a transfer, linking two potential trading partners.

FIGURE 1.2-1

TRANSFER ASSISTED BY INFORMATION CLEARINGHOUSE



From then on, below the dashed line of Figure 1.2-1, Clearinghouse plays no further role, thus reducing the basic transfer system to two actors. Generator and User negotiate directly, at $time_3$, to discover whether the many other requirements for a transfer; for example, purity requirements, price, transportation costs, and mutual confidence, are already satisfied or can be arranged. If so, at $time_4$, Generator will transfer its waste to User, again directly rather than via Clearinghouse. Most foreign and some U.S. clearinghouses try, for their own information, to learn by follow-up correspondence which referrals eventually lead to successful transfers; but this does not affect the results.

This limited and passive role of a clearinghouse produces an organization with distinct characteristics. For example, staffs are small, and costs are low. Many details appear in following sections, but the important characteristics to note at this point are that most foreign clearinghouses operate with subsidies and generally cannot pursue waste transfer opportunities actively. Although they may advertise their services, their staffs do not go into the marketplace seeking business, but must wait for generators to offer and users to request scrap wastes. With rare exceptions, the clearinghouses do not actively try to help satisfy the many other requirements for a transfer, but only that of linking trading partners.

Thus, the information clearinghouse plays only a passive role. It exists to perform only limited functions; to help generators advertise the existence of wastes with possible reuse value, to help users identify such scrap wastes, and to link the potential trading partners. All of the many other requirements for a transfer must be satisfied by others, sometimes by generators and users themselves, but sometimes aided by dealers and waste reprocessors.

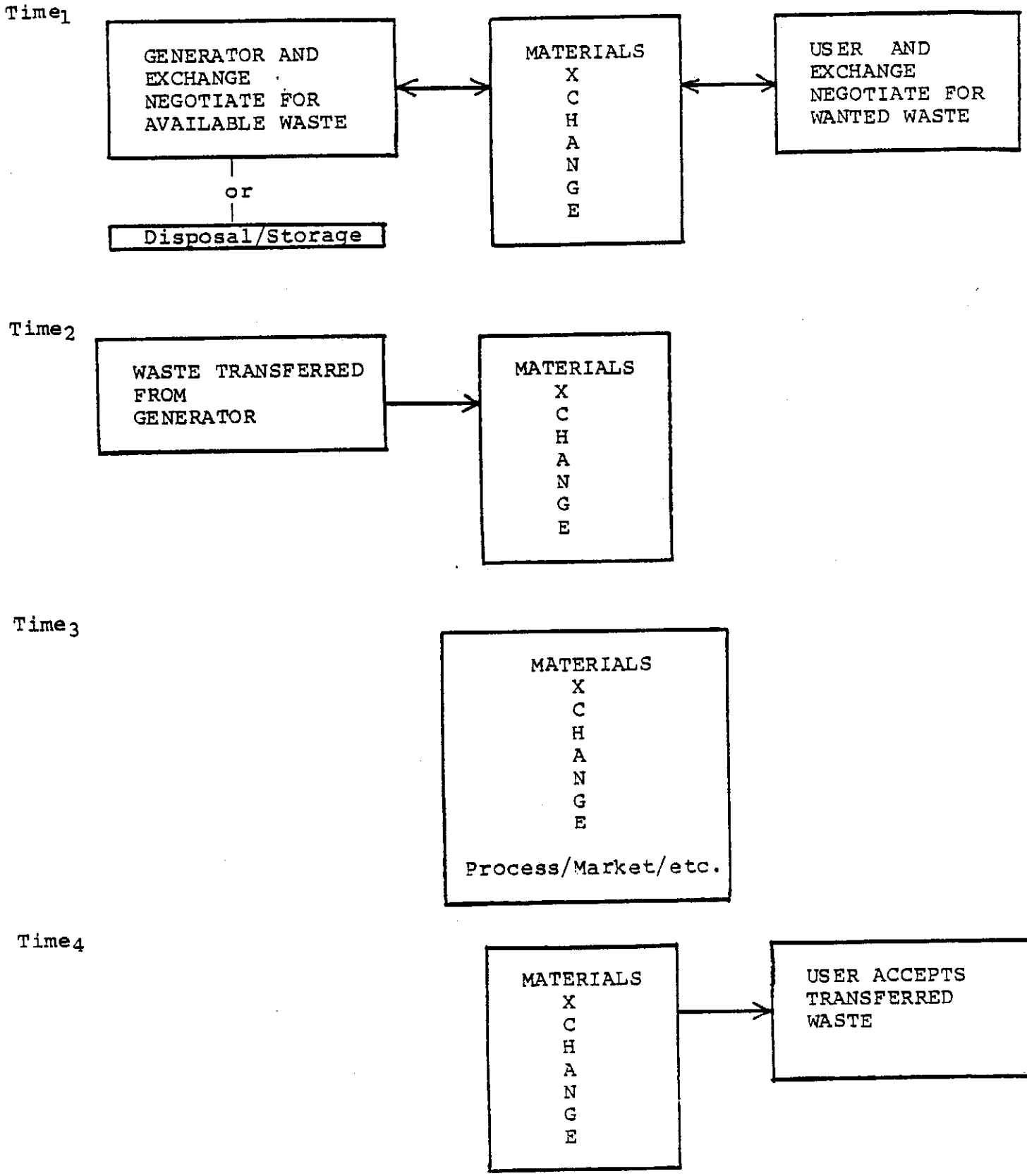
The Materials Exchange

By contrast, materials exchanges play an active role in arranging transfers. Many of the U.S. exchanges described in this report are profit-seeking firms. They can survive economically only by seeking transfer opportunities vigorously and completing them successfully.

The active role of the materials exchange is shown schematically in Figure 1.2-2. The four basic steps resemble those of Figure 1.2-1. But here, Exchange is interposed between the Generator and User. As in stock and commodity exchanges, the two trading partners do not

FIGURE 1.2-2

TRANSFER VIA MATERIALS EXCHANGE



know or deal with each other directly, but only via the middleman or broker. Therefore, the items transferred (the waste materials) pass physically, economically, and legally through the hands of the exchange, which earns its income from commissions charged on completed transactions.

It follows from the larger role played by the materials exchange that its organization and economics must be more complex than those of the information clearinghouse. For example, the User must know whether the waste materials has the chemical and physical properties compatible with his intended use. But the Generator often does not know enough detail about these properties, perhaps because several wastes from several chemical processes have been mixed; moreover, sufficient analysis can be done only with the potential use in mind. Thus, Exchange's laboratory must analyze the waste. In almost all cases, except for the unusual ideal case when the Generator's waste exactly fits User's need "as is", the Exchange's plant may process or treat the material. Sometimes the User wants assurance about the scrap waste's characteristics, sometimes from a legally binding certificate drawn up by Exchange's legal staff, and always backed by the Exchange's business reputation. Because form follows function, the staff and capital costs of the materials exchange are larger than those of the information clearinghouse. The organizational and economic differences between the two types of transfer service become apparent in more detail throughout this report.

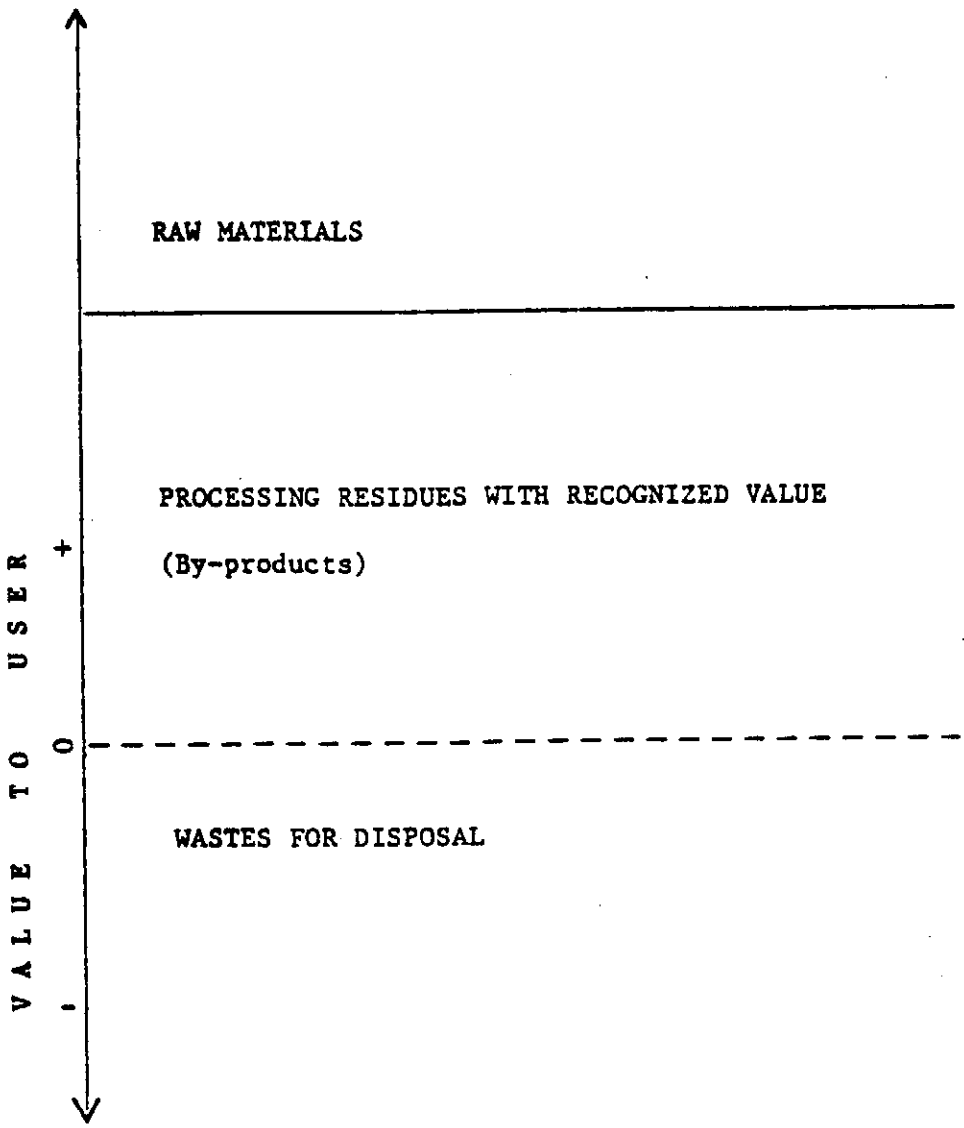
1.3 Types of Waste Materials

Since a waste exchange does not operate in a vacuum, but rather within a complex economic and technical environment, it is helpful to recognize the structure of the market for industrial and chemical waste materials. Figure 1.3-1 shows the total market in its basic form, as measured by value. Most valuable, and thus at the top of the structure, are raw or virgin materials; this category includes both raw materials from nature, for example, iron and bauxite, and unused manufactured materials, for example, plastics, which manufacturers need for their processes and view as primary materials or inputs. The solid line between the top and middle categories indicates that the distinctions between unused or primary materials and by-product residues are sharp and clear.

Processing residues, being generally less pure and thus less valuable, occupy the middle tier. Common examples

Figure 1.3-1

MATERIALS MARKET STRUCTURE



are solvents from pharmaceutical and paint processing, slag from steel making, and rejected lead plates from lead acid batteries. All have recognized value in their chemical or physical properties as material inputs for some manufacturers. But their values are set, of course, by supplies of and demands for competing raw materials, and by disposal costs. When primary materials are plentiful and cheap, secondary materials may have little or no demand, and thus, little or no value in commerce. The boundary between by-products and wastes appears in Figure 1.3-1 as a broken line, because fluctuations in raw material prices can change these residues back and forth between positive and negative values.

The bottom layer includes materials viewed as having no value. In the eyes of their manufacturers, they are wastes for disposal.

This three-tier market structure is, of course, a simplified and static first representation of relationships which are in fact both complex and changeable. Closer examination is needed, for our purposes, of materials in the "wastes for disposal" category.

The term "waste" requires clarification because it has two related but distinct meanings. First, it can refer to damaged, defective, or residual material resulting from an industrial process; this is the sense in which we use it, referring primarily to materials other than established by-products and secondary materials. Second, in everyday usage, it can refer to any kind of refuse - material with no value, to be thrown away.

Often, what is trash from one viewpoint is clearly useful from another. For example, the process of manufacturing textiles produces irregular trimmings and scraps of materials which cannot be reprocessed for sale as finished cloth, but which are extremely useful for rag content papers and wiping cloths. Another common example, from the iron and steel industry, consists of the shavings, scraps of metal, and off-specification parts left over after processing. Most of these unfinished and finished leftovers find their way to secondary uses - within the same plant, or to other plants within the same company, or to other companies via the established scrap metals market.

Materials often change their position in the market structure. Many residues in the chemical industry have evolved from trash to by-products, as uses for these materials were identified and gained acceptance. Some non-industrial examples come from recent environmental history: for decades

the paper, bottles, cans, and garbage making up household and municipal refuse were dumped into landfills. Now the growing scarcity of dump sites, new bans against burning, and new needs for cheap domestic fuel, have increased the economic attractiveness of recycling and reusing garbage as fuel.

Figure 1.3-2 distinguishes four residues of differing value and suggests how their values can change through time. Case 1 represents a residue which has recognized value as soon as it appears, at $time_1$, perhaps because engineers designed the process so that its residue would be resaleable as a by-product, and retains a steady value through $time_3$.

Case 2, however, is a scrap chemical competing with other materials, perhaps virgin materials; its value, therefore, fluctuates around the break-even line as prices of competing materials rise and fall. Thus, Case 2, for example paper, copper, or certain solvents, can sometimes be transferred at profit, but sometimes only at a loss.

Case 3 has latent value as a scrap chemical, but initially, at $time_1$, it is viewed as trash. At $time_2$, when a use is found or when the relevant economics change, its value increases and remains positive ($time_3$).

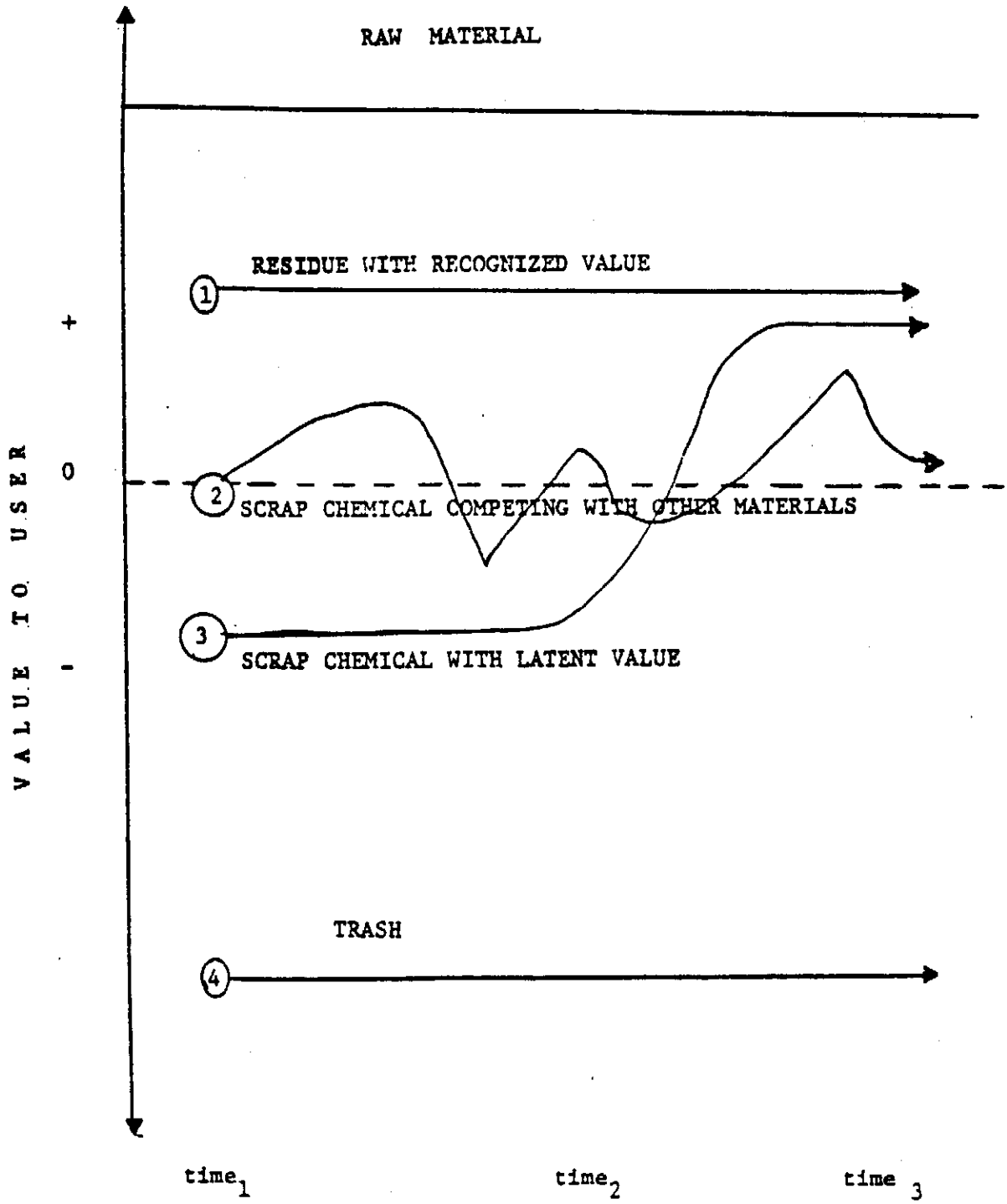
Case 4 is a material which can be transferred only at loss and has no possible reuse. It remains trash, requiring disposal.

Most attractive to the waste exchange, clearly, is Case 3. However, the transfer agent will not always participate in such transformations of materials from perceived trash into residues with recognized value; in fact, it may not participate even frequently. Chemical engineers designing new industrial processes routinely examine their residues to seek further uses as by-products. In recent years, stricter waste disposal regulations and rising prices of raw materials have made it more economically attractive for companies to research further uses for the valuable components of their waste. Large companies with many processes and skilled chemical engineers are likely to find those recycling opportunities which exist, if economical and/or if recycling solves disposal problems.

However, even large national companies cannot solve all waste problems, and technical discoveries of new ways to find value in scrap do not occur in all companies at once. Also, medium-sized or small companies typically lack the time and skills to find reuses for their wastes.

FIGURE 1.3-2

TYPES OF CHANGES IN WASTE VALUE



Although engineers in different companies do meet at professional societies to compare problems and share solutions, these informal personal networks are, by nature, limited in scope.

Therefore, needs still exist which waste exchanges can satisfy. The transfer service can seek to identify uses for wastes previously viewed as trash. It works the shifting and changing boundary between trash and by-products. If successful, it will gradually identify what can be described as a "scrap chemicals market", a distinct category of materials more valuable than trash but less so than established by-products. It may also move some scrap wastes up into the category of by-products.

To be economically and technically useful, therefore, a transfer service must recognize the realistic limits of its business or functions. On one hand, it learns by experience that it cannot afford to accept trash wastes. On the other, it would serve no unique environmental or public purpose by trying to deal in regular flows of residues with recognized value; these are established by-products, and the organization would not be a "waste exchange", but instead one of many competing commercial, industrial, or chemical brokerages. This suggests that a waste exchange can offer useful activities in only a narrow sector of the total materials market - the scrap sector.

Moreover, its technical and economic base will keep shifting over time. Waste exchange organizations (or "clearinghouses") frequently receive offers of continuous or regular waste streams, but once the initial match has been made between generator and user, the clearinghouse's usefulness ceases. Thus, one long-run objective of waste exchanges is to find uses for episodic or irregular scrap wastes. Technically, therefore, the boundaries of a transfer agent's business are set partly by the time required for a new use of a scrap waste to become recognized and partly by the size and sophistication of its customers. Economically, its boundaries keep shifting as the price of scrap materials becomes more or less attractive relative to those of competing raw materials.

1.4 Factors Affecting the Basic Transfer System

A waste exchange and the basic transfer system does not operate independently, but is affected by several factors.

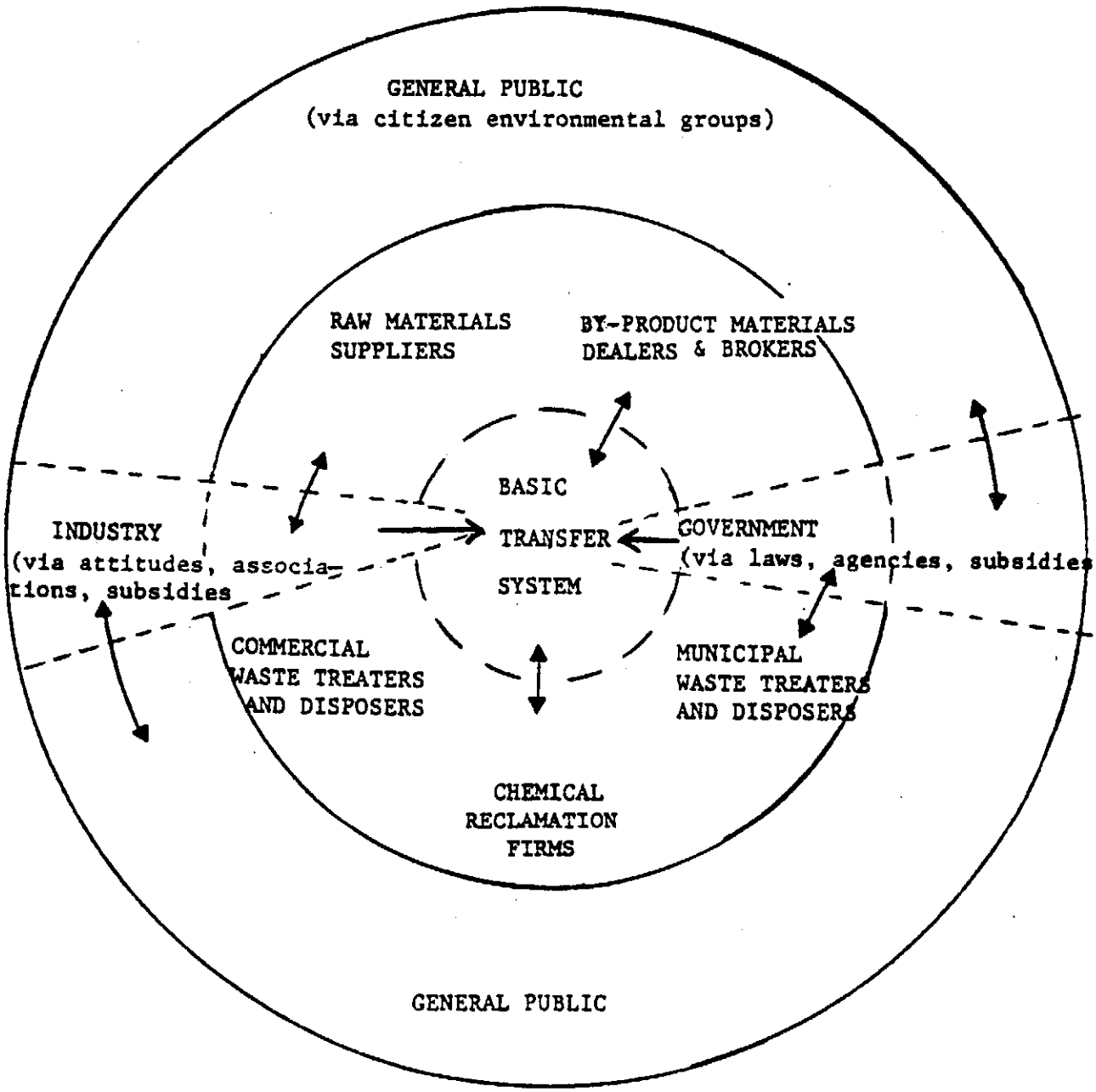
The various groups and their influences are suggested schematically by Figure 1.4-1. The general public belongs in the outer ring because, although interested in reducing wastes via transfer for reuse, it exercises its influence only indirectly, through industry associations and governments. Waste reuse can affect the public in several ways. It can encourage a shift in employment from virgin material suppliers to waste processors and transfer agents. It can extend the lives of disposal sites, and thus delay the time when more costly options would have to be adopted. It can delay public emotion involved in starting new disposal sites. It can displace risk from that associated with disposal at one site to that associated with the transport of the residue to another site for reuse. And finally, the long-term risks of disposal are minimized when wastes are recycled.

The middle ring contains groups which can influence the transfer system both indirectly, via government and industry associations, and directly through economic competition. Raw materials dealers transmit market prices and set the standards of competition among all materials. Their business may be reduced somewhat by the transfer agent's activities promoting reuse of waste materials, and they may lobby for such advantages as preferential freight rates. By-product materials dealers can use clearinghouse listing services to broaden their abilities to monitor, identify, buy, and sell scrap wastes with recognized value; the service may help them identify new uses for wastes hitherto thought to have no value. Alternatively, these dealers may view the transfer agent as an unwelcome competitor. However, a successful organization might possibly attract these dealers into offering transfer services themselves. Commercial waste treaters and disposers, which may also act as scrap materials dealers, can accept those wastes not transferred; they may act as competitors or as clients of a transfer organization. Some municipal disposers may do the same.

Figure 1.4-1 suggests how both industry and government belong to all three categories of parties affecting the transfer system. In the outside ring, industry's and the public's health are interdependent; in the middle ring, trade associations representing those companies not involved in treating, handling or disposing of various materials; and in the inner circle, industry, the main generator of wastes; (some hazardous wastes are also generated by government facilities, such as military bases and municipal hospitals). Industry can also be a subsidizer, through its trade associations, of the transfer service. Similarly, government in the outside ring represents and is supported

FIGURE 1.4-1

PARTICIPANTS IN THE
BASIC TRANSFER SYSTEM



by the tax-paying public. In the middle ring, it can regulate how companies handling various materials behave. In the inner ring, it can regulate how generators dispose of their waste, and influence transportation costs via freight rates. The government may also become a direct subsidizer of the transfer organization. In reality, any transfer system includes all of these participants and all of these effects. It is the sum of these effects which have a bearing on the basic waste transfer system.

The parties most directly involved in transferring wastes are:

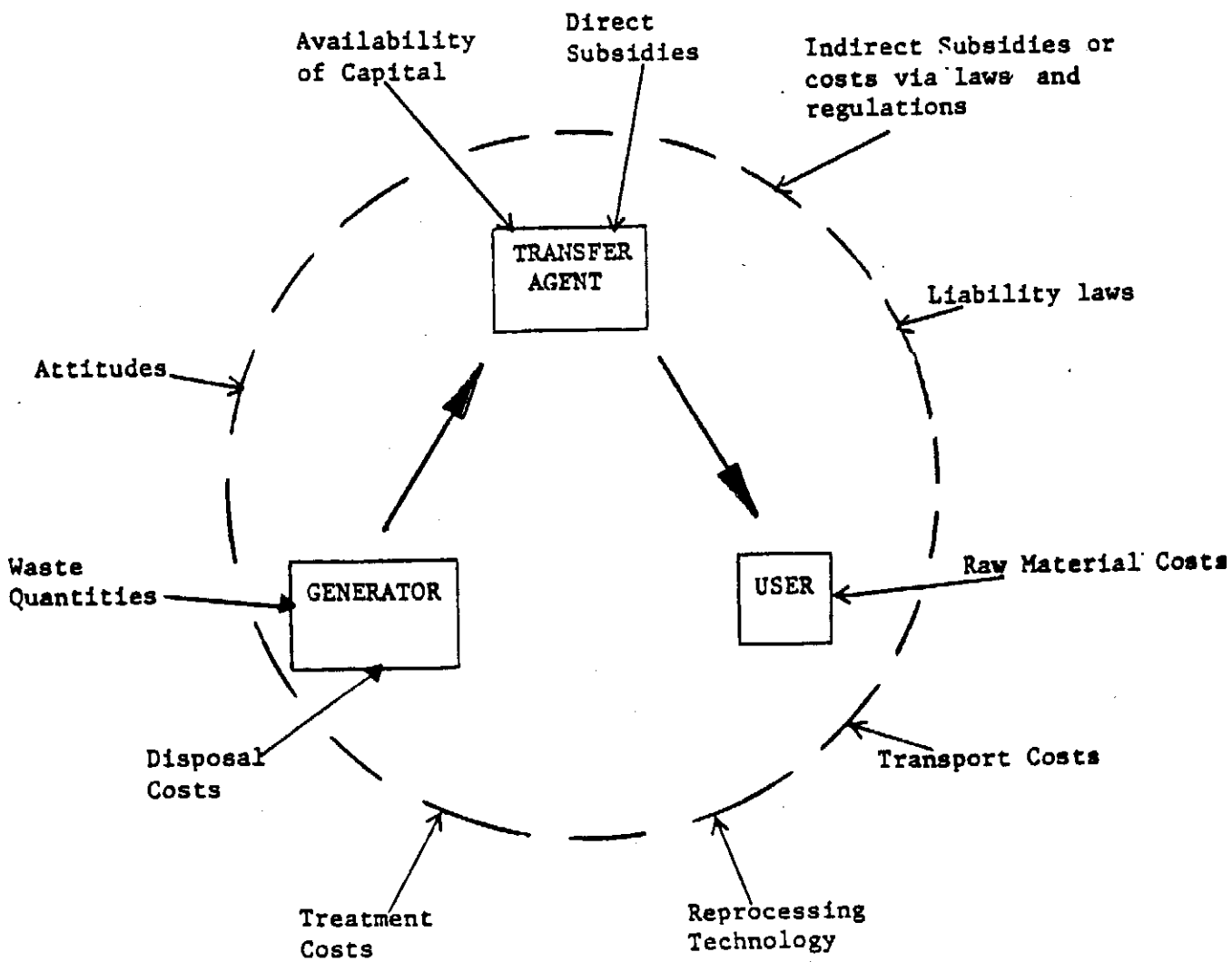
- The waste generator - which produces waste material as a natural part of its business, and must find some acceptable way of disposing of that waste;
- The waste user - which can utilize the raw or processed waste in its business, thereby reducing its need for raw materials from other sources; and
- The waste exchange - which links the generator and received in some way to facilitate reuse of the waste material.

The possibility of a fourth party is shown in Figure 1.4-2 by an arrow leading from "direct subsidies". Waste exchanges may operate on a break-even basis or at a profit, as a few companies are doing; but it also may be subsidized, as most foreign exchanges are. Although not a direct participant in negotiating waste transfers, the subsidizer is clearly interested in them and can influence the economic rules of transfers by its policies and money.

Generator, User, and Transfer Agent must be considered as a group, with attention to the effects on each of the transfer relationship. Although Figure 1.4-2 shows these three parties loosely arranged within the basic system, it does not suggest exactly how they relate to each other, because relationships can vary with different types of transfer service and different economic considerations governing transfers.

FIGURE 1.4-2

BASIC TRANSFER SYSTEM AND ITS EXTERNAL INFLUENCES



2.0 SUMMARY AND DISCUSSION

2.1 Foreign & Domestic History and Experience

Table 2.1-1 summarizes information on U.S. waste exchanges. Table 2.1-2 summarizes characteristics of foreign exchanges. The most striking characteristic is the wide diversity in the structures, types of materials, sectors of the economy served, and sources of financial support. The foreign exchanges are all information exchanges. In contrast, the United States exchanges range from strictly information exchanges (15) through exchanges which function as brokers (3), to exchanges which actually obtain possession of materials for possible reprocessing before resale (2). At least two of the American exchanges provide exchange services as part of overall waste management consultant services.

As far as can be ascertained, only one of the foreign exchanges is for-profit. At least seven of the U.S. exchanges are for-profit. All of the for-profit exchanges are either material exchanges, broker-like operations, or ancillary to waste consulting services. It is also observed that the for-profit operations deal principally with surplus inventories, off-spec products, and used or obsolete equipment rather than strictly waste products. An exception to this trend is the Ohio Resource Exchange (ORE) which emphasizes hazardous wastes. It is important, however, to note the increased interest of for-profit exchange companies in waste materials not previously dealt with. The technical knowledge and experience of these firms may offer increased opportunity for continued and growing success of waste exchanges.

Both the United States and foreign exchanges serve areas ranging from metropolitan to international. The opportunity for international cooperation among adjoining countries is, of course, promoted by the distinct geography of the Western European continent. One of the United States exchanges in close proximity to Canada, Information Center for Waste Exchange, Seattle, Washington, may begin to include Western Canada in its service area.

The majority of United States and foreign waste exchanges still retain confidentiality, but as discussed in section 2.2, there is a decreasing emphasis on this. Two of the U.S. exchanges offer options with or without confidentiality. RCRA and similar state laws will further decrease the emphasis on confidentiality.

TABLE 2.1-1

CHARACTERISTICS OF AMERICAN WASTE EXCHANGES

United States Exchange	Type of Exchange	Service Area	Material Categories Listed	Most Successful Transfers	Profit	Listing Fee	Subscription Fee	Gov't. Funding	Confidential
MIWE (Midwest)	INFORMATION	NATIONAL			NO	$10	NO	YES	YES & NO
IIWIE (Iowa)	INFORMATION	MIXED(1)	Oils, wood products, metals, plastics, paper " , chemicals	--	NO	NO	NO	YES	YES
ACE (Amer. Chem.)	BROKER	NATIONAL	Surplus chemicals (inorg. + org.) acids alk.	virgin chemicals	YES	NO	YES(2)	NO	YES(3)
ERC (Enkarn)	BROKER	NATIONAL	Films, foils, laminates, equipment	same as listed	YES	NO(4)	NO(4)	NO	YES
ECHO (Ill.)	Broker CONSULTING	INT'NATL.	--	--	YES	--	--	NO	--
GWE (Georgia)	INFORMATION	MIXED(1)	--	--	NO	$25/ITEM	$25(6)	NO(5)	YES
ICWE (WETA-Wash.)	INFORMATION	INTERSTATE + CANADA(8)	All materials except nuclear	--	NO	NO	NO(7)	NO	YES
MACI (Minn.)	INFORMATION	STATE	All types of hazardous & non-hazardous materials	--	NO	$30/3 mos. $60/12 mos.	NO(9)	NO	
TE (The Exchange)	Broker CONSULTING	INT'NATL.	Hazardous & non-hazardous waste secondary mat'ls., excess inv.	used equip. metals, electron.	YES	COMMISSIONS & CONSULTING FEES		NO	YES
OIWIE (Oregon)	INFORMATION	STATE	(Fig. 4.10-1)(see Fig. 4.10-3)		NO	NO	NO	NO(10)	YES
TWS(11) (Tennessee)	INFORMATION	STATE							
WASTE (World)	INFORMATION	NATIONAL			NO	NO(13)	$150/YR.	NO	--
ZWSI (Zero)	BROKER	REGIONAL(14)	Surplus chemicals and other materials reprocessed	same as listed	YES	NO REGULAR LISTINGS		NO	--
CWE (California)	INFORMATION	REGIONAL(14)	--	--	NO	NO	NO	YES	--
WMC (Ind.)	INFORMATION	NATIONAL	--	--	NO	$25/ITEM/6 mos.	NO	NO	YES
IWIE (Columbus)	INFORMATION	NATIONAL	--	--	NO	$5/ITEM	NO	NO	YES
IWIE (Newark)	INFORMATION	STATE(16)	see description	--		$5/ITEM	$5/YR.	NO	YES
MCWE (Mecklenburg)	INFORMATION	REGIONAL	All types of wastes from all industries		NO	NO	NO	YES	YES
UCC (Union Carbide)	BROKER MATERIAL	NATIONAL(19)	Damaged, off spec. or obsolete prod. slime, sludge residues, catalysts, metallic waste flue dust		YES	NOT APPLICABLE(18)		NO	NO
HCC (Houston)	INFORMATION	REGIONAL(20)	See Fig. 4.20-1		NO	$10/ITEM	$15/YR.	NO	YES
AARRI (Amer. All.)	INFORMATION	STATE	See Fig. 4.21-1		-	$6/ITEM(21)	YES(21)	NO	Yes
ORE (Ohio)	BROKER	INT'NATL.(22)	Emphasis on hazardous waste		YES	NO(23)	NO	NO	YES

See following page for Notes.

NOTES FOR TABLE 2.1-1

(1) Available listings only in state-wanted listings from out-of-state.
(2) A $250 charge to become member with variable commissions upon transfer.
(3) Anonymity is kept but not considered important.
(4) Ten percent of purchase price charged for match-ups.
(5) Originally had government funding.
(6) Charged to non-listers.
(7) Free to western Environmental Trade Association of Washington members only.
(8) Serves State of Washington primarily with some activity in Oregon, Idaho and Western Canada. Plans to link with other exchanges.
(9) Service included as part of membership in Minnesota Association of Commerce and Industry.
(10) Originally received state funds but now supported by Western Environmental Trade Association.
(11) Exchange is in process of being transferred from government to non-government agency.
(12) Fee is for commercial Associate Members, not for government, academic, or trade associations.
(13) Fees are charged for computer search of various wastes files.
(14) San Francisco-Oakland Bay area.
(15) Columbus, Ohio area.
(16) Some listings from New York, Pennsylvania.
(17) Fourteen counties in North Carolina.
(18) Internal distribution of lists within Union Carbide Corp.
(19) Service is for all Union Carbide companies.
(20) Houston, Texas area.
(21) AARRI members are not charged for listings but membership costs vary from $50 to $2,000/year.
(22) United States and Canada.
(23) Fee paid on completed transfers.

TABLE 2.1-2

CHARACTERISTICS OF EUROPEAN WASTE EXCHANGES

Foreign Exchange	Type of Exchange	Service Area	Material Categories Listed	Most Successful Transfers	Profit	Listing Fee	Subscription Fee	Gov't. Funding	Confidential
CWME (Canada)	INFORMATION	NATIONAL	1a,b,2a,b,c,3a,b,4,5,6a,b, 7,8a,b,c,9,17	2a,b,6b,7	NO	NO	$20/YR.	YES	--
UKWME (U.K.)	"	NATIONAL	1a,b,2a,c,3,4,5,6a,7,8a,b, c,9,11,12	1a,b,3,4,7,8c,10	NO	NO	$45/YR.	YES(1)	YES
NIMRA (U.K.)	"	NATIONAL	17(2)	17(2)	NO	NO	$32/YR.	NO(3)	NO
SWE (Switzerland)	"	NATIONAL	--	--	NO	--	--	NO	YES
CIAE (Austria)	"	NATIONAL	--	--	NO	--	--	NO	YES
FWE (Austria)	"	NATIONAL	--	--	--	--	--	--	NO
NWE (Sweden)	"	INT'NATL(4)	1a,b,3a,b,5,6a,b,7,8a,b 9,13	1a,b,5,8a,9	NO	NO	ANNUAL DUES	NO(5)	YES
TWME (Italy)	"	NATIONAL	1a,b,6a,7,8a,b,c,9,14	--	NO	--	--	NO	YES
ANIC (Italy)	"	NATIONAL	17(6)	--	NO	NO	YES(7)	NO	--
WEI (Israel)	"	NATIONAL	--	--	NO	NO	NO	YES	YES
MWDA (Australia)	"	METROPOLITAN (18)	1b,3a,4,5,7,8a,9,11,12, 13,15	1b,3a,4,6c,14	NO	$5/ITEM	NO	YES	YES
IWES (Australia)	"	REGIONAL(9)	1a,b,3,4,5,7,8a,9,13,16	1b,4,7,9,14	NO	NO	NO	YES	YES
ANRED (France)	"	NATIONAL	--	--	NO	--	--	YES	--
VCI (Germany)	"	INT'NATL.(10)	--	--	--	--	--	NO	YES
DIHT (Germany)	"	NATIONAL	--	--	NO	NO	YES(11)	NO	--
VNCI (Netherlands)	"	NATIONAL	--	--	NO	--	--	NO	--
FICB (Belgium)	"	NATIONAL	--	--	NO	$25(12)	YES(12)	NO	YES
OBEA (Belgium)	"	NATIONAL	1a,b,5,6a,7,8a,b,c, 9,11,12,14	1a,b,5,6a,7 8a,b,c,9	NO	NO	NO	YES(13)	YES

Note: See following pages for Material's Key and Notes.

MATERIAL'S KEY FOR TABLE 2.1-2

1a	-	Organic Chemicals
1b	-	Solvents
2a	-	Oils
2b	-	Fats
2c	-	Waxes
3a	-	Acids
3b	-	Alkalis
4	-	Inorganic Chemicals
5	-	Metals
6a	-	Metal Containing Sludges
6b	-	Metal Containing Slags
7	-	Plastic
8a	-	Textile
8b	-	Leather
8c	-	Rubber
9	-	Wood & Paper Products
11	-	Catalysts
12	-	Food Processing Wastes
13	-	Minerals
14	-	Waste Oil
15	-	Glass
16	-	Used Containers
17	-	Used Plant & Equipment

NOTES FOR TABLE 2.1-2

(1) UKWME was supported by government and directed to achieve 70 percent of costs from revenue by January 1980. This was not achieved and UKWME has been discontinued.
(2) Used plant, reprocessed valves, old stores tanks, compressors, small amount of chemicals.
(3) Originally received government funding.
(4) Service area includes Denmark, Norway, Finland, Sweden.
(5) Received government funding for first 3 years.
(6) Chemical products, process equipment.
(7) Included as part of membership in National Association of Chemical Industries.
(8) Services New South Wales area.
(9) Services Victoria region.
(10) Service area includes Belgium, Netherlands, Norway, Switzerland, Italy.
(11) Included as part of membership fees in Chamber of Commerce.
(12) Cost of listing is included as part of Trade Association fee for members. Non-members pay $25 for listing.
(13) Government is providing financial support on a 2-year experimental basis.

A number of U.S. and foreign waste exchanges which were originally begun and funded by government agencies are now operated by private sponsors such as Chambers of Commerce or Trade Associations. This trend reflects the general distrust or possible conflict with the regulatory functions of government. The shift to non-government sponsorship and/or funding of waste exchanges is expected to increase their effectiveness and efficiency in the long run.

Tables 2.1-1 and 2.1-2 also summarize the major material listings categories listed on the American and foreign exchanges, and the principal types of transfers in so far as information was available. The types of materials listed most frequently on the American exchanges are similar to those listed on the European exchanges and includes the following categories:

- Organic Chemicals & Solvents
- Oils, Fats and Waxes
- Metal containing Sludges & Slags
- Textiles, Leather and Rubber
- Wood and Paper Products
- Spent Catalysts
- Acids
- Alkalis
- Inorganic Chemicals
- Metals
- Plastics

Materials listed to a lesser but significant extent include:

- Glass
- Food Processing Wastes
- Minerals
- Waste Containers
- Paints
- Salts

The specialized nature of the listings in some material and for-profit exchanges has been discussed previously. These listings are also indicated in Tables 2.1-1 and 2.1-2.

With the exception of specialized materials, available information indicates that the most successful transfers involve organic chemicals and solvents for other than Btu value. Transfer of plastic residues appears highly successful as those of wood and paper products. Other successful transfers involve acids and alkalis, inorganic chemicals, textiles, leather, rubber and spent catalysts. Waste oils, metals, and metal-containing residues (sludge) are also fairly well moved. As discussed in another section of this report, organic residues with high heating value (e.g. waste oils, paper, wood, food residues) are expected to be in greater demand in an energy-short and cost inflated future.

The scope of exchange operations in terms of numbers of listings and successful waste transfers, are summarized in a later section of this report in Tables 2.4-1 and 2.4-2.

2.2 Confidentiality Requirements

There have been three historical reasons for having the identity of waste material listers kept confidential or anonymous. These were:

A. Industry's desire for secrecy of trade and manufacturing processes. Competitors could learn much of a product or process by examining and analyzing its wastes.

B. Industry's desire to "keep" from regulatory agencies knowledge of wastes that are generated and their manner of disposal. This was particularly true for hazardous or potentially hazardous waste materials.

C. To shield the lister from unsolicited inquiries; the lister takes the initiative to contact the inquirers who have expressed an interest in the material listed.

In consequence, the early efforts of waste exchanges were devoted to maintaining the anonymity of listers by coding the waste materials. The importance of preserving confidentiality on the origin of waste materials continues to be a valid reason for current waste exchange operations, but only for a few selective items.

As continued experience on waste exchange operations was gained, it became apparent that confidentiality was not imperative and could, in fact, slow down and hinder transactions for waste transfer. Confidentiality is not important for most of the waste materials seen in waste exchange bulletins. These are most categories of items such as oils, fats and waxes, acids, alkalies, plastics, textiles, leather, rubber, wood and paper products; solvents, metals and a high percentage of organic and inorganic chemicals or metal containing sludges. These are ordinary "run of the mill" items that neither hold trade or manufacturing secrets nor offer potential hazards in their disposal. Hence, inquirers that are able to by-pass the exchange and who can approach the lister directly can save significant time for transactions.

Furthermore, requirements for utmost secrecy cannot be preserved by a waste exchange and its coding system. The geographical area of origin and general description of the waste may provide those with a knowledge of the industry or trade with identification of the waste originator.

Also, a determined competitor can find subterfuges and work through the exchange to learn the identity of and obtain samples of listed waste materials.

In view of the weaknesses inherent in the exchanges' operating procedures for confidentiality, some of the early waste exchanges such as NIMRA in the United Kingdom and the Austrian Federal Waste Exchange (FWE) never offered confidentiality as an original feature of their operation. In more recent years, we find confidential and non-confidential listing options as a new feature of the Midwest Industrial Waste Exchange. Most of the waste exchanges examined, however, except as noted, maintain confidentiality by coding each waste listing.

2.3 Coding Systems

Coding of waste listings was established to preserve the anonymity of the listers, and to facilitate data-handling. A coding system becomes just as important for management of data, as for confidentiality, for exchanges with large numbers of listings. Hence, Midwest Industrial Waste Exchange, for example, continues to code waste material listings where confidentiality is not important for the lister. Reasons for less emphasis on confidentiality were previously discussed in Section 2.2 of this report. Similarly, some of the European exchanges code waste listings even when the lister's name, address, and telephone number are included with the waste description. Consequently, an ideal coding system should provide confidentiality when desired and should be designed to minimize data-haldling efforts and problems. A code should also be simple, with no more than 5 or 6 categories of identification. A complex, lengthy coding system would discourage its use and effectiveness.

The code might classify a waste according to its source, type of material(s), or potential end uses. The sources are manifest and may include, but not be limited to, zip codes, origin, SIC code, process, and general or specific waste category. The code might also classify a waste according to its actual or potential end use.

The latter coding by end-use is a more difficult problem for the "coder", because not all end uses are known and considerable professional judgment must be used. Coding by end use may also limit a material user's imagination. Changing economic patterns also change end-use of materials. One must weigh advantages of stimulating thinking about potential use and disadvantages of providing too much guidance so that the user is inhibited from identifying new uses.

Some end use categories might be sewage treatment, solvent recovery, metal value reclamation, acid-alkali neutralization, land or soil reclamation, oil reclamation and energy content.

The various coding systems used by operating exchanges differ in some minor respects and share major similarities. All of the known codes distinguish among materials that are available for transfer and materials wanted.

Some of the codes distinguish or identify the geographical region of origin. The reason for this became obvious very early in the history of waste exchanges and code systems because of the extremely important role transportation costs have on waste transactions and transfers. At the present time, because of high energy and fuel costs, transportation looms even more significantly as a factor on the transfer of wastes. Nearly all of the exchanges identify in words the region of origin together with a description of the waste. Hence, including the region in the code is not as important for confidentiality as for data handling. The location of the material wanted or available is very important, and if not included in the code should be noted in the listing if at all possible.

Nearly all of the exchanges identify a waste material by a number in the code, which most often represents the chronological or numerical order in which it was listed. Some typical codes are diagramed in Figure 2.3-1.

None of the exchanges include the category or type of waste classification in their code. The United Kingdom Waste Exchange was one of the few that did include the waste classification, but then only in their internal or computer code system.

Similarly, the United Kingdom was the only exchange that included the Standard Industrial Calssification SIC number for the waste origin. But, again, only for the internal computerized system.

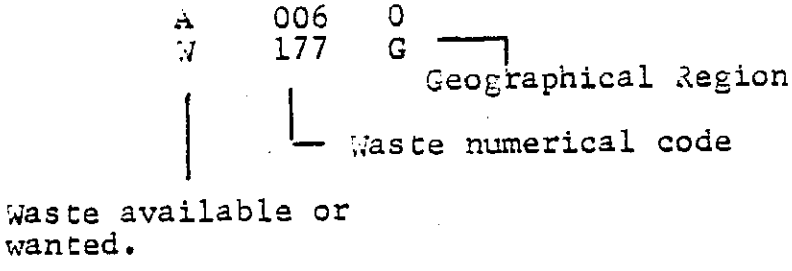
None of the exchanges attempted to include in their code systems actual or potential end use, zip codes, or process producing the waste. In all probability, the code would become too complicated and cumbersome if the aforementioned or other aspects were included in the code.

Two important trends in the development of waste exchanges have been noted, which will no doubt have an influence on coding systems. These are: 1) the amalgamation and coordination into regional, national and international waste exchanges; and 2) relaxation of requirements for confidentiality.

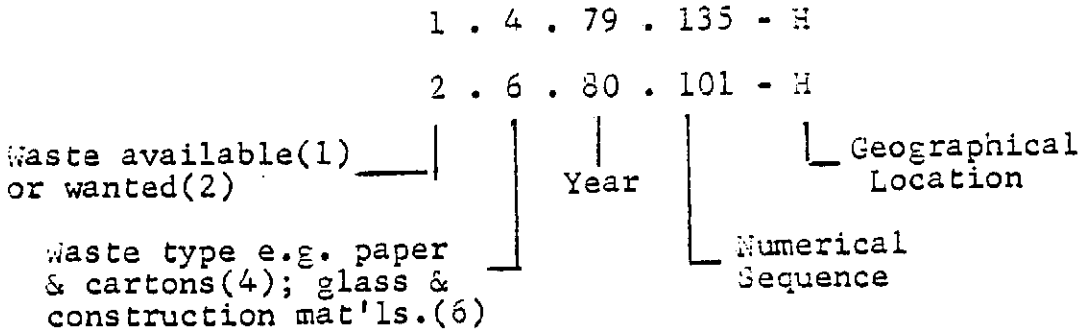
Figure 2.3 -1

EXAMPLES OF TYPICAL CODE SYSTEMS

CANADIAN WASTE MATERIALS EXCHANGE:



BELGIAN WASTE EXCHANGE:



An example of both trends was noted in the Midwest Industrial Waste Exchange which is now a co-sponsorship between the St. Louis and Kansas City metropolitan regions. Similar efforts are contemplated by the Oregon Industrial Waste Information Exchange, and West Coast listings from the Canadian Waste Materials Exchange. Nationalization of waste exchanges has already taken place in France and Germany. In France, the government has sponsored the coordination of regional exchanges through ANRED. In Germany, the National Chamber of Commerce, DIHT, is performing a similar function. A code should, therefore, show the waste exchange in which the listing originated.

Confidentiality requirements do not exist in some exchanges and, in others, it is an option of the listing company. Therefore, it becomes important for the code to distinguish between confidentiality and non-confidentiality.

Consequently, new or existing exchanges contemplating the reorganization or modification of their coding system should allow for these two potentialities in formulating their code.

Recognizing the two trends previously noted, and based on current practices, we have devised and suggest a "Universal Coding System". The code is summarized in Figure 2.3-2, and is based on the following category classifications:

A. Materials
   1. Available
   2. Wanted

B. Waste type or category
   1. Organic Chemicals & Solvents
   2. Oils, Fats and Waxes
   3. Acids
   4. Alkalis
   5. Other Inorganic Chemicals
   6. Metals & Metal Containing Sludges
   7. Plastics
   8. Textiles, Leather & Rubber
   9. Wood & Paper Products
   10. Miscellaneous

C. Numerical Sequence
   1. One letter, e.g. A = 1,000; B = 2,000 series

   2. Three numbers, e.g. 0-999 in any thousand series

D. Originating Exchange:
   <u>Foreign</u>:

CWME - Canadian Waste Materials Exchange
UKWME - United Kingdom Waste Materials Exchange
NIMRA - NIMRA Exchange United Kingdom
SWE - Swiss Waste Exchange
FCIO - Austria: Chemical Industry Association Exchange
FWE - Austria: Federal Waste Exchange
NWE - Nordic Waste Exchange
TWME - Turin Waste Materials Exchange
ANIC - Italian Chemical Industry Association (ANIC) Waste Exchange, Milano
WEI - Waste Exchange of Israel
MWDA - Metropolitan Waste Disposal Authority, New South Wales, Australia
IWES - Industrial Waste Exchange Service, Environment Protection Authority, Victoria, Australia
ANRED - France: National Agency for the Recovery and Elimination of Waste (A.N.R.E.D.)
VCI - Germany: VCI Waste Exchange
DIHT - Germany: DIHT Waste Exchange
VNCI - Netherlands: VNCI
FICB - Belgian Waste Exchange FICB
OBEA - Belgian Waste Exchange O.B.E.A.

United States:

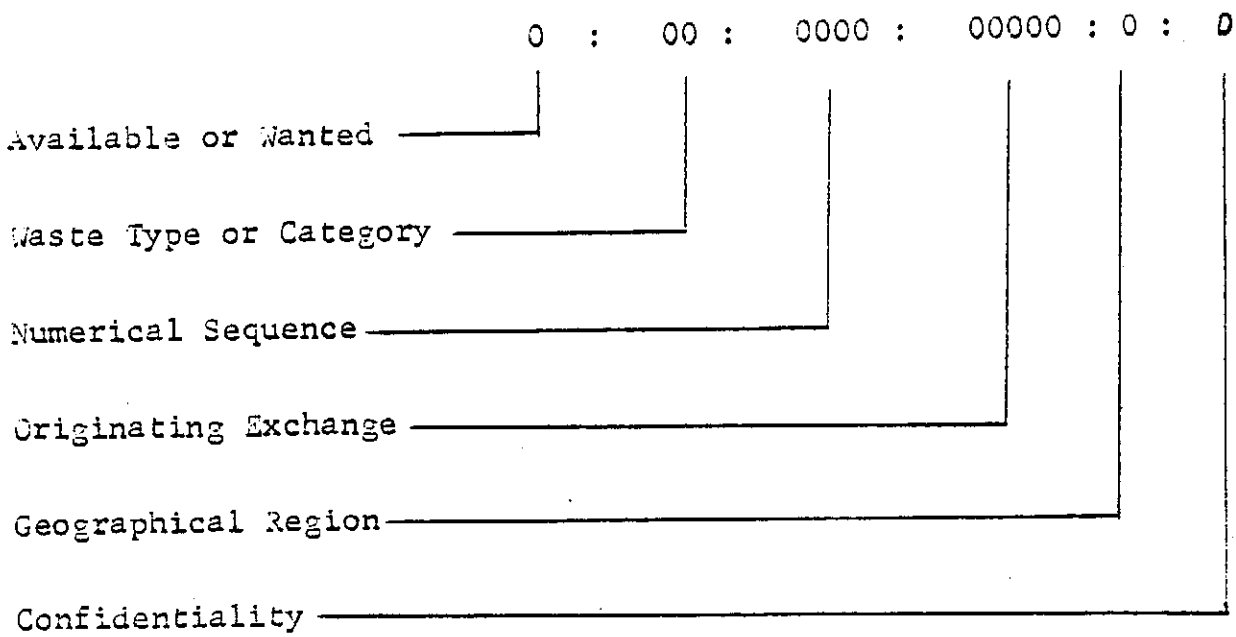
MIWE - St. Louis Industrial Waste Exchange Now: Midwest Industrial Waste Exchange
IIWIE - Iowa Industrial Waste Information Exchange
ACE - American Chemical Exchange
ERC - Enkarn Research Corp.
ECHO - ECHO Environmental Clearinghouse Organization
GWE - Georgia Waste Exchange
ICWE - Information Center for Waste Exchange WETA
MACI - Minnesota Ass'n. of Commerce & Industry
TE - The Exchange
OIWIE - Oregon Industrial Waste Information Exchange
TWS - Tennessee Waste Swap
WASTE - WASTE
ZWSI - Zero Waste System Inc.
CWE - California Waste Exchange
WMC - Industrial Waste Clearinghouse
IWIE - Industrial Waste Information Exchange, Columbus, Ohio
IWIE - Industrial Waste Information Exchange, Newark, N.J.
MCWE - Mecklenburg County Waste Exchange
UCC - Union Carbide Surplus Products Group
HCC - Houston Chamber of Commerce Chemical Recycle Information Program
AARRI - AARRII
ORE - ORE Corp.

E. Geographical Region:
   1. Use system of each individual waste exchange.

F. Confidentiality:
   1. Confidential
   2. Non-Confidential

Figure 2.3 -2

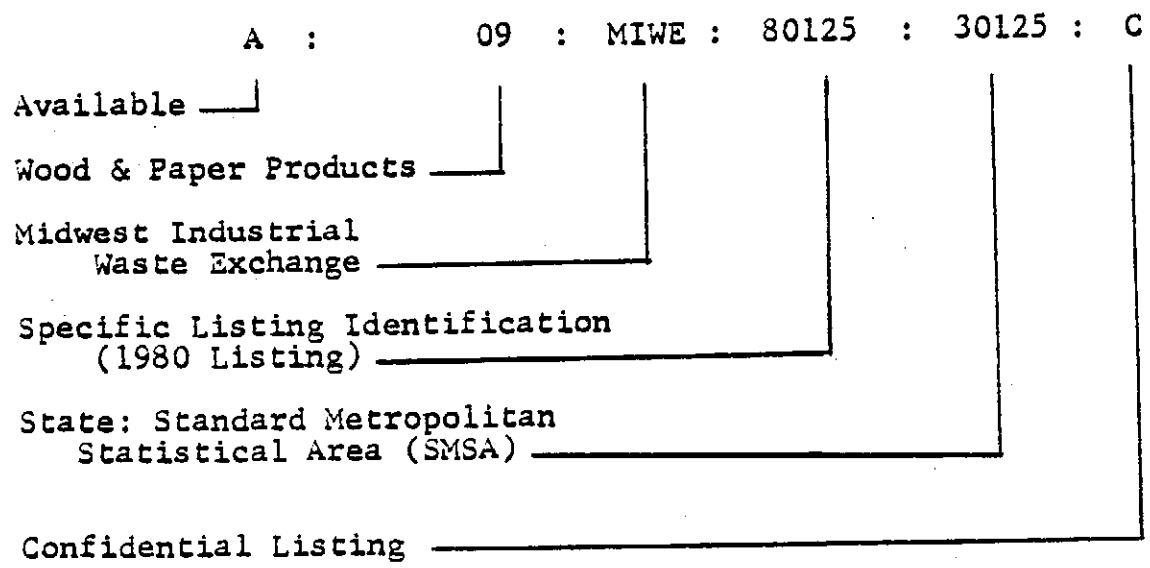
Suggested "Universal Waste Code"



The first digit of the Universal Waste Coding System indicates whether the waste is available (A) or wanted (W). The second 2 digit set indicates the general nature of the listed waste. Although only 9 categories of wastes have been identified in this report, there is room for a total of 99 categories, if necessary.

There is a five digit sequence of letters available for identification of waste exchanges listed previously. Unless a national or international system were implemented, each exchange would have a numerical identification sequence for each specific waste listed. From analyses of U.S. exchanges, it is doubtful if more than 1,000 listings would occur in any one year for a single exchange. Thus, a combination of the year listed and a number between 1 and 999 should be sufficient for encoding. If listings are to exceed 999, as may be the case with some European national waste exchanges, another digit must be added, thereby allowing 10,000 listing identifications per year for each exchange.

Coding of geographical regions becomes more problematic considering the variety of geographical, political and statistical subdivisions which are possible, especially on an international basis. A logical and useful system suggested for the United States is the combined use of a state and/or SMSA code. The first two digits would identify the state and the last 3 the SMSA. If an SMSA is irrelevant, then the last three digits would be 0's. The last one letter code would identify whether or not the listing is confidential (C) or not confidential (N). An example of a fully encoded listing is given below:



2.4 Match-Up Information

Data on match-ups or successful waste transfers is an important measure of an exchange's effectiveness. Data on match-ups can also be quite misleading. There is no doubt that the major purpose of waste information and material exchanges is to initiate the transfer of waste materials. Match-up figures reported as a percentage or fraction of the number of listings (which is the most prevalent practice of U.S. and foreign exchanges) do not reflect such factors as:

1. Tonnage or volume of material transferred.

2. Value of material.

3. Type of material:
   Hazardous or non-hazardous
   Availability and value of Resource replaced
   Disposal costs and practices
   Disposal effects on the environment

4. Frequency of transfer; one-shot, continuing or periodic.

5. Backlog phenomena:

   (a) Initially, generators list many wastes which they have accumulated and have not been able to dispose of for years.

   (b) As generators find new and regular users for their continuous streams, they no longer need the services of the exchange.

Match-ups initiated by waste exchanges soon become established avenues of exchange, and these materials are no longer listed. After a number of years, an exchange lists materials with less and less potential for transfer. Consequently, match-ups as a percent of listings will be very high in the early years of an exchange, and gradually become lower as an exchange matures and gets older. This trend is evident with many European exchanges and with the older U.S. exchanges.

A summary of listings and match-ups of the U.S. Exchanges are shown in Table 2.4-1 and Foreign Exchanges, in Table 2.4-2.

Of the 22 U.S. exchanges, only 3 have offered percentage match-up figures, and these were: 28 percent, 23 percent and 9 percent by actual survey, with one rather high estimate of

Table 2.4-1

SUMMARY OF U.S. WASTE EXCHANGE

LISTINGS & MATCH-UP INFORMATION

WASTE EXCHANGE	NUMBER OF LISTINGS			PERCENT MATCH-UPS DETERMINED BY	
	TOTAL	MAT'LS. AVAILABLE	MAT'LS WANTED	SURVEY	ESTIMATE
4.1 - Midwest	35	27	8	-	-
4.2 - Iowa	175	-	-	28	-
4.3 - ACE	-	-	-	-	-
4.4 - Enkarn	63	50	13	-	-
4.5 - ECHO	-	-	-	-	-
4.6 - Georgia	46	32	14	-	-
4.7 - WETA - Washington	100	-	-	-	50
4.8 - Minnesota	45	-	-	-	-
4.9 - The Exchange	-	-	-	-	-
4.10- Oregon	100	-	-	23	-
4.11- Tennessee	-	-	-	-	-
4.12- WASTE	-	-	-	-	-
4.13- Zero Waste Systems	-	-	-	-	-
4.14- California	-	-	-	-	-
4.15- Waste Mat'ls. Cl'hse.	50	-	-	-	-
4.16- Columbus, Ohio	9	7	2	-	-
4.17- Newark, N. J.	-	-	-	-	-
4.18- Mecklenburg County, N.C.	50	-	-	9	-
4.19- Union Carbide	-	-	-	-	-
4.20- Houston Chamber Comm.	25-80	-	-	-	-
4.21- AARRII	-	-	-	-	-
4.22- ORE	-	-	-	-	-

Table 2.4-2

SUMMARY OF FOREIGN WASTE EXCHANGE

LISTINGS & MATCH-UP INFORMATION

	NUMBER OF LISTINGS			PERCENT MATCH-UPS DETERMINED BY	
	TOTAL	MAT'LS. AVAILABLE	MAT'LS. WANTED	SURVEY	ESTIMATE
3.1 - Canada	1040	-	-	12	-
3.2 - United Kingdom	2663	-	-	18	-
3.3 - " " NIMRA	1200-1500	-	-	-	-
3.4 - Swiss	130	120	10	-	-
3.5 - Austria FCIO	-	-	-	-	-
3.6 - " FWE	-	-	-	44	-
3.7 - Nordic	270	-	-	27	-
3.8 - Italy Turin	393	293	100	-	-
3.9 - " ANIC	200	180	20	-	-
3.10- Israel	-	-	-	-	-
3.11- Australia-N.S.W.	370	-	-	32	-
3.12- " -Victoria	284	141	143	16	-
3.13- France - ANRED	-	-	-	-	-
3.14- Germany - VCI	-	-	-	24	-
3.15- " - DIHT	13,600	10,800	2,800	30	-
3.16- Netherlands-VNCI	-	-	-	-	30-35
3.17- Belgium - FICB	100	90	10	-	10
3.18- " - OBEA	707	598	109	10	-

50 percent. Of all the U.S. exchanges, the Oregon Industrial Waste Information Exchange was the only one submitting a list of the materials that were actually transferred. These are shown in Table 4.10-1.

Major reasons for sparse match-up information on U.S. Exchanges are:

1. Acquiring match-up data is not one of their operating goals.

2. Private for-profit exchanges want to keep this information confidential, so that competitors should not profit from a successful transfer. Eight of the twenty-two U.S. Exchanges (36 percent) are private for-profit organizations.

3. The U.S. Exchanges each have relatively small numbers of listings. One exchange had less than 200 listings; the 10 other exchanges reporting total listings had 100 or less, with relatively low levels of activity.

4. Some exchanges were just getting started and have not had an opportunity to record or report match-ups.

Foreign waste exchanges have offered more complete data on match-ups. Eleven out of the eighteen exchanges have offered match-up data as a percent or fraction of listing. These ranged from a low of 10 percent to a high of 44 percent.

The foreign Exchanges offer an excellent example of how percent match-ups can be misleading. The Canadian Exchange, with 1,040 listings, reported 12 percent or 127 match-ups. The Australian N.S.W. Exchange, with 370 or about 1/3 less listings than the Canadian, reported 32 percent or nearly three times higher percent match-ups. The actual numbers of Australian N.S.W. match-ups were only 118, and less than the 127 reported by the Canadian Exchange. Hence, neither the number of listings nor the percent or number of match-ups should be the sole or major criterion of a waste exchange's effectiveness.

As pointed out previously, match-up information developed in this survey indicate very little available information from U.S. exchanges. The reasons for this were also noted previously. However, data from the Oregon Industrial Waste Information Exchange, plus data from several foreign exchanges provided sufficient information for an analyses of materials that were successfully transferred and for evidence of potential match-ups. Comprehensive information from the Canadian Waste Materials Exchange

provide the best evidence of actual and potential match-ups for the United States, because of similar industries and commerce. Data on successful transfers from the United Kingdom, Nordic, Turin (Italy), Australia (N.S.W.), and Belgian (OBEA) Exchanges provided additional information for our analyses.

Table 2.4-3 summarizes the available information on categories of materials listed and transferred by these exchanges. Organic chemicals and solvents; plastics; metals; and metal containing sludges, (wood and paper products in Canada and Oregon only) were the most frequent material categories transferred. Fewest transfers occurred in the waste categories: paints; textile, leather & rubber; minerals; food processing; acids and alkalis (in Canada & Oregon).

Information on wastes that are successfully transferred is often incomplete and inaccurate, for many reasons. The most widely cited is the lack of funds and/or staff to engage in follow up of listings. Some operators believe that match-up performance is not even an important measure of an exchange's effectiveness. Many exchanges have, however, made periodic assessments of match-ups as an indication of effectiveness during their early years of operation. A few exchanges continuously monitor match-ups by enclosing postage paid postcards with mailings, and with request referrals. Since not all listers respond to the requested match-up information, percentages of waste transfers that are quoted are consequently on the low side.

Match-up information is no doubt useful to encourage the start-up of new exchanges, or to increase the activity in existing exchanges. For example, the identification of potential match-ups by industry and waste - in terms of generator and user industries; categories or types of waste materials; the amounts; frequency of shipment; and locations - if known to any degree, would serve as desirable examples for others to follow in their exchange activities. Match-up information from U.S. exchanges, however, was so sparse and limited, that valid projections could not be made. The desirability, nevertheless, for good match-up information still exists, and U.S. exchange operators should make sincere efforts to accumulate data of this nature.

Quantitative Valuation of Waste Transfers

It would be extremely valuable to have data on the value of transfers for U.S. and European waste exchanges. In most instances, valuation is very difficult because of the basic structures and operating procedures of waste exchanges.

TABLE 2.4-3

CATEGORIES OF MATERIALS LISTED AND SUCCESSFULLY TRANSFERRED BY WASTE EXCHANGES

CATEGORY OF MATERIAL	EXCHANGE							
	CWME (CAN.)	UKWME (U.K.)	NWE (SWEDEN)	TWME (ITALY)	MWBA (AUS.)	IWES (AUS.)	OBEA (BELGIUM)	OREGON OIWIE
1. Organic Chemicals & Solvents		x	x		x	x	x	x
2. Oils, Fats & Waxes	x							
3. Acids		x			x			x
4. Alkalis		x			x	x		
5. Inorganic Chemicals			x				x	x
6. Metals							x	x
7. Metal Containing Sludges or Slag	x				x			
8. Plastics	x	x				x	x	x
9. Textiles, Leather & Rubber		x	x				x	
10. Wood and Paper Products			x			x	x	x
11. Catalysts		x						
12. Food Processing								x
13. Minerals								
14. Waste Oil					x			x
15. Glass						x		x
16. Waste Containers (drums, boxes, bags)								x
17. Paints								x
18. Miscellaneous		x						

The confidential nature of most waste exchanges, wherein the exchange puts potential users in contact with listers and then withdraws from negotiations, dictates against the gathering of monetary valuation of the successful transfers.

Much information would be required to make any meaningful valuation of transfers. Thus, it would be necessary to know exactly what and how much of each listed waste is expected to be recovered, and the end uses of the recovered materials. For example, waste oil may be taken from a lister and either reprocessed and substituted for virgin oil, or used as fuel. The "replacement" value would be different in each case. In a similar manner, spent solvents originating from the pharmaceutical industry are recovered and reused for processes requiring less purity, with a commensurate decrease in value. It appears likely that attempts to gain detailed information on the uses and value of successfully transferred materials would discourage entrepreneurs from using exchanges, since desired confidentiality could be compromised. In addition, staffing of waste exchanges with limited budgets would have to be increased to obtain, file, and analyze these data.

Some exchanges have attempted to consider factors of match-ups relating to the value, quantity, type and frequency of generation by translating numbers of match-ups into a monetary replacement value or into Btu's of energy. They have also been able to glossover decreasing numbers of match-ups that occur over a number of years by expressing the monetary replacement value or Btu's of energy as sum totals per year or as cumulative values in the life of the exchange. Hence, if one wishes to grade or compare the effectiveness of an exchange by match-up information, replacement value offers the most realistic measure for comparison or assessment.

The Canadian, United Kingdom, and Oregon Exchanges were notable for expressing match-ups by replacement value and by Btu's of energy.

The Canadian Waste Materials Exchange estimated that 95,000 tons of wastes were transferred annually, with a replacement value (i.e., the value of virgin material that the waste has replaced) of 3.7 million dollars (Can.). This estimate was as of January 1980, after 23 months of operation.

A breakdown of values by material categories was not made available, but information on successful transfers indicates that organic chemicals and solvents, plastic residues, and metals and metal-containing sludges account for significant percentages of the total replacement value of transferred materials.

The United Kingdom Materials Exchange summarized the replacement values of transferred materials over the period 1974 to 1979 as follows:

REPLACEMENT VALUE OF TRANSFERRED MATERIALS
(United Kingdom 1974 to 1979)

	Continuous Tonnes/Yr.	Total Replacement Value U.K.	£ U.K. Value/Tonne
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 lbs.
1£ U.K. = $2.24 U.S. Dollars (July 1979)

As would be expected, the replacement values (£U.K./tonne) assigned to various wastes vary widely from a low of 17 for food wastes to 1,750 for metals. Spent catalysts (which often include precious metals), minerals, oils and waxes, organic chemicals and solvents, and rubber and plastics were assigned relatively high replacement values.

The experience of the United Kingdom Materials Exchange generally parallels the overall ranking of material categories revealed by the non-quantified data supplied by other exchanges.

The volume for mineral wastes is inordinately high and reflects a one-time transaction of 120,000 tonnes of a mineral waste. The rather low value and quantities of metals and paper and board product transferred by the United Kingdom Materials is as expected because these materials have established markets.

None of the United States Waste Exchanges have provided summaries on the estimated value of completed transfers. One, the Oregon Industrial Waste Information Exchange, has estimated energy savings affected by successful material transfers. This information is given in Table 4.10-1. These estimates represent either the energy required to produce the recovered products from virgin materials or the fuel values of the listed materials.

In the absence of enough information to calculate meaningful "replacement values", estimation of equivalent energy values will be useful. In order to do this, data on types and quantities of exchanged materials would be sufficient. The acquisition of often "sensitive" cost and market information for quantifying exchange success or effectiveness then becomes less important.

2.5 Criteria for Evaluating Waste Exchanges

There is a saying,"Beauty is in the eyes of the beholder". In a similar manner, success of waste exchanges depends on the expectations of the various groups which they serve. Thus, the for-profit entrepreneur has a set of "success" criteria which differ in both substance and degree from trade association or chamber of commerce criteria. The non-profit sector, as represented by government agencies, and Chambers of Commerce, place markedly different emphasis on what functions and related achievements comprise a successful waste exchange.

Table 2.5-1 lists criteria useful in assessing exchange operations. This Table also indicates the relative emphasis which private enterprise, trade associations, chambers of commerce, and the public sector or government are believed to place on these criteria.

As would be expected, an important criteria of success for a private entrepreneur is simply profit. This is, of course, a legitimate and highly desirable objective which stimulates much imaginative enterprise and diligent effort directed at waste recycling and utilization.

TABLE 2.5-1

EVALUATING CRITERIA FOR
WASTE EXCHANGE EFFECTIVENESS

CRITERIA FOR EFFECTIVENESS	EXCHANGE OPERATED BY: PRIVATE ENTERPRISE	TRADE ASSOCIATION/ CHAMBER OF COMMERCE	PUBLIC/GOVERNMENT
1. Profit	P	S	S
2. Number of Listings	S	S	S
3. Number of Match-ups	P	P	S
4. Listing/Match-up Ratio	P	P	S
5. Number of Industries/Companies Served	P	P	S
6. Least Cost Solution to Residuals Disposal (especially hazardous)	P	P	S
7. Relief from Bad Public Image (e.g. Love Canal)	P	P	S
8. Energy and Material Conservation	P	P	P
9. Diversion of Hazardous Waste from Landfill Disposal	P	P	P
10. Avoidance of "Pass On" Consumer Costs Effected by Transfers	P	P	P
11. Volume of Non-Hazardous Materials Transferred	P	P	S
12. Volume of Hazardous Material Transferred	P	P	P

P - Primary Importance
S - Secondary Importance

Trade Associations and Chambers of Commerce are not as interested in profit as they are in providing useful services to the industries they represent and promote. These organizations, along with individual companies, are highly interested in finding least-cost solutions to the residuals disposal problems of industry, and improving the public image of industry through recycling and diversion of hazardous wastes from landfills.

Private enterprise, trade association, and chamber of commerce-managed waste exchanges are, of course, highly concerned with the number of listings, and particularly match-ups. The public, government sector is more interested in the types of transfers made. They would hope to see listings and match-ups of materials that have been identified as hazardous under RCRA or state hazardous waste programs.

The extent to which particular wastes of interest appear on "available" lists without successful match-ups is indicative of the lack of recycling or reclamation opportunities for these materials. On the other hand, match-up of materials of concern will indicate recycling alternatives to questionable or costly disposal options.

The current serious concern for hazardous waste disposal in the environment, energy shortages, and inflation create a high degree of interest in diversion of hazardous waste from landfill disposal and accompanying high costs associated with secured chemical landfills or high temperature incineration. Hence, all types of waste exchanges consider of prime importance energy and material conservation (Criterion 8 of Table 2.5-1); diversion of hazardous waste from landfill disposal (Criterion 9); and avoidance of "pass-on" consumer cost resulting from transfers (Criterion 10).

2.6 Impact of Governmental Regulations

Finding evidence of cause-and-effect linkages between waste control legislation and activity in waste information exchanges is difficult. Many exchanges are non-governmental organizations, set up and administered by industry associations. Neither offerers nor requesters of materials need to reveal their motives for using an exchange, hence, their desire for anonymity and confidentiality. Thus, the relationship between legislation and exchange activity can only be inferred.

But it is clear that waste pollution control legislation was initiated or strengthened in many industrialized countries during the 1970s, just as exchanges were being created.

It seems reasonable to suggest that both laws and exchanges resulted from the same awareness and concern. For example, in the United Kingdom, two major legislative acts (the 1972 Deposit of Poisonous Waste Act and the 1974 Control of Pollution Act) changed the basic methods of waste disposal. The U.K. Waste Exchange began in October 1974 and had been vigorously active until recently. Some West European countries, for example, the Netherlands and Denmark, recently strengthened disposal laws, but it is too early to observe results. However, the Italian chemical industry association's exchange which began in 1973 with high activity, (a typical pattern as users clear their backlog of wastes and try out the new service), saw a decline in listings, and then saw activity revive significantly in 1978-79 apparently due both to stricter laws and tighter raw material supplies. In France, as in the United Kingdom, government has directly initiated and supported exchanges, through a new agency created by a 1975 law which in turn supported formation of six regional information clearinghouses. Waste disposal control laws normally increase the generator's disposal costs, and thus presumably increase their incentives to seek buyers for their wastes before paying for hauling and disposal.

In the United States, where some exchanges were formed before passage of RCRA or state laws, most exchange personnel seem unfamiliar with the legislative framework, at least in its details. However, many of the exchange managers seem to feel that listing activities will increase notably after RCRA regulations are implemented. They may be proven correct, if waste generators, seeing the legislative handwriting on the wall, change their disposal procedures in anticipation of new regulations.

Increased interest and use of waste exchanges will result when rules and regulations mandated by the 1976 RCRA become enforced. Section 3001 of RCRA requires identification and listing of hazardous wastes from almost all sectors of American industry. Final rules and regulations under Section 3001 were published in the May 19, 1980 Federal Register.

Under Section 3001, industry is required to identify process and pollution control residuals which must be considered hazardous, based on hazard and toxicity criteria detailed in Section 3001. A number of wastes have already been identified and listed by EPA as being hazardous, and hence subject to all hazardous waste regulations.

The rules and regulations for generators of hazardous waste (Section 3002), transport (Section 3003) and treatment

and disposal of hazardous waste (Section 3004) will significantly increase the costs of trucking, handling, and secure disposal of these wastes. As an example, high temperature incineration for the destruction of toxic, carcinogenic or mutagenic organic wastes is likely to be required as opposed to less costly landfilling. Secured (i.e. clay and/or synthetically-lined) chemical landfills will be able to accept many inorganic and organic wastes, but these are significantly more expensive than traditional landfills. Siting problems for new secure landfills will keep these in short supply for a number of years. Liquid or semi-solid toxic, hazardous, mutagenic or carcinogenic organic wastes may even be prohibited from secured chemical landfills.

The "cradle to grave" liabilities in the RCRA regulations may prompt hazardous waste generators to avoid using a waste exchange, since a potential transfer would loosen its control and would not absolve it from its long-term liabilities.

On the other hand, the requirement for a permit on hazardous wastes, and its satisfactory disposition within 90 days, will encourage listings on an exchange. Similarly, the use of exchanges may be enhanced by Section 261.33 of RCRA which specifies that certain chemical products, as long as they are in commerce and not going for disposal, are exempt from manifest requirements.

The impact of other Sections of the RCRA regulations on Waste Exchanges will become apparent over a period of time. The overall effect of RCRA will no doubt enhance and foster the transfer of hazardous and other waste materials in the U.S.

It is expected that recovery and recycle of wastes, as through waste exchanges, may be more cost effective for handling toxic wastes than traditional methods now under severe scrutiny and regulation.

3.0 FOREIGN WASTE EXCHANGES

3.1 Canadian Waste Materials Exchange, Mississauga, Ontario

First efforts towards a Canadian Waste Exchange were started by Canadian Chemical Processing Magazine in 1973, and then by the Ontario Ministry of Industry and Tourism in 1975. These initial efforts have been taken over by Canadian Waste Materials Exchange.

The Canadian Waste Materials Exchange (CWME), as it currently exists, issued its first Bulletin in February 1978. It is managed and operated by Ontario Research, a private non-profit organization. Environment Canada, the Federal government's environmental agency, fully funded and sponsored the exchange for a two-year period ending in December 1979. The exchange is presently working towards self-sufficiency by charging an annual subscription fee of $20.

The objectives of the exchange are (1) to conserve raw materials; (2) to conserve energy required to process raw materials; (3) to promote use of energy-rich waste materials; and (4) to protect the environment.

Wastes are listed in the Bulletin under 10 categories as shown at the bottom of Figure 3.1-1. The listings are coded as wastes available - AA, or wastes wanted - AW, followed by three digits which identify wastes sequentially. A last letter in the code identifies the geographical region in which waste materials are available or wanted. See top of Figure 3.1-1. Listers' names are kept confidential. Listings are free.

Sample pages of wastes wanted and wastes available from a Bulletin are shown in Figures 3.1-2 and 3.1-3, respectively. The Bulletin circulation is 6,000 and is issued every other month.

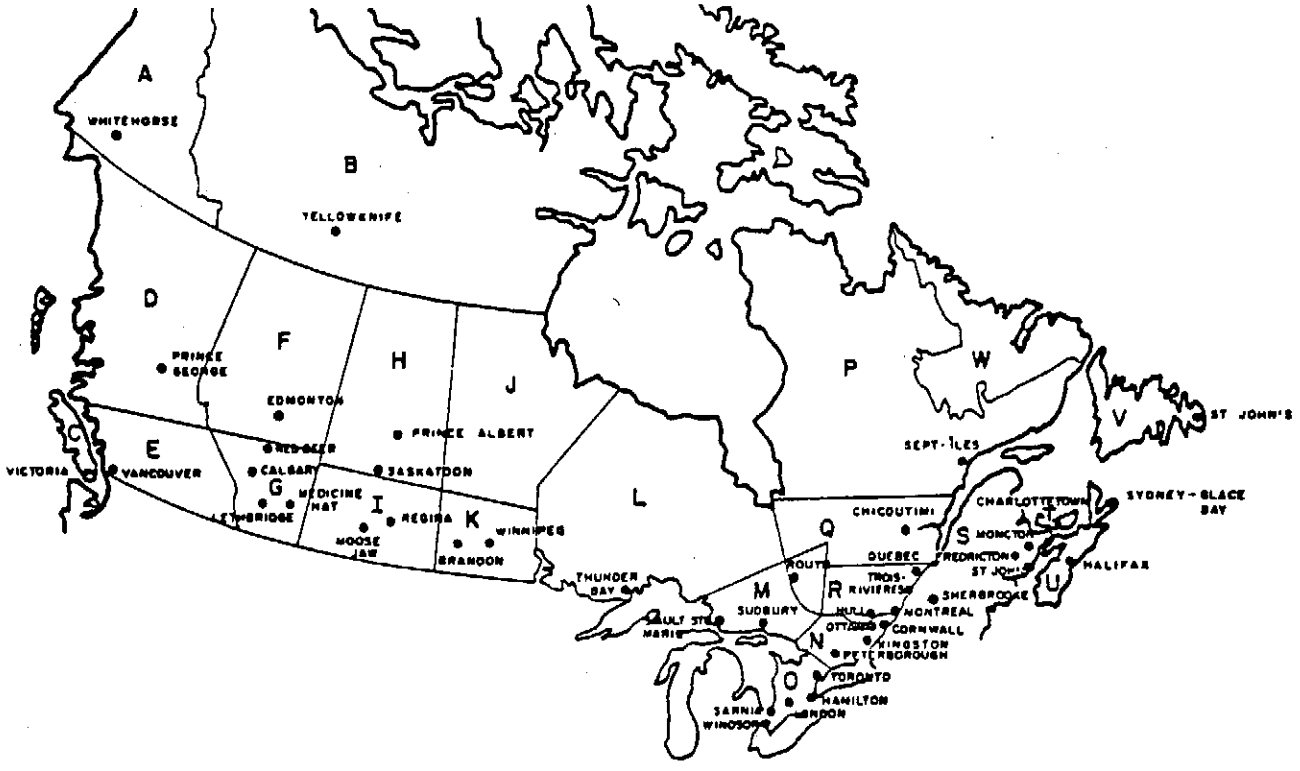
The exchange accepts for listing all materials from all industries without geographical limitations. The program is operated by one highly skilled manager and one secretary for about one-quarter time each. The operating budget is about $50,000 per year.

Vital statistics, as of September 1979, after 19 months of operation are:

Number of participating companies . . . 5,700

BULLETIN NO. 12

NOVEMBER
NOVEMBRE 1979



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 apparait 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.

Figure 3.1-1

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

Veuillez utiliser la formule 3 pour demander des renseignements au sujet des déchets que vous pensez pouvoir fournir.

1. ORGANIC CHEMICALS AND SOLVENTS : PRODUITS CHIMIQUES ORGANIQUES ET SOLVANTS

	Region/Région	Quantity/Quantité	
AW 022	R	30,000 tonnes	Recyclage Beton Bitumineux (Valleyfield)
AW 064	G	30 gals/month	Rubber cement (naphtha - polymer)
AW 085	R	large quantities	Waste solvents, all kinds
AW 109	O	---	Methyl hydrate (Windsor)
AW 114	O	---	Paints (Windsor)
AW 115	O	---	Thinners (Windsor)
AW 185	O	Unlimited	Paint overstock etc.
AW 190	O	Unlimited	Waste chlorinated solvents (Toronto)
AW 191	R	45 gall/week	Resin wash solvent

2. OILS, FATS AND WAXES : HUILES, GRAISSES ET CIRES

AW 065	G	45 gal/week	Waste lubricating oil
AW 072	S	12,000 gal/sem	Huile à moteur
AW 149	M,N,O,R	--- ---	Les huiles usées (Ontario & Quebec)
AW 150	All	---	Waste hydraulic oils
AW 151	All	---	Waste cutting oils
AW 176	Q	illimité	Gras animal et huiles vegetales usées
AW 180	G	2500 lb/week	Broken graphite electrodes
AW 196	O	50,000 gal/month	Waste oil max. BSW 8%, 100-200 vis. sus., sulphur 0.5 max.

3. ACIDS : ACIDES

AW 081	O	100,000 gal/month	Pickle liquor
AW 099	E	15,000 gal/month	HCl pickling waste (Pb<2gpl Fe>200 gpl)
AW 201	O	~20 million gal/year	Contaminated sulphuric acid 10-90% H_2SO_4

4. ALKALIS : ALCALIS

AW 188	E	10 tons/week	Caustic (Vancouver)
AW 189	E	10 tons/week	Quicklime (CaO) (Vancouver)
AW 202	O	Unlimited	Dirty or clean caustic wastes 10-50% caustic

Figure 3.1-2

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.

1. ORGANIC CHEMICALS AND SOLVENTS : PRODUITS CHIMIQUES ORGANIQUES ET SOLVANTS

	Region/Région	Quantity/Quantité	
AA 006	O	----	Crude Naphthenic Acid Still bottoms (Toronto)
AA 029	O	3 ton/week	Organic Hatchery waste (Brantford)
AA 058	O	60 gal/month	Toluol with silicone paint
AA 170	O	5000 lbs/week	Slush from solvent processing
AA 201	O	12,000 gal/year	90% Toluol; 10% phenolics (Scarborough)
AA 221	O	2000 gal/week	Light solvents, sludge (Toronto)
AA 298	R	80,000 gal/week	Molasses Stillage (Montreal)
AA 375	U	3000 lbs/year	Activated charcoal and Oils and Phenols
AA 415	G	---	Mixed rubber cure accelerators
AA 416	N	12,000 gal/year	Methylene chloride & water & animal fat lubricant
AA 520	K	250 gal/month	Waste ink & solvents (Winnipeg)
AA 528	O	1000 gals/month	Spent solvent ketones, alcohols, etc. (Hamilton)
AA 547	O	100 lbs	U.C.L-77 silicone (Toronto)
AA 565	O	1200 gals/year	Non phenolic paint stripper (Toronto)
AA 711	O	4000 lbs	Dow Corning - Antifoam "B" liquid
AA 713	O	300 lbs/day	Latex compound and water sludge (Markham)
AA 736	O	---	Used acetone and oil mixture
AA 783	G	2000 gals/month	Fusel Oil (Calgary)
AA 788	O	15 x 45 gal/month	Recovered and fresh solvents (not mixed)
AA 792	U	1100 x 50 lb. bags	"Polybor"
AA 816	S	3 x 45 gal	Varsol avec graisses
AA 820	N	700 gal/month	Contaminated M.E.K.
AA 837	R	. .	Used paint thinners
AA 851	N	100 gal/week	Glycol & Mineral oil mixture (Trace H_2O, dirt)
AA 852	N	4 drums/year	Thermally degraded polyalkylene oxide H.T. fluid
AA 856	O	6 ton/month	Wetted paint sludge (alkyd resin & pigment) (Windsor)
AA 878	O	1800 gal/year	Insulating varnish
AA 913	O	5000 lbs.	Di-Isooctylphthalate
AA 918	R	.	Obsolete solvent based paints suitable for baking
AA 929	O	5000 gal/month	Resin plant wash solvent
AA 930	O	1000 gal/month	Water - Resin plant solvent mixture
AA 931	O	1000 gal/month	Resin and paint plant sludge
AA 932	O	1000 gal/month	Defective resins and paints
AA 938	N	6250 Kg/month	Filter press cake containing 50% plasticizers & 50% Carbon and filteraj
AA 939	N	17,500 Kg/3 months	Distillation residue, phthalic anhydrides and higher acids
→ AA 945	O	3000 lb.	Trichloroacetic acid contaminated with Fe + H_2O (Sarnia)
AA 962	O	2000 lb	High heat silicone resin (DC803-50X)
AA 966	E	9000 gal/day	Aqueous organic acids (5% acetic 1% formic + trace proprionic)
AA 973	O	1685 lbs	Silicone resin DC 805

→ Indicates the start of new listings in each category

→ Indique le début des nouvelles inscriptions pour chaque catégorie

Figure 3.1-3

Number of wastes listed	1,040	
Number of those wastes generating inquiries	863	(83% of listings)
Number of inquiries	4,012	(3.9/ listing)
Number of wastes transferred	124	(12% of listing)
Annual tonnage of waste transferred . .	66,000 tons	
Approximate value of the waste transferred	$2.65 million	(Can.)

By January 1980, after 23 months, the exchange reported 95,000 tons as the annual tonnage of waste transferred, with a replacement value of $3.7 million. "Replacement value" is computed by estimating the value of material that the waste has replaced. Conservative estimates have been used throughout. For example, wood waste has been assumed to have a value of $18 per ton based on 18×10^6 Btu per ton and $1 per 1×10^6 Btu.

The distribution of listings follow very closely the general distribution of industrial activity in Canada. The distributions of numbers of inquiries and transfers recorded are skewed in favor of Ontario. This may be explained by the fact that the Exchange is located in Ontario, and thus telephone communication is cheaper and easier, or it may be that there are more opportunities for transfers to take place in a province where almost 50% of Canada's industrial activity is concentrated.

Wastes are listed under 10 categories. In Tables 3.1-1 and 3.1-2 waste listings, number of inquiries received, and transfers recorded are summarized by category for both available and wanted wastes. The lowest interest is in inorganic acids, alkalis and other inorganic chemicals. Plastics, organic chemicals, and metal sludges have the highest interest and show the highest proportion of recorded transfers.

The distances for transport of transferred wastes were analyzed. It was found that most of the wastes, 52%, moved over a short distance of less than 100 miles. The fact, however, that 12.5% of the transferred wastes did travel over 1,000 miles indicates that distances of transport did not necessarily inhibit waste transfer.

Table 3.1-1

Analysis of Enquiries and Transfers of Available Wastes
In Bulletins 1 - 9 by Categories

Category	No. of Wastes (A)	No. of Wastes Enquired About (B)	No. of Enquiries (C)	Enquiries Per Listing (C)/(A)	Enquiries per Waste of Interest (C)/(B)	Transfers
1. Organic Chemicals and Solvents	79	62	339	4.3	5.5	27
2. Oils, Fats and Waxes	38	36	187	4.9	5.2	6
3. Acids	29	21	54	1.9	2.6	1
4. Alkalis	40	39	140	3.5	3.6	4
5. Other Inorganic Chemicals	78	64	229	2.9	3.6	2
6. Metals & Metal Containing Sludges	93	83	515	5.5	6.2	15
7. Plastics	64	57	383	6.0	6.7	14
8. Textiles, Leather and Rubber	133	109	474	3.6	4.3	11
9. Wood and Paper Products	207	176	787	3.8	4.5	24
10. Miscellaneous	98	67	258	2.6	3.9	10
	859	714	3,366	3.9	4.7	114

Table 3.1-2

Analysis of Enquiries and Transfers of Wanted Wastes In Bulletins 1 - 9 by Categories

Category	No. of Wastes (A)	No. of Wastes Enquired About (B)	No. of Enquiries (C)	Enquiries Per Listing (C)/(A)	Enquiries per Waste of Interest (C)/(B)	Transfers
1. Organic Chemicals and Solvents	10	7	46	4.6	6.6	1
2. Oils, Fats and Waxes	15	10	35	2.3	3.5	0
3. Acids	4	4	28	7.0	7.0	0
4. Alkalis	1	1	2	2.0	2.0	0
5. Other Inorganic Chemicals	11	6	13	1.2	2.2	0
6. Metals & Metal Containing Sludges	32	25	110	3.4	4.4	0
7. Plastics	19	19	86	4.5	4.5	1
8. Textiles, Leather and Rubber	30	26	141	4.7	5.4	4
9. Wood and Paper Products	43	36	127	3.0	3.5	1
10. Miscellaneous	16	15	58	3.6	3.9	3
	181	149	646	3.6	4.3	10

Contact: Dr. Bob Laughlin, Manager
Canadian Waste Materials Exchange
Ontario Research Foundation
Sheridan Park Research Community
Mississauga, Ontario L5K 929

Date: March 1980

3.2 United Kingdom Waste Materials Exchange, Stevenage Herts, England

The United Kingdom (UK) Waste Exchange was started in 1974 by the Department of Industry's Warren Spring Laboratory at Stevenage because of its previous work and experience on waste recovery.

The U.K. Waste Exchange was operated and funded by the Government from its inception in 1974 until November 1979. The Exchange has been directed to recover 70% of its annual costs by January 1980 and to achieve total self-funding by October 1980. A membership fee of about $45 for 4 Bulletins annually was assessed for cost recovery. The 70% self-funding status was not achieved by January 1 1980 and the Exchange was discontinued.

The U.K. Exchange had been managed by Mr. Ray Tron for about one-third of his time, in addition to a full-time clerical officer. The annual operating costs were approximately $81,000 (£36,000).

The coding system used for each waste material listing consisted of two letters, then three digits, followed by a letter, e.g. AC584D. The first letter A denotes that the material is available. (Listing of materials wanted was discontinued after one year of operation.) The next letter and three digits are an alphanumeric description of the waste material. The last letter from A-G represents the geographical region of origin. Hence, AC584D means waste material C584 from West Midlands and Wales is available for transfer. The code system enables confidentiality for the lister.

A computer is used for data storage, handling and printouts for each quarterly bulletin. Each new listing is entered into the computer according to its classification as one of the 12 material categories, e.g. metals, inorganic chemicals, oils and waxes, etc.

The geographical code and waste material categories are shown as follows:

GEOGRAPHICAL REGIONS:

A Scotland

B Northern Ireland

C North of England

D West Midlands and Wales

E East Midlands and East Anglia

F Central Southern and South East England

G West of England

WASTE CATEGORIES:

1. Acids and Alkalis
2. Catalysts
3. Inorganic Chemical
4. Organic Chemicals and solvents
5. Food Processing
6. Metals
7. Minerals
8. Miscellaneous
9. Oils and Waxes
10. Paper and Board
11. Rubber and Plastics
12. Textile and Leather

The U.K. waste exchange operated primarily in the British Isles, and in a passive information clearinghouse manner. It handled waste materials from manufacturing processes, but excluded "domestic waste, scrap metals, second-hand equipment and related materials for which adequate commercial markets already exist."

Companies submitted to the Exchange the basic information of items available, together with the geographical

location. The items were classified into the twelve groupings shown above. All information available within the system is coded and stored in a computer data bank. In addition to the information printed in the bulletin, the code includes certain other data, e.g. address of the originating company and its Standard Industrial Classification order, a more detailed breakdown of the composition and type of each item and the number of inquiries for it. This register, in addition to forming the basis for producing the bulletin, can be searched to produce statistical analyses based on any suitable set of parameters.

Requests for information from potential users are forwarded to the originating company so that they may make their own arrangements; thus, the identity of the waste producers is never disclosed by the Exchange, and full commercial confidence is maintained.

Forms used by listers and inquirers, as well as the major components of a sample Bulletin are shown in Figures 3.2-1, 3.2-2 and 3.2-3.

Types and quantities of materials available and utilized during the five years (1974-1979) of operation are summarized in Table 3.2-1. Table 3.2-1 also summarizes the type and availability of materials carried by the exchange and those matched-up. Items not quantified within the Table are mainly containers, e.g. bottles and caps, sacks, bags or boxes.

In order to obtain some estimate of the monetary value of the transfers, the final column in Table 3.2-1 shows an estimate of the "as new" cost of the materials utilized. These figures indicate only the actual values of transactions.

A number of companies have reported very significant savings resulting from successful transactions.

It is apparent from the Table that the main impact of the Exchange has been in promoting reuse of chemicals in one form or another. Acids and alkalis have been successfully reused on a large scale, but equally large amounts of both sulphuric acid and caustic solutions, all of which contained contaminants, have not been disposed of.

The catalysts section is small but has enjoyed reasonable success. The indications are that while there is a lot of interest in nickel compounds, there is virtually none for zinc or aluminum. As we might expect with chemicals, there is no definite pattern of requirements or utilization. Most

UK WASTE MATERIALS EXCHANGE

Contact Request Form

Company Name:	Address: Tel. No:	Contact:
This Company Information is Confidential and Will Not Be Publicly Disclosed		

I am interested in obtaining the following items listed in the bulletin:

Ref. No.†	Description†
	NOTIFICATION OF ITEMS BOUGHT, SOLD OR WITHDRAWN.

† give the reference number and description from the bulletin

Figure 3.2-1

UK WASTE MATERIALS EXCHANGE
Notification Form

Company Name:	Address:	Contact:
	Tel. No:	
This Company Information is Confidential and Will Not Be Publicly Disclosed		

I should like the following items* included in the next edition of the bulletin:

Quantity & Timing †	Description ≠
	Available

* space in the bulletin may be limited so please enter items in order of priority

† give amount per period eg gals/week. Note that the period should give some indication of the regularity of the arising or requirement. For instance a regular production of 1000 litres/month should not be listed as 12,000 litres/year, but a single annual discharge would correctly be given as say 20 tonnes/year. Please use the following abbreviations day (D), week (W), month (M), year (Y), litres (LT), gals (GL), kilos (KG), tonnes (TE), tons (TN), pounds (LB), hundredweight (CT), sq. metres (SM), cubic metres (CM)

≠ give a brief informative description, indicating physical form where necessary. DO NOT use more than 60 characters as all descriptions will be printed in the bulletin as one

Figure 3.2-2

SECTION A: MATERIALS AVAILABLE

REF R	QUANTITY		ACIDS & ALKALIS
AC027F	350	GL/Y	HYDROCHLORIC ACID (25% HCl)
AC069C	2400	GL/W	25% W/V SULPHURIC ACID WITH NOT MORE THAN 2% ORGANICS
AC094F	11	TE	SULPHURIC ACID 96% IN TANK
AC156D	450	GL/D	SULPHURIC ACID 40% W/V(INCL.4%ORGANICS) BROWN COLOUR
AC184F	1500	GL/W	SULPHURIC ACID 15%W/W WITH 1.2% ALUMINIUM
AC266D	4000	GL/W	SPENT HYDROCHLORIC ACID PICKLE LIQUOR 14.9%HCL 5.7%IRON
AC324F	600	GL/W	60% W/W SULPHURIC ACID WITH TRACE OF SULPHUR DIOXIDE
AC359C	2	TN/M	CAUSTIC SODA EFFLUENT
AC406C	250	KG	ADIPIC ACID
AC409C	150	KG	CITRIC ACID POWDER
AC410C	1200	KG	1:6 CLEEVES ACID
AC411C	1000	KG	1:7 CLEEVES ACID
AC415C	580	KG	META-PHENYLENE DIAMINE SULPHONIC ACID
AC421C	1200	KG	R R ACID
AC505F	700	GL	PHOSPHORIC ACID 121.5 GPL AS H2 SO4
AC570C	50000	GL/D	HCL,3.5% SIOCL2,1.0% NH4CL,1.0% NACL,1.0% ZROCL2,1.0%
AC580D	120	TE/W	15% SULPHURIC ACID LESS THAN 1% ORGANICS APPROX 1% NH3
AC584D	10	TE/M	ACETIC ACID 80% (20TE.IN STOCK)
AC620A	70	TE/M	67%SULPHURIC ACID WITH 23% HNO3 & 10% H2O
AC621A	40	TE/M	59% SULPHURIC ACID WITH 23% HNO3 & 18% H2O
AC633G	10	TN	HYDROFLUORIC ACID 40% AR GRADE PACKED IN 40 GAL DRUMS
AC642C	120	GL/W	WASTE NITRIC ACID JIG STRIPPING SOLUTION
AC646C	20	TE/M	ACETIC ACID 80% TECH.
AC651C	20	TE/M	ACETIC ACID GLACIAL 97%
AC772E	10	TE/W	77% SULPHURIC ACID TAR HYDROCARBON OIL REFINING
AC779D	200	TE/M	ACID TAR(X60SULPHONIC 20 H2SO4 15 OIL 5 H2O)CV2000BTU/LB
AC780D	500	TE/M	SPENT ACID(X60SULPHONIC 65 H2SO4 5 OIL 5H2O)CV2000BTU/LB
AC781D	70	TE/M	SPENT CLAY (50% FULLERS EARTH,50% MIN OIL CV7000BTU/LB
AC917F	325	LT	ELECT.STRIPPING SOLUTION(NITRIC ACID BASED)
AC926E	250	KG/M	CITRIC ACID(50KG BAGS SOUND)
AC938C	200000	GL/W	CAUSTIC SODA(10-12%) WITH 4% SILICA
AC946G	7	TN	ACETIC ACID(IMPURE) CA 86%
AC953D	12	KG	CAPRIC ACID
AC970D	10	TE/M	ACETIC ACID,80%

REF R	QUANTITY		INORGANIC CHEMICALS
AC088G	4400	LB	SODIUM THIOSULPHATE IN 110 LB BAGS
AC108D	500	TN/W	BLACK IRON OXIDE 0,5"DOWN IN BULK
AC125D	10	TN/M	CARBON POWDER DRY COARSE ABOVE 50MICRONS
AC138E	1000	TE/Y	LIME SLUDGE (CARBONATE-CALCIUM 78% MAGNESIUM 15%)
AC153G	2	TE/M	SPENT CAUSTIC POTASH LIQUOR 48/50%
AC180D	15	TE/M	MIXED CARBON BLACKS(IN BAGS OR OCTOBINS)
AC182C	8	TE	SODIUM ACETATE TRIHYDRATE B.P.
AC193C	300	TE/W	AQUEOUS AMMONIUM HYDROGEN SULPHATE 60%
AC233G	917	KG	SODIUM SULPHATE ANHYDROUS
AC275C	240	KG	MAGNESIUM STEARATE BP
AC277D	900	KG	SODIUM SULPHITE
AC286E	3000	GL/M	NICKEL CARBONATE SLUDGE(CONT.3.5-4.0% NICKEL)
AC290F	250	KG	CUPRIC CHLORIDE IN 50KG CARDBOARD DRUMS
AC295C	3000	KG/Y	SILICON CARBIDE GRITS HS/KGG H80 LONZA
AC309G	12	TN	SCARLET CHROMES
AC360G	5	TN	YELLOW CHROMES

Figure 3.2-3

TABLE 3.2-1

TYPE AND QUANTITIES OF MATERIALS AVAILABLE AND UTILIZED VIA

THE UKWME 1974-1979

With Continuous Quantities Costed on an
"As-New" Basis Per Year

Type of Waste	No. of Items Advertised	Quantities Available		No. of Transactions Reported Match-ups	Quantities Disposed		Estimated Cost on "as-new" Basis of Items Disposed x 1,000 £U.K.
		Continuous TE/YR	Single TE		Continuous TE/YR	Single TE	
Acids and Alkalis	132	408,370	90	18	102,350	10	3,010
Catalysts	31	2,270	780	14	930	750	481
Inorganic Chemical	379	1,615,690	12,510	75	22,400	2,497	952
Organic Chemicals and Solvents	466	41,110	900	114	10,180	314	1,333
Food Processing	65	241,760	560	16	1,960	264	33
Metals	94	62,440	10,110	7	12	26	21
Minerals	163	619,220	700,360	21	2,110	185,010+	500
Miscellaneous	397	293,740	7,290	53	3,400	6,876	339
Oils and Waxes	135	56,280	870	31	2,710	107	389
Paper and Board	146	48,650	140	29	960	40	36
Rubber and Plastics	475	24,990	2,090	87	8,503	370	1,020
Textile and Leather	180	27,460	230	22	555	60	32
Totals	2,663	3,441,980	735,930	487	156,070	196,324+	8,146

+ This includes one item of 120,000 TE.
* This does not include a further 30 items disposed of as numbers of items for which weights are not known but totaling 135,000 in "as-new" value.
TE = tonnes
= metric tons (1,000 kilograms)
= 2205 pounds
1£ = $2.24 U.S. (July, 1979)

interest has been shown in solvent mixtures, metal oxides, or material where there is a significant metal content; but again, contaminants appear to be the main constraint. There appears to be little or no interest in complex organic compounds or items listed under trade names and no demand for waste sulphate or sulphite solutions.

All items grouped under food processing attracted many inquiries. About 50% of mineral items attracted a lot of interest, e.g. silica, silicon carbide grits, graphite and high alumina-content materials. Items identified only by trade names have been ignored and little interest shown in waxes in the oil-and-waxes group. As with food processing section, virtually all items in the paper and board, textiles and leather sections attracted a high interest.

There was no interest in rubber wastes and very little in foams, mixed polymers or high molecular weight compounds.

The Bulletin circulation is in excess of 6,000. A total of 2,660 different items have been advertised, with over 24,300 inquiries resulting in 487 known match-ups. The estimated savings in landfill capacity are in the order of 500,000 cubic metres. Estimated saving of oil (5,000 TE) is approximately 1.25×10^6 gallons.

Of the total number of items advertised, approximately 20% have been match-ups. Other items have been withdrawn from the Bulletin because the process has been modified so that the waste is no longer available or because the company has reclaimed the waste itself for reuse. The average size of the Bulletin was reduced to about 600 items by withdrawing listings over two years old and those resulting in less than 2 inquiries.

It was assumed from the outset that a waste exchange would have a limited useful life in that, once contacts had been established, a central activity would no longer be required. This situation may have been reached when sufficient support for the exchange did not materialize. Nevertheless, a vocal minority of firms want the exchange to continue, if necessary in the private sector. Apparently, there is a problem in "transferring the exchange" because of the confidential nature of the files. Consequently and apparently, the matter is not yet closed.

Contact: Mr. Ray Tron, Exchange Manager
U.K. Waste Materials Exchange
P. O. Box 51
Stevenage, Herts SG1 2DT
Telephone: Stevenage (0438) 3388

Date: October 1978

3.3 National Industrial Materials Recovery Association, NIMRA, London, England

NIMRA was established and supported from 1942 to 1956 by the British government. The service became self-sufficient after 1956 by Association fees.

NIMRA is a non-profit organization, run by and for industry on a voluntary basis. Originally formed to conserve materials in time of war, the Association has continued to help members achieve positive cost savings by providing services in the fields of research, advice and information exchange. The objectives of NIMRA are:

i) To stimulate the maximum re-use and economical recovery of redundant or waste materials, physical plant and by-products.

ii) To encourage the search for new uses for wastes or residues arising from production processes.

iii) Assist members to reduce pollution by practicing reclamation and recycling.

iv) To maintain an advisory service on recovery and reclamation.

It publishes a bulletin called Industrial Recovery, which is free to members, with articles and information on profitable recovery plus free advertising of redundant plant, machinery, surplus stores, material, by-products, and recoverable wastes from manufacturing processes. Membership fees are £ 20 ($32) per year. They have approximately 2,000 members.

The listings are mainly for used plant, reprocessed valves, old stores, tanks, compressors, etc., with only a very small section on chemicals. There are both Wanted and Disposal sections. Confidentiality is not maintained in the NIMRA exchange. Listers give an address or telephone number at which they can be contacted. NIMRA does not have the staff to operate the exchange on a confidential basis. Figure 3.3-1 shows the rules governing listings.

NIMRA's membership is mixed, encompassing scrap dealers, reprocessors plus some industrial companies. Representation from larger industrial concerns is quite small.

No statistics on the numbers of listings were available,

since inquiries are not directed through the exchange. Likewise, information on inquiries or transactions are also unavailable. The August 1976 magazine contained about 120 listings, which would give yearly figures of 1,200-1,500, which is quite high compared with many of the European waste exchanges. The items listed, however, would have to be described as already having a reasonably well established "second-hand market".

Contact: Mr. F.G. Walker, Secretary General
National Industrial Materials Recovery Assoc.
York House
Westminister Bridge Road
London, S.E. 1 7UT
England

Telephone: 01-928-5715

Date: March 1977

3.4 Swiss Society of Chemical Industries Waste Exchange, Zurich, Switzerland

The exchange was started in February, 1973 by the Swiss Society of Chemical Industries, the Society of Varnish Manufacturers, and the Soap and Detergent Society. The purpose of the exchange is the protection of the environment, and the utilization of valuable resources. The service is available only to companies that belong to the three organizations.

Activity of the exchange is limited, since only 120 offers and 10 requests have been published in a four year period. An average of 5-10 offers are made each month with a much smaller number of requests. An estimated 0.4 inquiries are received per listing. Statistics on match-ups are not kept, since their release is not approved by the membership. In a small country like Switzerland, waste material transactions occur which by-pass the exchange.

Offers and requests are accepted only from members of the sister societies. Offers and requests must be made in German or French. Publication is made under the condition that the exchange is not responsible for impurities in the wastes.

Listings are published monthly in the society's journal and also in the German VCI. Bulletins have a total circulation of 600.

Listings are coded for confidentiality and anonymity of advertisers. The mechanics of the exchange are similar to others. Listings for the exchange are made on a form shown in Figure 3.4-1. Information on this form is coded and after deleting the lister's name and address, is published in the waste exchange sections of the respective society's monthly bulletins. Inquiries for listed materials are made to the societies and the inquiry is then passed on to the listing company.

The exchange is operated at minimum cost. About 2-3 hours per week for the Director and for a secretary are required to maintain the service.

A draft comprehensive new environmental law is being considered by the Swiss parliament, and this includes a section concerning waste disposal. It is expected that it will take 2 or 3 years before this is voted on and probably 4 or 5 years to become effective. It is, therefore, difficult to judge its impact on the Exchange.

Contact: Dr. Karl Wegman
Borse fur weiterverwertbare Chemie-Abfalle
Swiss Society of Chemical Industries
Nordstrasse 15
8035 Zurich
Switzerland

Telephone (01) 60-10-30

Date: December 1979

3.5 Austrian Chemical Industry Association Exchange Vienna, Austria

This exchange is sponsored and operated by the Association of Austrian Chemical Industries. It was started in February of 1973 and the exchange service is open only to members.

Offers and requests are published in their regular journal. The number of listings is low, with none listed some months. Listings are also published in the German VCI bulletins.

This exchange is similar in organization to the German and Swiss Exchanges. Listings are coded for confidentiality.

Figure 3.4-1

Formulaire pour l'annonce de
résidus chimiques aptes à la réutilisation

(Application for reuse of chemical residues)

No du chiffre (à ne pas remplir par l'expéditeur): .....

Nature du résidu: .....

Spécification:

Concentration:.....%
Teneur en eau: (water content).....%
Impuretés organiques: (Organic contaminants) .....%
Impuretés inorganiques (dissous et non dissous):.....%
(Inorganic contaminants - dissolved & nondissolved)
Métaux lourds: (Heavy metals).....%
pH: .....
Propriétés physiques et état:
(p.ex. visqueux, pâteux etc.) (Physical properties).....

Quantité par semaine / mois: (Quantity by week/month) kg 100%

Tonnage annuel.... / pendant les semaines du.... au.....

Emballage:.....

Possibilité de transport: .....

De la gare de / de l'usine de [1] : .....

Maison offrante [2] : .....

Timbre et signature

Date..... .....

1) 2) Ces renseignements ne figureront pas dans le bulletin.

(This data will not be published in the bulletin.)

Contact: Frau Dipl.-Ing. Haberfelner
Fachverband der Chemischen Industrie Osterreichs
A-1011 Vienna, Austria

Telephone: (0222) 6357-63

Date: December 1979

3.6 Austrian Federal Waste Exchange, Linz, Austria

This exchange was started in July 1974 specifically for large volumes of waste with "problematical compositions".

Confidentiality is not maintained and names of the listers are published in the Bulletin. Bulletins are published monthly and distributed to all members of the chamber of commerce. Listings are not published in the German VCI Bulletins.

Listers are asked to notify the exchange of match-ups and a high rate of notifications have been received. For the first year of operation, 44% of the listed wastes were exchanged.

Contact: Dr. Kerschbaummayr
Bundesabfallborse
Hessenplatz 3,
Linz, Austria

Telephone: (0732) 78-444-295

Date: December 1979

3.7 Nordic Waste Exchange, Stockholm, Sweden

The Nordic Exchange began in November 1973 as a joint venture of the Federations of Industry in Denmark, Norway, Finland and Sweden.

A Nordic intergovernmental foundation (Nordisk Industrifond) provided some of the funds for the Waste Exchange during the first three years with matching funds from the Federations of Industry. The Federations of Industry provided the total budget thereafter, from annual membership dues. The exchange service is free to members.

A special charge was considered but was not introduced. The objectives of the Nordic Waste Exchange are to:

i) provide a 'passive' service as intermediary between generators of industrial waste residues, surplus materials, etc. and potential users of such substances as basic raw materials for their own processes. (Available capacity for safe conversion or ultimate destruction of hazardous wastes in included also), and

ii) active follow-up of the results of the intermediation procedures, to characterize wastes and the processes which either generate them or utilize them from the standpoint of 'waste versus resource'. This would entail considerable technological input, as required.

Wastes are classified by type and code number. Each item is classified by:

i) offer of or

ii) request for specific wastes or residues.

iii) offer of surplus chemicals or products, or

iv) available spare capacity for treatment (refining or destruction) of specific types of (hazardous) wastes.

Companies interested in any item may contact the Waste Exchange by letter requesting further information. The request is forwarded to the listing company, whose anonymity is protected. The listing company may, at its own discretion, contact the interested party/parties. The Waste Exchange does not participate in any negotiations or dealings after the primary contacts are made.

The waste categories are listed as follows:

1. Plastics
2. Textile, leather
3. Paper-containing materials
4. Solvents, waste oil
5. Acids, pickling liquors
6. Inorganic chemicals
7. Organic chemicals
8. Slags, Sludges, etc.
9. Miscellaneous

Each request for further information sent to the listing organization is accompanied by a Waste Exchange form with questions regarding the outcome of the contact established. In the period December 1973 to December 1975, a total of 270 items were listed that received 517 inquiries. Of the 147 contacts completed, 27% yielded positive results (transactions) while 63% gave negative results. The remaining 10% were incomplete (inconclusive).

The results have been further broken down to 'Positive Results per Item' as follows:

Summary of Two Years of Operation 1973-1975

Waste Category	Percent of Total Listed (%)	Inquiries per Item	Positive Results per Item
1. Plastics	23.7	2.5	0.2
2. Textiles	12.6	4.1	0.4
3. Paper	5.2	2.4	0.4
4. Solvents	6.7	1.2	0.4
5. Acids	7.4	0.2	0
6. Inorganic Chemicals	11.5	1.5	0.5
7. Organic Chemicals	7.8	0.7	0.3
8. Slags, sludges	7.0	2.2	0.2
9. Miscellaneous	18.1	1.0	0.1
	100.0		

Long transportation distances are a particularly serious problem in Nordic countries for successful transactions. However, it was found at an early stage that the Waste Exchange did provide a useful means of identifying the principal waste problems in each region.

Contact: Mr. L.G. Lindfors
I.V.L. Research
Halsingegatan 43
S-100-31
Stockholm, Sweden
Telephone: 08-24-96-80

Date: December 1979

3.8 The Turin Waste Materials Exchange, Turin, Italy

The Exchange was started in late 1977 by the Turin Chamber of Commerce. The first Bulletin was published in May 1978 with the seventh Bulletin published in January 1980.

The objectives are to conserve raw materials and to reduce waste disposal costs.

All materials, including paper and machinery are accepted for listing. The Bulletin has a circulation of 3,000 and is sent at no charge to all the Italian Chambers of Commerce, their members, and industrial unions.

Listings are coded for confidentiality as materials wanted or available in 11 general categories as shown in Table 3.8-1. This table also summarizes the activity of the exchange from 5 Bulletins between March 1978 to September 1979, or some 19 months.

Match-up information was not available because follow-ups to inquiries were not made.

Recent Bulletins contain articles of interest such as meeting and conference announcements, European Common Market legislation on wastes, national and regional legislation and energy and recycling relationships.

Contact: Dr. Alumno or
Mr. Roberto Guazzetti
Camera di Commercio Industria
Artigianato e Agricol
Via S. Francesco da Paola, 24
10123 Torino, Italy
Telephone; (011) 57-161

Date: March 1980

3.9 Italian Chemical Industry Association (ANIC), Milan, Italy

The Bulletin or "Exchange of Industrial Wastes" was established in 1973 by the National Association of Chemical Industries (ANIC). The service is open to members only on an official basis. Unofficially, announcements from non-members are also accepted.

Table 3.8-1

SUMMARY ACTIVITY OF THE TURIN ITALY WASTE MATERIALS EXCHANGE

March, 1978 - September, 1979
(5 bulletins - 19 months)

WASTE CATEGORY	MATERIALS AVAILABLE	INQUIRIES NUMBER	INQUIRIES PERCENT	MATERIALS WANTED	INQUIRIES NUMBER	INQUIRIES PERCENT
CHEMICAL WASTES	58	43	74	18	16	89
PLASTIC MATERIALS	44	30	68	19	17	89
PAPER AND CARDBOARD	37	29	78	8	19	237
WOOD	24	4	17	15	13	87
RUBBER	12	4	33	2	2	100
LEATHER	2	-	-	-	-	-
TEXTILES	22	3	14	13	9	69
GLASS	3	2	67	2	3	150
METAL	46	26	57	20	9	45
VARIOUS MATERIALS	42	13	31	3	6	200
EQUIPMENT	3	1	33	-	-	-
T O T A L	293	155	53	100	94	94
TOTAL OF FIRMS	192	-	-	34	-	-

The association's weekly Bulletin includes exchange listings. The wastes are not categorized, but are listed in the order received. All wastes such as chemical products are accepted for listing, and in recent years, announcements for process equipment, such as used heat exchangers and centrifuges have also been accepted.

Statistics on successful matches are unavailable because the exchange does not follow completed transactions. Since the start of operations, 180 items were listed as available with 20 items wanted. As an average, 5 inquiries are received for each listing, with a range from 1-10.

The overall trend since the service was started has been initial peak of listings followed by a slack period until 1977. In 1978-79, interest increased because of tighter environmental protection laws and constraints on the supply of materials.

The cost of operating the exchange is included in the association's budget. About 2 hours per week each are required from the Director, a graduate chemist, and one secretary.

Contact: Dr. Dario Linares
Associazone Nazionale dell'industria Chimica
Via Fatebenefratelli 10
20121 Milano
Italy
Telephone: 02-657-28-41

Date: January 1980

3.10 Waste Exchange of Israel, Jerusalem, Israel

The waste exchange of Israel (WEI) is sponsored by the Ministry of Industry, Commerce, and Tourism, which operates and funds it through the National Physical Laboratory of Israel. The object of the waste exchange is to reduce imports and pollution. It was started in September of 1976. The annual operating budget is approximately $20,000, U.S.

The WEI, in addition to a free twice yearly clearing-house publication, plays an active role using technical imagination. It provides consulting, analytical and reprocessing information.

The Bulletin is circulated to all factories and research establishments in Israel having wastes. The exchange lists

about 10 new items per month, with a response rate of about 4 inquiries for each listing. All industries are served and all wastes with no other avenues for marketing are accepted.

The exchange is staffed by 2 full-time and 2 part-time personnel with extensive skills in chemistry, engineering, processing and marketing.

Information on listings is kept in notebooks and is coded for confidentiality by a 4 digit number. The Bulletin classifies materials as available or wanted. Data on match-ups is shown in Table 3.10-1.

Contact: Mr. Ezra Shamash, Manager
Israel Waste Exchange
Danziger Building A
Hebrew University
Jerusalem, Israel 91999

Telephone: 02-584480

Date: January 1980

TABLE 3.10-1

MATCH-UPS FROM THE WASTE EXCHANGE OF ISRAEL

Match-ups or Transfers	Quantities	Continuous	One Shot
Methyl ethyl ketone	4 tons	Monthly	
Xylene	3 tons	"	
Toluene	4 "	"	
Ethanol	5 "	"	
Acetic Acid	10 "	"	
Acetone	5 "	"	
Sulphuric Acid (clean)	20 "	"	
Hydrazine Sulphate	3 "	"	
Ferrous Sulphate waste (Pickling steel)	1 "	"	
Lead Oxide	5 "	"	
Rubber powder (from recap. tires)	3 "	"	
Polypropylene battery cases	2 "	"	
Cellulose waste	3 "	"	
Nylon fibres	4 "	"	
Used benches (wooden)	2,000	-	One shot

3.11 Metropolitan Waste Disposal Authority, New South Wales, Australia

The Metropolitan Waste Disposal Authority is charged with responsibility for the transport, collection, reception, treatment, storage and disposal of waste within the Metropolitan Waste Disposal Region. The Authority, besides ensuring that waste disposal occurs in an efficient and environmentally satisfactory manner, is putting considerable effort into developing conditions that will encourage the recycling of waste materials. Thus, it has established an Industrial Waste Exchange to put generators of waste materials in touch with industries which have a use for them. The Exchange, by finding users for waste materials, helps to conserve raw materials and saves industry disposal costs. This service was introduced in March 1977.

The Exchange is concerned with waste materials originating from manufacturing processes but excludes wastes from domestic sources and those scrap metals, second hand equipment and related materials for which adequate commercial markets already exist. Some examples of waste that are readily exchanged are: waste lubricating oils or solvents for use as a fuel; relatively clean waste alkali for neutralization of waste acid; metal rich slags which are worth recovering; waste phosphoric acid for use in the manufacture of fertilizers, etc.

A register is maintained of wastes for disposal and materials required. This information is published every four months as listings of:

(a) waste materials offered, and
(b) waste materials sought.

The identity of participating companies is protected by assigning each item listed with a code number. Responses to listings are promptly forwarded to the firm which has made the listing; the firm chooses the responder with which to negotiate. The Exchange does not participate in negotiations. The firm's only obligation to the Exchange is to notify the Exchange when a successful negotiation has been completed.

There is a fee of $5 per item listed. The fee is intended to cover mailing and stationery costs. Two cards are prepared for each item listed. One of these cards is filed by company name and in alphabetical order and the other card is filed under either materials for disposal

or materials required and according to waste type. Typical categories are as follows:

> Food Processing, Acids and Alkalis, Inorganic Chemicals, Organic Solvents and Oils, Pallets, Sand, Ash etc., Shavings and Sawdust, Timber Offcuts, Paper and Cardboard; Textiles and Other Offcuts, Containers (drums, boxes, bags, etc.), Plastic Scrap and Miscellaneous Items.

The number of companies which have registered since the start of the exchange is 293, and the current 370 listings originate from 58 companies. There have been 140 successful exchanges, 37 percent, during the period of operation and it is estimated that a total saving of over $100,000 (Australian) per year is being achieved by the companies concerned.

Examples of materials exchanged in the one year period from July 1978 to July 1979 are shown in Figure 3.11-1.

Contact: Mr. R. Conolly, Director
Metropolitan Waste Disposal Authority
7 Help Street (P.O. Box 699)
Chatswood 2067
N.S.W. Australia
Telephone: 412.1388

Date: October 1979

3.12 Industrial Waste Exchange Service, Victoria, Australia

This is the second Australian Waste Exchange and was introduced in February 1978 by the Environment Protection Authority in the State of Victoria.

Participation in the service is free, the only obligation being that the Authority is to be advised of the outcome of negotiations between the waste generator and the potential customer. Listings are published at quarterly intervals, with guaranteed anonymity.

Items are listed in two consecutive issues only. A cumulative total of 141 disposal registrations and

July, 1978 - November, 1978

A111	400 sheets	Masonite sheets with damaged edges
A147	3 tonnes	Calcium carbide in rock form
A152	2,000 linear ft	2" x 2" western red cedar
A175	2,000 bags/mth	Kraft paper bags
A193	60 cu m/wk	Hardwood shavings
B133	400 bags	Heavy duty plastic bags
B138	610 gals	Contaminated 45% HNO_3 acid
B180	2,000 gals/wk	Used mineral oil
B151	50/wk	Cardboard cartons
B177B	Unspecified	Polystyrene offcuts
	420 kgs	Chloroform
	50 bales	Straw
	40 gals	Aviation grade methanol
	130 gals	Concentrated chromic acid
	1½ tonnes	Sodium peroxide
	3 tonnes	Phenol mercury urea fungicide
	80 gals	Cooking oil
	8,000 gals	Lube oil additives

November, 1978 - March, 1979

A175	14,000	Polyethylene bags
A209	200	Masonite sheets
A213	15	114 litre open top drums
B129	20	Wooden packing cases
B151	2,000	Cardboard cartons
B179	10 tonnes	Polyurethane foam
B180	2,000 litres/mth	Hydraulic oil
	200	Softwood pallets of various sizes
	750	5 litre ampar glass wire flagons
B183	4,000 litres	Colored paraffin wax
B212	750 kg	Potassium per sulphate
	5,000/mth	Polyester discs
	200 drums	Cylindrical fibre drums
	200 kg	Calcium chlorite
B229	10,000 kg	Paraffin wax

March, 1979 - July, 1979

A152	900 metres	Red cedar offcuts
A173	5 tonnes/wk	Broken glass
A228	12,000 litres	Waste caustic soda solution
A231	2,200 litres	Used fuel oil
B108	20 m^3	Hardwood offcuts
	20 m^3	Pine offcuts
B250	20/month	Small wooden packing cases
B192	23 m^3/wk	Sawdust
B208	Several thousand	Cardboard cartons - various sizes
	Unspecified	Zinc chloride solution
B212	10 kg	Mercury
B212	14 kg	Mercury perchloride
	9 kg	Potassium ferricyanide
B235	Unspecified	Cardboard cartons
	Unspecified	Shredded plastic for packing
	5 tonnes	P.V.C.
B236	20 m^3 cont. load	Timber dunnage for machinery packing
A207	1,000 bags	Multi-ply 30 kg kraft paper bags

Figure 3.11-1. EXAMPLES OF MATERIALS EXCHANGED BY METROPOLITAN WASTE DISPOSAL AUTHORITY, NEW SOUTH WALES, AUSTRALIA

143 requirement registrations were recorded up to December 31, 1978. Over 11 months, the total number of successful negotiations was 23, i.e. 16%. Waste materials which have prompted many of these inquiries include various types of plastic waste, glass, sawdust, lime and solvents.

The waste categories are:

Acids, Alkalis
Inorganic/organic Chemicals
Paints, Oils, Solvents
Textiles
Timber
Paper, Plastics
Miscellaneous

Contact: Mr. Dennis Bloor
Environment Protection Authority
Land Waste Management Branch
Victoria, Australia
Telephone: 651-4392

Date: March 1980

3.13 National Agency for the Recovery and Elimination of Waste, (ANRED) Angers, France

The first waste exchange in France was operated by a French magazine "Nuisances et Environment" started in April 1975. A second waste exchange was started in June 1975 by the French Chemical Association (I.R.C.H.A.), which was subsequently united with the "Nuisances et Environment" effort.

In July 1975, a law was enacted for waste elimination and recovery of materials. One provision of the new law was establishment of a National Agency for the Recovery and Elimination of Waste (A.N.R.E.D.) in 1976. It became fully operational in 1978. Since ANRED became operational, the two waste exchange efforts described above have ceased.

The 1975 legislation made producers of waste accountable for its safe disposal and also enabled the government to take steps to encourage optimal disposal and recovery, including measures of support to industry. Perhaps the most important government measure was the establishment of the National Agency (A.N.R.E.D.).

It is a state body, under the joint tutellage of three ministries: Environment, Industry and Budget. Its board consists of representatives of central and local government and of industry, environmental and consumer groups. It has a permanent staff of 15.

ANRED's terms of reference are broad, requiring it to find satisfactory solutions to industrial and household waste problems in order to "keep France clean". For the 15 months ended December 31, 1978, it had a budget of FF40 million (nearly US $10 million) to finance direct and indirect intervention programs.

In practice ANRED:

- helps to set up waste treatment centers (based on incineration and chemical processes) including the provision of subsidies and technical support. These include centers for treatment of toxic as well as other waste;
- encourages the development of new technology;
- provides technical assistance to communities and companies;
- disseminates information to industry and others on their legal obligations and on the opportunities for assistance available to them;
- promotes campaigns of publicity and education aimed at the public at large.

ANRED has supported the establishment of waste exchanges. These are operated on the familiar passive model, i.e. information on material 'available' and 'wanted' is published in bulletins by regional groupings of chambers of commerce. There are six such groupings at present; these are shown in Figure 3.13-1.

Contact: Regional Offices shown in Figure 3.13-1
or
Agence Nationale pour la Recuperation et
L'elimination des Dechets
2, Square Lafayette
49000 - Angers
France
Telephone: (41) 88.98.25

Date: March 1980

Figure 3.13-1

REGIONAL INDUSTRIAL WASTE EXCHANGES IN FRANCE

1. BASSE NORMANDIE

(Calvados, Manche et Orne)

41, boulevard du Marechal Leclerc - 14000 CAEN
Monsieur HUBERT - Tel.: (31) - 85 4968

2. CHAMPAGNE-ARDENNES

(Ardennes, Aube, Marne, Haute-Marne et Meuse)

10, rue de Chastillon - B.P. N° 1506 - 51002 CHALONS-SUR-MARNE
Monsieur RUELLE - Tel.: (26) 68.44.11

3. ILE-DE-FRANCE

(Seine, Seine-et-Marne, Yvelines, Essonne, Hauts-de-Seine, Seine-Saint-Denis, Val-de-Marne et Val-d'Oise)

9, rue Salvador Allende - 92000 NANTERRE
Monsieur DeMIERRY - Tel.: 776.44.90

4. PROVENCE-ALPES-COTE D'AZUR

(Alpes, Alpes-Hautes-Provence, Alpes-Maritimes, Bouches-du-Rhone, Var et Vaucluse)

Association "Environnement-Industrie"
Palais de la Bourse - 13222 MARSEILLE CEDEX
Monsieur ALLEMAND - Tel.: (91) 91.91.51

5. AQUITAINE

AREDRA - Chambre Regionale de Commerce et de l'Industrie "Aquitaine"
9 Place de la Bourse 33075 BORDEAUX Cedex Tel.: 909128

6. PAYS DE LA LOIRE

A.R.A.P.O. Palais de la Bourse 18 X
44040 Nantes Cedex
Tel.: (40) 48.65.83

3.14 VCI - Abfallborse Frankfurt, West Germany

This exchange was established in January 1973 by the Association of Chemical Industries (VCI). It is directed specifically to the chemical industry with the goal of environmental protection and reuse of resources.

Listings are published in a bulletin sent only to VCI members about 8 times per year and also in the monthly magazine Chemical Industry, which has a broad circulation. Consequently, because of broad non-member circulation, the exchange can be used by anyone. Both the aforementioned publications print listings from the other German DIHT exchange, the Belgian (F.I.C.B.) Netherland, Nordic, Austrian (Association of Chemical Industries), Swiss and Italian (ANIC) Exchanges.

Confidentiality is maintained by coding the waste materials. Inquiries are forwarded to the lister who may negotiate a transaction with the inquirer. The listings, since they are few in number, and are listed but once, are not categorized. Quantities, analyses, availability, and area or region of location are described. A sample list for October 1979 is shown in Figure 3.14-1.

A sample of Chemical Industry listings of European Waste Exchanges for September 1978 are shown in Figure 3.14-2.

The VCI exchange does not list waste materials with established markets such as solvents and plastics. Potential listers of these materials are sent lists of brokers or companies who handle that particular material. It has been estimated that one-half the wastes submitted to VCI are published in the bulletin. The other half are directed to established markets.

The effectiveness of the exchange was evaluated in 1974, by a questionnaire sent to 100 listers. The questionnaire yielded 85 answers. Forty-nine percent of the replies resulted in no transaction. Some of the reasons for failure were:

1. Excessive impurities - 13 replies
2. Weak concentration - 7 replies
3. High transport costs - 7 replies

Twenty-four percent of the replies described successful exchanges. Negotiations were in progress for the remaining replies. The current estimate of match-ups is 20 percent.

Verband
der Chemischen Industrie e.V.

6 Frankfurt am Main
Karlstraße 21
Postfach 11 9081
Telefon (06 11) 25 56–1
Fernschreiber 411 372 vcif d

Nur für den internen Gebrauch
der Mitgliedsfirmen

VERBANDS-MITTEILUNGEN

Verband der Chemischen Industrie e.V.

6/79 (Auszug) 1. Oktober 1979

VCI-Abfallbörse

Die VCI-Abfallbörse nimmt chemiespezifische Angebots- und Nachfragemeldungen aus dem Gebiet der Bundesrepublik Deutschland zur Veröffentlichung entgegen. Voraussetzung ist, daß es sich um Produktionsrückstände handelt, die laufend anfallen.
Wenn Sie sich für die folgenden Angebote oder Nachfragen interessieren, wenden Sie sich bitte unter Angabe der Chiffre – Ihr Schreiben wird durch uns an die betreffende Firma weitergeleitet – an:
VCI-Abfallbörse, Karlstraße 21, D-6000 Frankfurt 1

A454) Lösemittel-Regenerat, vorwiegend aus Aromaten (Xylol) aliphatischen Kohlenwasserstoffen, Glykoläther und geringen Mengen an Alkoholen, Estern und Ketonen, wasserfrei
Menge: ca. 20 t
Raum: Ruhrgebiet

A455) Verbrauchte Kühlsole (Hoesch Pa 9 rot), pH 12
Menge: 6,4 t einmalig, davon:
4 t Sole mit 0,2 g/l NH_3 und ca. 30 mg/l Cu
2,4 t Sole mit 0,01 g/l NH_3 und ca. 20 mg/l Cu
Raum: Baden-Württemberg

A456) Graphitelektroden-Reste aus Diaphragma-Elektrolyse, leinölimprägniert, chlorhaltig
Menge: ca. 20 t/Monat
60 bis 65 t am Lager
Raum: Nordrhein-Westfalen

A457) Zinkspäne, lamettaartig, jedoch kurzer, mit wasserlöslicher Emulsion auf natürlicher Fettbasis genngfügig benetzt (Emulsion kann vom Anbieter ggfs. entfernt werden)
Zinkgehalt 99,95 %
Menge: 4 bis 5 t/Monat
Raum: Köln

A458) Elementarschwefel, feucht (40 bis 60 % Feuchtgehalt), 99 %ig rein in trockenem Zustand, mit geringen Mengen Kohlenwasserstoffen
Menge: ca. 8 t/Jahr kontinuierlich anfallend
Raum: Frankfurt/Main

Nachfragen

N85) Altschwefelsäure, Säureharz, Säureteer pumpfähig, mit organischen Verunreinigungen
gesuchte Menge: jede, regelmäßig

Belgische Abfallbörse

Firmen, die sich für die nachstehenden Angebote und Nachfragen interessieren, werden gebeten, sich unter Angabe der Chiffre zu wenden an:
Bourse des Déchets ECOCHEM, Square Marie Louise 49, B-1040 Brüssel

A146 Quecksilberhaltige Rückstände:
Amalgam aus 17 % Hg und 83 % Zn,
Menge: 25 t
Amalgam aus 22 % Hg und 78 % Metall oder nicht bestimmte Metalle,
Menge: 20 t
Kleinbatterien mit 45 % Hg,
Menge: 40 t

Niederländische Abfallbörse

Firmen, die sich für die nachstehend veröffentlichten Angebote (A) oder Nachfragen (V) interessieren, werden gebeten, sich unter Angabe der Chiffre zu wenden an:
Afvalbeurs VNCI, Javastraat 2, 'S-Gravenhage

A358 Gemisch aus Essig-, Propion- und Buttersäure
Heizwert etwa 4800 kcal/kg, verunreinigt mit 10 ppm Chlor und Manganoxid
Menge: 12000 t/Jahr

A357 Antimontriacetat, 80 bis 95 %ig mit 5 bis 20 % Toluol
Menge: 2,6 t

Schweizerische Abfallbörse

Firmen, die sich für die nachstehenden Angebote oder Nachfragen interessieren, werden gebeten, sich unter Angabe der Chiffre zu wenden an:
Börse für weiterverwertbare Chemie-Rückstände, Schweizerische Gesellschaft für Chemische Industrie, Postfach, CH-8035 Zürich

AB192 Salpetersäure, rauchend, destilliert, 77 bis 80 %ig, 20 bis 23 % Wasser, verunreinigt durch etwa 0,5 % HNO_2 und Schwermetalle in Spuren
Menge: 150 t/Monat (rund 1500 t/Jahr)

DIHT-Abfallbörse

Bei Interesse an den nachstehend veröffentlichten chemiebezogenen Angeboten (A) und Nachfragen (N) aus der Bundesliste der von den Industrie- und Handelskammern (IHK) betriebenen Abfallbörsen wenden Sie sich bitte direkt an die genannte IHK unter Angabe der vorangestellten Chiffre.
Die Anschrift der IHK ergibt sich durch Hinzufügen der Angaben »Abfallbörse«, darunter »Postfach« und den jeweiligen Ort mit Postleitzahl.

DIHT-Bundesliste
Abfallbörse Nr. 6/79
IHK zu Dortmund

DO-A-154-1 Gebrauchte Salzsäure, Fe-haltig
Menge: 60–80 t/Monat in Teilpartien zu 20 t

Niederrheinische IHK zu Duisburg

DU-A-331-10 Phosphatgips (Anhydrit)
Menge: jede

IHK Essen

E-N-008-04 staubförmige Zuschlagstoffe, nicht toxisch
Gesuchte Menge: 3–5 t

E-N-041-01 Phenolhaltiger Ronstoff, flüssig, mit wenig Neutralölen weitgehend in waßrigem Alkali löslich
Gesuchte Menge: 20–100 t/Jahr

DIHT-Bundesliste
Abfallbörse Nr. 8/79
IHK Essen

E-A-10/123 Kobalt-Molybdän-Katalysatoren
Menge: 30 t

IHK zu Köln

K-A-278-1 Beta-Alanin-isobutylester-HCl 100 %
gelöst in 50 %iger Chlorbenzollösung
Menge: 9620 kg

Figure 3.14-1

EUROPEAN WASTE EXCHANGE OFFERINGS AND REQUESTS
(does not include the U.K.)
From Chem. Ind. XXX/September 1978

GERMANY

Angebote - Offers

A 419 Filterpapierabfalle, imprägniert mit ca. 18% nicht gehärtetem Phenolharz
Menge: ca. 5 t/Monat
Lieferform: Pressballen zu 100 - 110 kg.
Raum: Nordhessen
A 421 Diphenyl-Diphenylenoxid, fest, verunreinigt mit u.a. 6% Phenol.
Menge: 20 t/Monat
Raum: Krefeld
A 422 Ameisensäure, regeneriert, ca. 80% ig mit ca. 5% Wasser, 12% Äthylformiat und 3% organischen Verunreinigungen
Menge: 30-40 t/Monat
Raum: Südwest-Deutschland
A 423 Kaliabfallsalz (18% K) als stichfester Schlamm mit 50% Wasser, verunreinigt mit 50% PO_4, 1% organ,S, 0,3% organ, N, 0,6% NaCl (Wiederholung von A 395)
Menge: 200 t/Monat, in 5 t Absetzcontainer
Raum: Köln
A 424 Spaltofenabbrand (74% Fe_2O_3), verunreinigt mit H_2O, $MgSO_4$, TiO_2, S, CaO, Al_2O_3, SiO_2 (Wiederholung von A 396)
Menge: 9,000 t/Monat
Raum: Krefeld

Nachfrage - Requests

N 80 Phosphorsäure mit geringen Anteilen Schwefelbzw. Salzsäure, auch mit geringen Anteilen Metallionen für regelmässige Abnahme gesucht.
N 81 Ammoniakwasser als wässerige Lösung mit mind. 25% NH_3-Gehalt, ggf. als Entsorgungsprodukt in verunreinigtem Zustand.
Menge: ca. 800 t/Jahr.

BELGIUM

A 132 Alt-Schwefelsäure, ohne organ. Verunreinigungen, mit mind 20% H_2SO_4, mind. 35% Ammoniumbisulfat und 45% Wasser
Menge: et wa 1 600 t/Monat
A 133 Aufarbeitungsfirma gesucht für Filterkuchen mit 20-30% Benzoesäure in wässriger Lösung
A-134 Firma sucht für eine Dauer von 6-8 Monaten:
1. Natronlauge mit etwa 35 g NaOH/l und 100 g/l Natriumaluminat
   Menge: etwa 50 cbm/Woche

Figure 3.14-2

BELGIUM continued

2. Schwefelsäure mit etwa 200 g H_2SO_4/1 und 500 g/1 Aluminiumsulfat
Menge: etwa 25 cbm/Woche

HOLLAND

A 292 Nickelformiat in Jutesäcken. Menge: 2,000 kg.
A 292 Wolfram-Nickel mit ca. 40% WO_3 und 20% NiO i. TrS., feucht
Menge: ca. 1,000 kg.
A 293 Raney-Nickel, einmal gebraucht und mit organ. Material verunreinigt, in Fässern unter Wasser. Menge: ca. 70 kg.
A 297 Altschwefelsäure mit 20% H_2SO_4, 35% Ammoniumbisulfat und 45% Wasser Menge: ca. 1,600 t/Monat
A-298 Ultramarinblau Menge: 1 160 kg.
A 300 Natriumdichlorisocyanurat, Pulver Menge: 1,000 kg.
A 304 Aceton (90%)/Äthanol (10%)- Gemisch Menge: 17 000 kg.
Xylol (75%)/Isoamylalkohol (25%)-Gemisch Menge: 23 000 kg.

NORDIC

R/186-N Rohschwefel, 99,5% rein, gesichtet 16 mesh Norwegen
Menge: 45 kg.
R/187-N Phosphorpentasulfid, dest. Menge: 30 kg.
R/189-N Äthylcyanacetat, rein. Norwegen, Menge: 400 kg.

AUSTRIA
Angebote
Carboraffin (Entfärbungskohle) Menge: 3 300 kg, einmalig
Benzoesäure, 80- bis 90%ig Menge: 120 t/Jahr
Altwachs in Fässern Menge: 30 t, einmalig

SWITZERLAND
Angebote
AB 145 m/p-Cymol, etwa 95%ig Menge: ca. 10 t (in 200-l-Drums)
AB 146 Hippursäure, ca. 98%ig Menge: 45 t (in 50-kg-Fässern)
AB 148 L-Tyrosin, ca. 99%ig Menge: ca. 12 t (in 25/50 kg)
AB 150 Tetramethyläthylammoniumchlorid 55% ig, mit 44% Wasser und maz. 0,1% Monochlorbenzol als organ. Verunreinigung sowie je maz. 0,1% Brom, Schwefel, Phosphor in gebundener Form als anorgan. Verunreinigung, flüssig. Menge: ca 30 t/Woche t.q.
AB 151 Trimethyläthylammoniumbromid 81%ig (Gehalt an gebund. Brom 42%), mit ca. 7% Wasser, ca. 9% Trimethyläthylammoniumsulfat und ca. 3% Natriumsulfat, fest, Schmelzpunkt ca. 65-70°C
Heizwert: ca. 16 000 kJ/kg
Menge: 30-40 t/Woche (eingeschmolzen)
AB 152 ISAF-Russ 97%ig mit unter 1,5% Wasser, unter 0,5% anorgan. Verunreinigungen und unter 0,02% Schwermetallen, spez. Oberfläche nach Areameter 114 qm/g, DBP-Absorption 113 ml/100 g.
Menge: ca. 8 t einmalig, in 25-kg-Papiersäcken.

Figure 3.14-2 Cont'd.

Nearly all the listings originate in Germany, with some from neighboring countries. Transportation costs limit exchanges to a 200 mile radius and to where transshipment from truck to rail is unnecessary.

The activity of the exchange has declined since the transactions occur through avenues that the exchange has established. It is felt that the exchange has fulfilled its original function of acting as an information clearinghouse. Opportunities for recycling and other problems related to wastes are becoming a new add-on function of the exchange service.

Contact: Mrs. Ilse Mueller
VCI Abfallborse
Karlstrasse 21
D-6000
Frankfort, Germany
Telephone: (0611) 2556-1

Date: October 1979

3.15 DIHT - Waste Exchange Bonn, West Germany

This network of Chamber of Commerce-operated exchanges was established in 1974. The DIHT is Deutscher Industrie- und Handelstag, similar to a National Chamber of Commerce, which serves as the coordinating organization for the regional or local Chamber of Commerce waste exchanges (Industrie und Handels Kammern, IHK). Funds for the exchanges are supplied from the chamber's operating budgets which come from membership fees. All German registered companies must become members of their local IHK or chamber of commerce.

Waste material listings are sent to the local IHK, which assigns a code number or "chiffre" to the material. The bulletins which include all the local listings are published by the national DIHT on a monthly basis. There is no charge for use of the exchange.

A July 1978 article published in "Chemische Industrie" by the German Chamber of Commerce (DIHT) states that 13,600 listings have been published since 1974. Of these, 10,800 were for waste materials available and 2,800 were for materials wanted. Inquiries for these listings totalled 22,000, and more than 30 percent of the listings were successfully matched, as determined by a survey.

Contact: Frau Dr. F. Haenert
Deutscher Industrie - und Handelstag
53 Bonn 1
Postfach 1446
Adenauvallee 148
West Germany
Telephone: 02221-104

Date: October 1979

3.16 VNCI Waste Exchange
The Hague, Netherlands

The VNCI or "Afvalbeurs" Waste Exchange was started in April 1972 by the Association of Netherlands Chemical Industries. It is a passive exchange which does not participate in the negotiations for waste material transactions.

Listings are published by code every month in the VNCI chemical trade journal, "Nederlandse Chemische Industrie", with weekly letters sent to interested companies. Listings are also published in the German VCI bulletins.

The listings are mostly from the Netherlands, but many inquiries come from German firms in the Ruhr area or within a 100 to 150 mile radius.

Match-ups are not followed or recorded, but it had been estimated that 30 to 35 percent of the listings were successfully transferred.

Contact: Mr. Beukers (Mr. Verhoef)
Afvalbeurs VNCI
Javastraat 2
's Gravenhage (The Hague)
Netherland

Telephone: (070)46·94·22

Date: October 1979

3.17 Belgian Waste Exchange (FICB), Brussells, Belgium

This exchange was established in November 1972 and is operated by the Federation of Belgian Chemical Industries (Federation des Industries Chimique de Belgique, FICB). One function of FICB is industrial environmental protection, and the waste exchange was initiated to help this effort.

Listings of waste materials are published in the Federation journal, "Chemie Flash", issued three times per week. This is a clearinghouse publication emphasizing instant, next-day notification. The German magazine "Chemische Industrie" also publishes the Belgian listings along with those of other Continental European Exchanges.

The listings are shown either as materials wanted or materials available. The listings are coded to maintain confidentiality.

The journal is circulated to about 800 member firms plus 200 non-members, at no charge. A $25 listing fee is made to non-members. The journal has about 100 listings; 90 available and 10 wanted. The number of match-ups has been estimated at 10 percent.

The exchange is operated by one person less than half-time. The exchange is a relatively small part of the Federation's activities and is not being promoted actively. When the new government-supported exchange was established in the autumn of 1978, FICB considered stopping its exchange. However, since they provide virtually instant publication (three times weekly, versus every two months) they decided to continue the exchange program.

Contact: Mme Cordier (Mlle. Stouvenakers)
Federation des Industries
Chimique de Belgique
Bourse des Dechets
ECOCHEM
49 Square Marie-Louise
B 1040 Bruxelles, Belgium
Telephone: 02-230-4090

Date: October 1979

3.18 Belgian Waste Exchange (OBEA) Brussels, Belgium

This is a second, newer than FICB exchange in Belgium, which was started in the autumn of 1978 by the Belgian Ministries of Economics and Agriculture (Office Belge de L'Economie et de L'Agriculture, O.B.E.A.). The exchange service is being operated for a two-year experimental period.

The exchange service is operated as a clearinghouse in a passive or administrative manner. The clearinghouse publication is issued every two months and is called "Bulletin d'Information". It is printed on recycled paper and the second issue has nearly 60 pages. The bulletins and listings are free, with operating expenses coming from the Scientific Programs budget of the Ministry of Economic Affairs. After an initial mailing to 10,000 firms, the bulletin has about a 1,000 distribution.

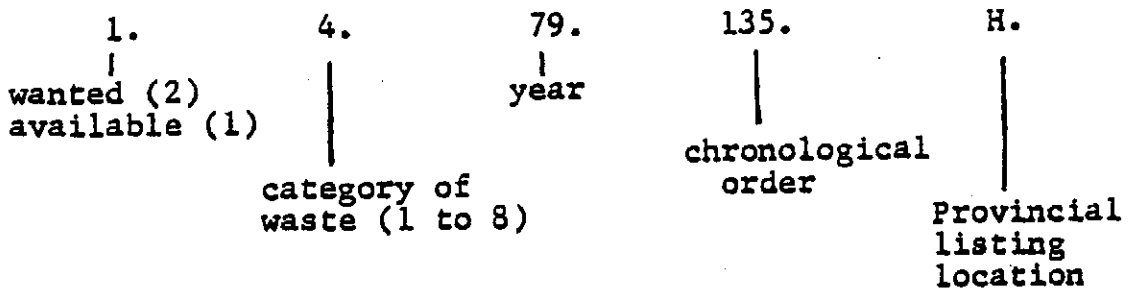
The exchange service is active in Belgium and Luxembourg with plans to include listings from southern Netherlands. All wastes from all industries are accepted. The bulletin is divided into two sections. The first is for materials available or offered (1), and the second for materials wanted (2). The waste materials are classified in 8 categories as follows:

1. Agriculture and Food
2. Leather, Fur and Textile
3. Wood and related
4. Paper and Cartons
5. Chemical and Plastic Products
6. Glass - Construction materials
   - Earth and Stone
7. Metals and Steel
8. Rubber and related - miscellaneous

The first bulletin had 490 listings for materials available and 70 for materials wanted. Three hundred inquiries followed the first bulletin with 60 known match-ups, or about 10 percent of the listings; the second bulletin had 598 materials available and 109 materials wanted. Thirty-six of the most recent match-ups were in the following categories:

6 match-ups in Leather, Fur and Textiles
9 match-ups in Wood and related
13 match-ups in Paper and Cartons
5 match-ups in Chemicals and Plastics
1 match-up in Metal and Steel
2 match-ups in Rubber and miscellaneous

Operation of the exchange is by 3 full-time people with managerial and clerical skills plus some broad technical skills. Data on listings is kept on card files. Cards are coded and filed for confidentiality by 5 groupings. For example, a card with the code:



Confidentiality is preserved by coding each listing as in the above, plus accepting only written inquiries. After a written inquiry is received, the exchange telephones the lister for its permission to divulge its name to the inquirer. The two parties can then contact each other and arrange a match-up. The exchange acts as an intermediary and does not handle any waste or intervene in the transactions.

Contact: Mr. E. Mouteau
Conseille Adjoint (Director)
Belgian Waste Exchange O.B.E.A.
Rue de Treves 82
1040 Bruxelles
Belgium
Telephone: 02/230.17.40

Date: October 1979

4.0 UNITED STATES WASTE EXCHANGES

4.1 Midwest Industrial Waste Exchange St. Louis, Missouri

The Midwest Industrial Waste Exchange was originally organized in 1975 as the St. Louis Industrial Waste Exchange. At that time, it was sponsored and funded by the St. Louis Regional Commerce of Growth Association (RCGA) with the St. Louis metropolitan region as the prime service area. In January of 1979, an agreement was reached with the Chamber of Commerce of Greater Kansas City (CCGKC) for co-sponsoring the Exchange by both organizations under a new name, the Midwest Industrial Exchange, to reflect its broader base.

The Midwest Industrial Waste Exchange is being upgraded and expanded with assistance from the United States Environmental Protection Agency (U.S.E.P.A.) and the East-West Gateway Coordinating Council. The U.S.E.P.A. subsidy will enable inclusion in the catalog of a news section with information relating to the waste exchange method of dealing with problem wastes as well as current environmental news and meetings. RCGA will continue to operate the exchange.

The objective of the exchange is to assist industry in toxic and hazardous waste management, reduce waste and reduce pollution of the environment. It acts as a clearing-house for waste materials and as a source of information.

The Midwest Industrial Waste Exchange issues a "Clearinghouse Catalog and News" quarterly. The August 1979 issue contained 35 listings: twenty-seven items available and 8 items wanted. All waste materials from all industries from any geographical area are accepted for listing. A fee of $10 is charged for each listing, but the catalog is circulated at no charge. The circulation is 1,600 and will be increased to more than 3,000.

The exchange service, its promotional and advisory efforts, is staffed by a full-time director and secretary, plus assistance from other staff members when necessary. The Director's skills are extensive with other staff members having moderate skills

Data are kept in file folders.

The Midwest Industrial Waste Exchange, in addition to being the first of its kind in the United States, is

probably the first to initiate a non-confidential alternative method of listing. Under the confidential method, the lister submits a "Confidential Listing Form" to the exchange. The waste listing is coded to protect the lister's identity. If a company is interested in a particular listing, the exchange forwards the inquiry to the lister, who then decides if he wishes to proceed.

Under the non-confidential method, a "Non-Confidential Listing Form" is used, and the waste is coded for the catalog. In addition to sending inquiries to the lister for his subsequent action, the lister's name is also given directly to the inquirer by the Exchange. Either party may then initiate contact with the other. This unique approach stimulates and hastens contact and discussion for waste transfer.

Another innovation being considered is a monthly supplement to the catalog that will contain new listings so that it may be kept updated and speed up waste transfers.

The Midwest Industrial Waste Exchange considers waste match-ups a major criterion of success for a waste exchange. From 10 to 15 percent match-ups are considered good. Other criteria for success of an exchange are to identify, isolate and recover resource materials; and to gain acceptance and use by industry; and to overcome the normal reluctance of industry to publicize waste materials, due to a fear of revealing production and trade secrets.

Contact: Mr. Oscar S. Richards
Director
Midwest Industrial Waste Exchange
10 Broadway
St. Louis, Missouri 63102
(314) 231-5555

Date: March, 1980

4.2 Iowa Industrial Waste Information Exchange Ames, Iowa

The Iowa Industrial Waste Information Exchange was established in 1976 by the Center for Industrial Research and Service (CIRAS). CIRAS is an extension service to Iowa industry conducted by Iowa State University. Hence, indirectly, the exchange service is non-profit and funded by the State.

CIRAS, in operation since 1964, has handled many projects relating to possible uses for wastes and has worked with individual firms to search out economical methods for their use or disposal. These projects are handled on a one-to-one basis, and many satisfactory solutions have been achieved. When the number of problems increased, the Iowa Industrial Waste Information Exchange was established by CIRAS to provide an orderly approach for handling the greater variety and volume of requests for advice on waste management.

Listings in the available section are accepted only from Iowa firms. Listings for materials wanted are accepted from out-of-state.

A list of nationwide recyclers, disposal facilities, and services is also maintained for distribution.

A conventional coding system is used to preserve confidentiality. A sample page from the May-June 1977 Bulletin is shown in Figure 4.2-1. The bulletin is issued quarterly, with no charges for listings or the bulletin.

After one year of operation, about 175 materials have been listed from 140 companies. More than 500 inquiries for these listings were processed, which resulted in about 50 successful match-ups or 28 percent of the total listings.

The Iowa Industrial Waste Information Exchange, after initial high volumes of activity, now finds the activity has slowed down to a point where waste inquiries are handled and solved for the most part on a one-to-one basis. The need for publishing and mailing listings has, therefore, diminished. The exchange "appears to have run its course."

Several factors have been proposed as apparent contributions to the exchange's "die-out." One reason is the relatively small numbers of industries in Iowa. These approximate 3,500 or 1.6 percent of the national total. The small number of industries, coupled with acceptance of materials available only from within the state, diminished the need for an exchange after a period of time. Supplying a list of recyclers, disposal facilities and services to inquirers for self help in waste disposal problems has also reduced the need of an active waste information exchange. Successful match-ups of waste materials generated on a continuing basis also reduces the need for listing on an exchange. Examples of this are the early listings of used pallets, wood wastes and steel drums, which now find ready disposal through avenues established by the information exchange.

LIST #5 IOWA INDUSTRIAL WASTE INFORMATION EXCHANGE
(Sample Listings)

Available Materials

Wood Products:
A-75.0 - Sawdust, chips, waste; hard and soft woods, 20 truck loads/month, loose, E. Iowa.
A-69.0 - 40 x 48 wood pallets, 30-50/month, C. Iowa.

Paper Products:
A-74.0 - Obsolete multi-wall paper bags - 100 lb. size, one lot 40,000 bundles, S.E. Iowa.
A-73.0 - Heavy cardboard boxes on wood pallets - hold 1,000 lb., 200/month, E.C., Iowa.

Metals:
A-77.0 - Assorted tool steel, rod and tubing, varying quantities, N.W. Iowa.
A-70.0 - 55 gal. steel drums, up to 100/month, C. Iowa.

Plastics:
A-78.0 - Expanded polystyrene foam, 1.25-1.75 lb/cu. ft. density, 300 lb/wk. 15,000 lb. on hand, loose, S.E. Iowa.
A-76.0 - Ground expanded polystyrene, 600-4 cu. ft. bags/month, 1500 bags on hand, C. Iowa.

Miscellaneous:
A-71.0 - Aircraft polish, one lot, pint cans, cts. of 24, E. Iowa.
A-68.0 - Scrap polyester cloth, 300 lb/day, loose, E.C. Iowa.

Materials Wanted

W-15.0- All waste wood items, truck. W.C. Iowa.
W-14.0 - Aluminum shavings or chips, 1000 lb lots, E.C. Iowa.
W-12.0 - Sludges, residues containing metallic ions, unlimited, Ohio.
W-10.0 - Food or feed by-product for cattle feeding, truck loads, E.C. Iowa.

Figure 4.2-1

Data is kept in file folders with a cross-indexed card system. It is staffed by two people, the director and one secretary, for about one-quarter time each. In addition, the exchange uses the services of 6 part-time field representatives who make about 6,000 to 7,000 calls per year to encourage CIRAS activity. Skills are extensive. All types of wastes are accepted for listing.

Contact: Mr. Edward O. Sealine or Mr. Wilson A. Kluckman
Industrial Specialist
Center for Industrial Research & Service
201 Building E
Iowa State University
Ames, Iowa 50011
(515) 294-3420

Date: March 1980

4.3 American Chemical Exchange Skokie, Illinois

The American Chemical Exchange (ACE) was established in January 1976 as an Illinois corporation. ACE uses a computerized matching service allowing the buying and selling of surplus inventories of chemicals. It deals in about 105 chemicals, primarily virgin materials, but also in a few specific waste materials that satisfy certain evaluations and specifications. Waste materials make up from 5 to 8 percent of total items traded, and these are increasing at a slow rate each year. A list of goods traded is shown in Figure 4.3-1. These may be hazardous or non-hazardous.

ACE is a for-profit materials exchange acting as a broker between buyer and seller. It charges $250 to become a member of the exchange, and a commission of 5 percent for virgin products, with a variable percentage for waste materials.

When a match between a seller and buyer has been arranged, ACE handles the transfer of funds through an escrow account and arranges for the transportation. The identity of both parties is kept confidential, although ACE finds that anonymity is not all that important for its operations.

ACE handles about 100 deals per year as match-ups, with a volume of roughly 150 million pounds.

Computer data are not coded since they are not disseminated. The service is staffed by 4 people full-time, with extensive experience in chemistry and business.

LIST OF GOODS TRADED (REVISED)

Acetic Acid
Acetone
Adipic Acid
Ammonia, Anhydrous
Benzene
Benzoic Acid
Bisphenol A
Borax, Anhydrous
Calcium Chloride
Caustic Potash
Caustic Soda
Chlorine
Chromic Acid
Citric Acid
Cumene
Diammonium Phosphate
Diethanolamine
Diethylene Glycol
Diethylene Glycol Monobutyl Ether
Diethylene Glycol Monoethyl Ether
Diethylene Glycol Monomethyl Ether
Dipropylene Glycol
Ethylenediamine
Ethylene Dichloride
Ethylene Glycol
Ethylene Glycol Monobutyl Ether
Ethylene Glycol Monoethyl Ether
Ethylene Glycol Monomethyl Ether
Ethylene Oxide
Formaldehyde
Formic Acid
Fumaric Acid
Furfural
Furfuryl Alcohol
Glycerine
Hexylene Glycol
Hydrazine
Hydrochloric Acid
Hydrofluoric Acid
Hydrogen Peroxide
Isopropyl Alcohol
Maleic Anhydride, and Molten
Methanol
Methyl Ethyl Ketone
Methyl Isobutyl Ketone
Methyl Methacrylate
Methylene Chloride
Monoethanolamine
Morpholine
Naphthalene,
Normal Butanol
Oxalic Acid
Pentaerythritol
Perchloroethylene
Phenol
Phosphoric Acid
Phthalic Anhydride, and Molten
Potassium Carbonate
Potassium Nitrate
Propylene Glycol
Propylene Oxide
PVC Resin
Sodium Carbonate
Sodium Sulfate
Sodium Tripoly Phosphate
Styrene
Sulfuric Acid
Tetraethylene Glycol
Tetrahydrofuran
Tetrapotassium Pyrophosphate
Titanium Dioxide
Toluene
Trichloroethane
Trichloroethylene
Triethanolamine
Triethylene Glycol
Urea
Xylene

Note: This list of goods to be traded will be subject to change from time to time. It will be amended according to the desires of the Exchange members.

Figure 4.3-1

Contact: Mr. Tom Hurvis, Chairman
American Chemical Exchange
4849 Golf Road
Skokie, Illinois
(312) 677-2800

Date: March 1980

4.4 EnKarn Research Corporation Albany, New York

EnKarn Research Corporation is a private, for-profit New York State corporation organized in March 1977. Its objectives are to act as consultants to those with surplus inventories and waste materials. EnKarn also assists manufacturers to recycle by-products, industrial excess, and waste materials.

The objectives are accomplished in two ways: through personal involvement on the sellers' behalf and through a publication called "Industrial Materials Bulletin." Listings in, and circulation of the Bulletin are free. A commission of 10 percent of the purchase price is charged for match-ups resulting from the listing in the Bulletin or from EnKarn's active soliciting and marketing efforts.

The Bulletin listings are kept confidential by a code number. The code number contains the letter A or W representing materials for sale or wanted followed by numbers as listed in sequence in the Bulletin; these are then followed by a roman numeral representing the Bulletin issue number. A sample page from the January 1980 Bulletin is shown in Figure 4.4-1.

Categories of Materials for Sale that are followed in the Bulletin are: Paper Products; Films, Foils & Laminates; Miscellaneous & Equipment. A new Bulletin section has been added, devoted to materials available on a continuing basis.

The Bulletin has a circulation of 1,000. Listings are taken without any limitations. These numbered 50 listings for sale and 13 materials wanted in the January 1980 Bulletin. Many responses are received following each Bulletin. Bulletins are issued monthly, with an average of 80 listings in each.

EnKarn is staffed by its two principals on a full-time basis. The two principals on the staff have extensive waste exchange operational experience.

EN KARN Research Corporation
P.O. BOX 590 • ALBANY, NEW YORK 12201 • Phone (518) 436-0684

MATERIALS FOR SALE

MISCELLANEOUS & EQUIPMENT CON'T:

A40-XI URETHANE FOAM: FS-250 from Owens-Corning. Stored in easily handled corrigated cartons.

8,359	- 3/4" x 3 7/8" x 4 5/8"
5,077	- 3/4" x 4 1/8" x 5 5/8"
25,000	- 3/4" x 4 7/8" x 7 5/8"
143,694	- 3/4" x 5 1/8" x 9 1/8"
28,800	- 3/4" x 5 1/8" x 10 7/8"
210,930	pcs. total.

A41-XI S.I. SWITCH CARTS: 150 3 x 4' wooden platforms (flat) used in a flo line tow system. Excellent condition. Each can be used manually. Asking $40.00 each. FOB CT.

A42-XI FLOCK CUTTER: Matsushita Mfg. Call EnKarn for specifications. FOB CT.

A43-XI 160-G - ACRYLIC AND COTTON. FOB.

A44-XI POLYPROPYLENE: Grey 700,000# per month. Price negotiable. FOB New York.

A45-XI POLYPROPYLENE: Multi-colored, 100,000# per month available. Price Neg.

A46-XI CHANDLER AND PRICE: 50" paper cutter, used, older "automatic". FOB Seattle

A47-XI MEDICAL NON-WOVEN SECONDS: Rolls from 5-80" wide, 3" cores, mostly blues, some greens, occasionally white. BW 20-40 lbs. 2,880 ft. currently avail. 40,000 lbs. generated continuously. Price neg. FOB CT.

A48-XI 1-1 1/4" extrusion line - extruder - vacuum calibrator - puller and winder - manufacturing polyurethane products (customers included) for medical purposes Asking $75,000. California.

A49-XI NYLON FIBER: virgin, 3 denier x 3/4" bright drawn. Monsanto Mfg. type 66, packed in original cartons 242 lbs. per carton. Total wt. 32,000 lbs. Price neg. FOB CT.

A50-XI HDPE: Pelletized - fractional melt index .4, density .946, medium molecular wt. distribution, 20,000 lbs/mo. in Gaylords. FOB New York.

MATERIALS WANTED

W1-XI STEEL INVENTORIES: Surplus, excess and obsolete. Sheet, coil, structural, plate, pipe, wire, rod (ferrous and non ferrous) Prefer 10 tons or more. New Jersey.

Figure 4.4-1

Listing data is stored on code sheets in preparation for computerizing the system.

EnKarn envisions expanded services by establishing field offices in several geographical locations and by issuing specialized bulletins to selective manufacturers. EnKarn also publishes "Railroad" and "Textile" bulletins which are circulated monthly.

Contact: Mr. J. T. Engster
EnKarn Research Corporation
P.O. Box 590
Albany, New York 12201
(518) 436-9684

Date: March 1980

4.5 Environmental Clearinghouse Organization (ECHO) Hazel Crest, Illinois

The Environmental Clearinghouse Organization, Inc. (ECHO) is a Commercial Associate member of the World Association for Solid Waste Transfer and Exchange - WASTE, and hence, offers the same basic services as described in Section 4.12.

ECHO provides its clients with waste surveys and waste management programs. It is a privately-operated, for-profit organization.

Contact: Mr. William Petrich
Environmental Clearinghouse Organization Inc.
3426 Maple Lane
Hazel Crest, Illinois 60429
(312) 335-0754

Date: March 1980

4.6 Georgia Waste Exchange Atlanta, Georgia

The Georgia Waste Exchange was established and operated in 1976 by the Environmental Protection Division's Resource Recovery Unit, in Georgia's Department of Natural Resources. In early 1977, the exchange program was taken over and operated as a service of the Georgia Business and

Industry Association, (GBIA). The GBIA, a private non-profit organization, was asked to administer the program because it was felt that... "the industrial community will participate more fully....when it is being operated by a private enterprise organization rather than a regulatory agency of the State government."

"The Exchange collects and publishes information concerning available and desired waste products of industrial processes and attempts to link up potential trading partners for these wastes." The Exchange encourages productive use of waste material with a re-use value which may alleviate certain material shortages, thereby reducing waste management and disposal problems and costs.

The Exchange charges $25 per item listed as either "wanted" or "available" which includes a quarterly listing of each entry for a year, plus a subscription to the publication. A $25 subscription fee is charged to non-listers, who are not Association members, for one year's publications or $10 for each quarter's listing publication.

"Wastes Available" listings are accepted only from within Georgia; "Wastes Wanted" listings are accepted from within and outside the State. This policy is apparently not adhered to strictly.

Confidentiality is maintained by a coding system, which lists materials available as GIA or wanted as GIW followed by sequential numbers.

The publications have a circulation of about 1,100. The July 1979 report contained 32 items listed as available, with 14 items wanted. There are no restrictions on waste materials accepted for listing. Approximately 3 new listings are received each month, with about one inquiry for each listing.

The Exchange is operated by a Director and a secretary for about one hour per week each. Data on listings and inquiries are kept in loose-leaf binders.

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

Date: March 1980

4.7 Information Center for Waste Exchange Seattle, Washington

The Information Center for Waste Exchange (ICWE) was started in early 1977. It is sponsored by the Western Environmental Trade Association of Washington, (WETA-Washington) which is a private non-profit labor/business association.

The exchange service is offered free to WETA members, serves all industries except nuclear, and accepts all materials. It serves the State of Washington area primarily with some activity in Oregon, Idaho and western Canada. The exchange plans eventually to link with other exchanges.

ICWE operates as a passive clearinghouse for the transfer of information about waste materials. The program is administered by one part-time, non-technical person for about 4 hours per week.

It has about 100 listings which it circulates to its 90 subscribers. There are an average of 2 inquiries for each waste material listed. Listings are coded and a covenant of confidentiality is maintained for the listers' anonymity. The coding system uses the letter S or O for seeker or offerer, followed by three digits which provide a sequential identification of the waste material.

Most of the wastes listed may be considered non-hazardous with a few (about 20 percent) that are potentially hazardous.

ICWE considers its role as effective and successful with expansion of its operations being planned. Approximately 50 percent of its listings are matched-up.

Contact: Ms. Judy Henry
Executive Assistant
Information Center for Waste Exchange
2112 Third Ave., Suite 303
Seattle, Washington
(206) 623-5235

Date: March 1980

4.8 Minnesota Association of Commerce and Industry, Waste Exchange Service and Technotec of Control Data Corporation Saint Paul, Minnesota

The Minnesota Association of Commerce and Industry (MACI) operates the Waste Exchange Service in cooperation with Technotec, which is a technology exchange service of Control Data Corporation. The exchange service was started in 1977. MACI is a State Chamber of Commerce type of non-profit organization, with about 2,800 members from commerce and industry.

The exchange is designed for the reuse of waste products, to help industry find alternatives to disposal, thereby reducing wastes for disposal.

Firms wishing to obtain or dispose reusable wastes submit a generic listing of the material available or sought. A computerized match is made between users and producers, who are notified of each other's interests. Actual transfer, sale or purchase of materials is negotiated between users and producers.

The exchange is operated as a non-profit service to MACI members and non-members. Cost of listing a material needed or available into the computer data base is $30 for three months or $60 per year. After subscribers and users locate each other, they are free to deal directly for the exchange of material. The company does not charge brokerage fees, royalties or commissions. MACI pays Control Data Corporation for actual computer time used to place information in the system and to make searches for matches.

Availability of certain wastes are mentioned periodically in a newsletter. Judging from the inquiries, this type of periodic advertising is beneficial for the overall program.

The data base currently contains about 45 listings. All types of hazardous and non-hazardous materials without geographical limitations are accepted for listing. Materials are listed in the computer by generic name.

The exchange is staffed by one person on a part-time basis for approximately one day per week.

Contact: Mr. James T. Shields
Vice President for
Energy and Environmental Affairs
Minnesota Assoc. for Commerce & Industry
200 Hanover Building
480 Cedar St.
St. Paul, Minnesota 55101
(612) 227-9591

Date: March 1980

4.9 The Exchange
Boston, Massachusetts

The Exchange was started in mid 1975 and is an independent, for-profit company. It acts as a consultant to manufacturers and others with hazardous and non-hazardous wastes, secondary materials, and surplus inventories. It actively brokers materials, for companies who are in the business of recycling and disposing of by-products and hazardous materials.

Regular publications or bulletins are not published, but special catalogs and brochures are created for clients that help define the best markets, and the catalogs are distributed to the appropriate markets. Direct follow-up telephone sales contacts are used to close the most economically advantageous transactions.

The Exchange moves such things as excess textile equipment, excess metal inventories, unused electrical hardware and electronic components, and hazardous chemicals, on a worldwide basis.

The Exchange works on a commission basis and charges consulting fees to cover expenses for a client project. Since it never owns the inventories in question and cannot control internal shifts of policy by its clients, the Exchange does not broker/sell totally on a commission basis.

The Exchange maintains professional contacts throughout the industry and keeps itself abreast of changing regulatory patterns. Client situations are kept entirely confidential when appropriate.

Contact: Mr. Howell Hurst, President
The Exchange
63 Rutland Street
Boston, Massachusetts 02118
(617) 266-8498

Date: March 1980

4.10 Oregon Industrial Waste Information Exchange
Portland, Oregon

The Oregon Industrial Waste Information Exchange (EXCHANGE) is an information clearinghouse which identifies and locates industrial waste materials with a reuse value.

The service is for Oregon business and industry, with the purpose of achieving economic and environmental savings through the diversion of waste materials from disposal to secondary use.

The EXCHANGE was initiated in April 1978 and operated by Resource Conservation Consultants with a funding grant ($11,600) from the Oregon Department of Energy for one year. This was followed by 6 months interim funding ($4,500) from the Department of Environmental Quality (DEQ). In October 1979, the Western Environmental Trade Association (WETA) assumed responsibility for the funding and operation of the EXCHANGE. WETA publishes the bi-monthly bulletin, processes listing forms, refers requests and publicizes the EXCHANGE to the media.

Listing Bulletins are published every other month and list 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. The March 1980 Bulletin listed 128 waste items: 92 Available and 36 Wanted.

Waste materials are classified in 12 categories as shown in Figure 4.10-1. Sample pages from the March 1980 Bulletin are shown in Figure 4.10-2.

The Bulletin has a circulation of over 1,100. The EXCHANGE services are totally free; all wastes are accepted for listing from any geographical area. Approximately 27 percent of the wastes listed may be considered hazardous.

The EXCHANGE also provides additional waste transfer service through extended DEQ funding. This service provides active assistance for waste transfer and coordination of a regional exchange network. Since a WETA association in Washington also sponsors an exchange program, coordination of listing, distribution and coding systems is planned. Publication of listings from the British Columbia area of the Canadian Waste Materials Exchange is also being seriously considered. The role of waste exchanges in hazardous waste management is also being surveyed.

The EXCHANGE has put considerable emphasis and effort into determining successful waste transfers, or match-ups, as a means of judging the degree of success and as a measure for improving a waste transfer program. After the first year's operation, some 23 waste materials had been successfully transferred out of approximately 100 listings. These are listed and described in Table 4.10-3 and expressed in terms

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
2. Organic Chemicals & Solvents
3. Metals & Metal-containing Sludges
4. Minerals (incl. glass, sand)
5. Oils & Waxes
6. Food
7. Paper & Wood
8. Plastics & Rubber
9. Catalysts
10. Textiles & Leather
11. Inorganic Chemicals
12. Other (please specify)

EXCHANGE USE ONLY: CODE# _____ DATE: _____

Fig. 4.10-1

OREGON SAMPLE LISTINGS

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.

WANTED

W4-5 Waste Oils of any type. Any quantity, any packaging. OR & S.W.WA.

W34-SW5 Used Creosote - used in soaking fence posts. Several gallons needing proper reuse or disposal. Portland.

CATEGORY SIX: FOOD

AVAILABLE

A65-SW6 Cabbage Leaves trimmed by food processor. Generally is the wrapper leaves from cabbage heads, about 90% moisture. Excellent use as animal feed. Approx. 20 tons/day for 3 mos. beginning in Sept. Conveyed loose into truck. NW of Portland.

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. Bottoms cut for flat storage. Portland.

A13-7 Sawdust & Hogfuel Mixed. Approx. 70 cu.yd./mo. Loose. East Multnomah County.

AVAILABLE - CATEGORY SEVEN, cont.

A23-7 Three acres of Scrap Wood in racks; sizes ranging from 1X1 to 2X2 and up to 10 ft. lengths. Approx. 100,000 bd. ft. Springfield.

A25-7 Telldown 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.

A32-SW7 Re-usable Wooden Pallets. Various sizes. 50/mo. on an irregular basis. Loose . Portland area.

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.

A44-7 Sawdust from kiln-dried lumber. 6 tons/mo. available Jan. through Aug. Packaged in @ 10 gal. paper barrels/mo. Southeastern Oregon.

A47-7 Pelletized Wood Fuel - no additives - approx. 8500 BTU's/lb. - pollution-free. Approx. 80% cost of comparable quantity of coal; greater savings against oil & gas. Use as fuel in coal-, oil-, or gas-fired boilers, veneer dryers, etc. 1 to 10 bulk truckloads (28 tons/truckload)/day, week or month. Mid to South Willamette Valley.

A52-7 Red Cedar Shingle Scrap; green; 1½" minus X 16". Ideal kindling. 210 cu.yds./mo. on a regular basis. The material is loose; loaded in either self-dumping bins or by dump truck. Greater Eugene area.

A53-7 White & Colored Ledger Paper. 8X11 sheets. Clean. One ton available now, 2-3 tons/yr. on an irregular basis packed in boxes. Milton-Freewater - could haul to Pendleton or tri-cities.

A55-7 Scrap Wood - various sizes. 500 lbs/mo. offered on an irregular basis. Loose. Portland area.

A58-7 Creosote Wood Piling in random lengths, 3'- 20'. Possible use as fence posts. Approx. 500 linear ft. available now; more on an irregular basis. Loose. Portland.

Fig. 4.10-2

Table 4.10-1

Oregon Successful Waste Transfers: Energy Savings Analysis

WASTE DESCRIPTION	VOLUME	EST'D.BTU SAVINGS	REFERENCE
April 1 - June 30, 1978			
Metal Racks	.25 tons	2.3×10^6	1
Waxed Sulphate Board	45.50 tons	1203.0×10^6	2
Polyethelene Drums	.60 tons	22.3×10^6	3
Paint	.20 tons	1.4×10^6	4
Solvent	.16 tons	1.1×10^6	4
	SUB-TOTAL:	1230.1×10^6	
July 1 - September 30, 1978			
Chlorine Tablets	100 lbs.	11.7×10^6	6
Waste Acid	500 gals.	6.23×10^6	5
Beef Byproducts	600 cu.yds./6 mos.	------	-
Waxed Paper Labels	20 tons	487.8×10^6	6,8
Waste Solvent	159 gals.	4.45×10^6	5
Wood Pallets	4000 units	63.0×10^6	9
Voting Booths	30 units	$.52 \times 10^6$	5,6,9
	SUB-TOTAL:	573.70×10^6	

Table 4.10-1 (Cont'd.) Oregon Successful Waste Transfers: Energy Savings Analysis

WASTE DESCRIPTION	VOLUME	EST'D.BTU SAVINGS	REFERENCE
October 1 - December 31, 1978			
Broken Plastic Berry Flats	2500 units	27.8×10^6	6
Sheet Aluminum	52 sheets;4316 lbs.	610.7×10^6	6
Acetone	1300 gals.	78.2×10^6	6
Gasoline/Oil Mixture	5 gals.	$.6 \times 10^6$	11
Gasoline (35%)/Diesel (65%) Mix	10,000 gals.	1422.0×10^6	11
Chlorinated Solvent Recovery Waste	6,500 gals.	152.0×10^6	11
Broken Wood Pallets/Cardboard	200 units	3.15×10^6	11
	SUB-TOTAL:	2294.45×10^6	
January 1 - April 15, 1979			
5-Gallon Metal Cans	100 units	5.67×10^6	6
Used Lacquer Thinner	200 gals.	21.2×10^6	6
Full-Twist Glass Gallon Jars	1440 units	3.42×10^6	10
Liquid Waxes Mixture	5800 gals.	84.9×10^6	6
	SUB-TOTAL:	115.19×10^6	
	GRAND TOTAL:	4213.44×10^6 BTUs	

of energy savings or estimated Btu savings. References used for the energy savings analysis are shown in Figure 4.10-4.

Contact: Mr. David Clark
Western Environmental Trade Association
Oregon Industrial Waste Information Exchange
333 SW 5th - Suite 618
Portland, Oregon 97204
(502) 221-0357

Also: Delyn Kies
Oregon Industrial Waste Information Exchange
Resource Conservation Consultants
1615 NW 23rd - Suite One
Portland, Oregon 97204
(503) 227-1319

Date: March 1980

4.11 Tennessee Waste Swap
Nashville, Tennessee

Tennessee Waste Swap (TWS) was originally started and sponsored by the Division ofSolid Waste Management in the Tennessee Department of Public Health. The program, as originally envisioned, did not materialize. Staffing problems and the resistance of industry towards a State Agency appeared to hinder the success of the program.

At the time of this writing, plans were being finalized whereby the waste exchange program would be taken over, managed and operated by a non-governmental agency, the Tennessee Manufacturers Association. The waste exchange is expected to be in operation by July 1980.

Contact: Mr. Ernest C. Blankenship
Vice-President
Tennessee Manufacturers Association
708 Fidelity Federal Building
Nashville, Tennessee 37219

Date: March 1980

OREGON INDUSTRIAL WASTE INFORMATION EXCHANGE

SUCCESSFUL WASTE TRANSFERS: ENERGY SAVINGS ANALYSIS

REFERENCE SOURCES

1. National Association of Recycling Industries. Energy Conservation Through Recycling. 1977. p. 1.

2. Peter Love. Net Energy Savings From Solid Waste Management Options. Environment Canada. 1976. p.70.

3. Mike Males. Resource Conservation Through Citizen Involvement in Solid Waste Management. Metropolitan Service District. 1975. p. 12.

4. Estimates derived from conversation with Dr. Charles Rohrmann, Battelle Northwest Laboratory.

5. Third Report to Congress. U.S. E.P.A. 1976.

6. C.B. Smith. Efficient Electricity Use. Pergamon Press. 1976.

7. "Report Estimates Energy Required to Produce Essential Primary Products". News Focus. Vol. 26, No. 2. 1976.

8. Energy Conservation - The Data Base. Energy Conservation and Environment, Office of Industrial Programs. 1975.

9. Personal communication with Robert Jamison. Weyerhauser, Seattle.

10. "Energy Savings from the Recycling of Selected Waste Materials". Resource Conservation Consultants. 1979.

11. not listed.

FIGURE 4.10-4

4.12 World Association for Solid Waste Transfer and Exchange (WASTE) San Francisco, California

WASTE was started in December 1978 after two years of planning. It is a privately-operated, non-profit organization that provides a forum for the exchange of information on waste management situations. It uses a computer network system for the search and transfer of information.

The organization collects its data and offers varied services through three major types of memberships and affiliates. Affiliated Members (free) are drawn from municipal recycling centers, government and academic research centers, public works departments, county waste management agencies, and non-profit information centers.

Associate Members (free) consist of Trade Associations, Chambers of Commerce, Jaycees and other business and industry groups.

The third category of membership in WASTE is Commercial Associates who are charged $150 annually. This category is made up of waste haulers, processors, treatment and testing facilities, consulting engineers and other organizations offering waste management services.

In September 1979, WASTE had 11 Affiliate Members; 14 Associate Members; and 400 personal and organization members.

The data files are programmed for storage, retrieval, and dissemination of various types of waste and waste management data, structured in different files as follows:

"A" FILE - Descriptions of Available Reusable Materials

"W" FILE - Descriptions of Wanted Reusable Materials

"F" FILE - Facilities for Testing, Processing, Recycling, Disposing, etc.

"E" FILE - Expertise Available in all Areas of Waste Management and Environmental Control

"T" FILE - Technologies Available for Transfer

"P" FILE - Products Marketed for Handling, Hauling, Separating, etc.

"R" FILE - Promulgates Regulations Prescribing Standards for Generators, Transporters, and Processors of Waste Materials

"S" FILE - References to Sources of Information where a Waste Manager can Refine/Define Concepts

"L" FILE - Summaries of Literature Pertaining to Solid Waste Management

Individuals and organizations associated with the WASTE program may conduct searches of the computerized data and pay for the costs incurred. The computerized data system is called "International Waste Exchange Register".

WASTE Search Centers are being established worldwide, and a WATS 800- number will also be provided for those interested in searching the Register, but do not have access to computer terminals. Government agencies, clearing-houses, and exchanges may elect to conduct searches via their own computer facilities to insure confidentiality.

Manufacturer associations, chambers of commerce, special libraries, and others concerned with providing members and participants with information services may use the Register to provide such services on a fee basis. In such cases, however, the participating organization will be responsible for any computer costs incurred in the search process, i.e. connect time, systems seconds, etc.

WASTE has invested $50,000 in its operations to date and has received $20,000 from membership dues, contracts, etc. Its total annual operating budget is estimated at $140,000.

Contact: Mr. Frank S. Patrinostra
WASTE
152 Utah Ave. "F"
South San Francisco, California 94080
(415) 871-1711

Date: March 1980

4.13 Zero Waste Systems, Inc.
Oakland, California

Zero Waste Systems, Inc. (ZWS), a private, for-profit corporation was founded in 1973. ZWS is devoted to minimizing the loss of reusable chemical resources as waste to the

environment. Its approach relies on the application of innovative chemical expertise and intensive marketing.

ZWS handles surplus chemicals, collects industrial processing wastes, sells recycled and surplus materials and provides consulting aid in waste management and control problems. The firm takes possession of materials for recycle, and prepares them for specific market needs by processing such as by distillation, recrystallization, electrowinning, grinding, or simply repackaging. The services of contract processors and other consultants are used as required.

ZWS does not issue a regular publication with listings of materials available or wanted, since it does not act primarily as a waste information clearinghouse; it does, however, circulate a small list of surplus materials to a selective mailing list. A sample of this list is shown in Figure 4.13-1.

The firm was founded by Dr. Paul Palmer, a physical chemist and employs up to 8 people full-time. Five of these people are chemists or engineers. Specific wastes are handled for processing and sale with the Bay Area, its prime area of involvement.

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

Date: October 1978

4.14 California Waste Exchange
Berkeley, California

The California Waste Exchange is operated by the State of California, through the Hazardous Materials Management Section of the Department of Health Services. The waste exchange was started in 1976 as a pilot program in the San Francisco Bay Area, to locate and identify the waste streams of various companies with potential for recycle and reuse. The purpose of the program is to conserve energy and chemical resources and to reduce the volume of materials requiring land disposal.

The program was a one-man effort started by Mr. Carl G. Schwarzer. His approach involved technical

ZERO WASTE SYSTEMS, INCORPORATED

2928 POPLAR STREET
OAKLAND, CA 94608
Tel (415) 893-8257

Surplus Materials List--All materials are ready for immediate delivery.

Material	Manufacturer	Quantity	Price
Adiprene, call for current stock	Dupont	50 gal	$1.00/lb
Aluminum Hydroxide Gel, technical	Baker	9000 lb	20¢/lb
Aluminum Oxide, chromatographic	Merk	250 lb	on request
Ammonium Bifluoride, purified	Baker	200 lb	$1.15/lb
Ammonium Chloride, USP	Baker	200 lb	$1.50/lb
Ammonium Thiocyanate, practical	Baker	3,000 lb	50¢/lb
Aqua Ammonia, 30% reagent, 45 lb carboy	Baker	2,250 lb	15¢/lb
Barium Titanate, other Titanates and Stannates available	National Lead	700 lb	50¢/lb
Caffeine, practical	Baker	100 lb	$1.00/lb
Calcium Carbonate, USP	BASF	200 lb	17¢/lb
Carbitol Solvent	Union Carbide	8,000 gal	35¢/lb
Chloroacetic Acid, Sodium Salt, practical	Baker	220 lb	85¢/lb
Cobalt Chloride	Harshaw	50 lb	on request
Cobalt Nitrate	Harshaw	120 lb	on request
Dioctyl Acid Pyrophosphate	Stauffer	670 lb	on request
Iron(III) Chloride, Anhydrous		143 lb	30¢/lb
Lithium Carbonate	Lithium Corp	326 lb	95¢/lb
Lithium Hypochlorite	Lithium Corp	232 lb	50¢/lb
Magnesium Zirconate	Lithium Corp	326	$2.00/lb
Manganese dioxide, practical	Baker	275 lb	30¢/lb
Pluronic F-68	BASF	225 lb	65¢/lb
Potassium Chloride, USP, crystal	Baker	250 lb	80¢/lb
Quso G32(Microfine precipitated silica	PQ Chem	60 lb	$1.15/lb
Rayflo-C	Rayonnier	1250 lb	20¢/lb
Raney Nickel Alloy 50/50		unlimited	$20.00/lb
Sodium Benzoate, USP	Baker	100 lb	$1.05/lb
Sodium Citrate, Dihydrate, reagent	Baker	275 lb	$1.10/lb
Sodium meta-Bisulfite, reagnet	Baker	800 lb	70¢/lb
Tetrahydrofurfuryl Alcohol, practical	Baker	600 lb	$1.25/lb
p-Toluenesulfonyl Chloride	Aldrich	100 lb	$2.00/lb
Zinc Chloride, techmical		200 lb	13¢/lb
Shell Epon C-111	Shell	55 gal	80¢/lb

Terms: Net Cash 30 Days FOB Zero Waste Systems, Inc. Oakland, Ca.

INDUSTRIAL RECYCLING • CHEMICALS – WASTES – SURPLUSES

Figure 4.13-1

personal interviews with industries to determine the types and quantities of waste streams being generated, with the object of suggesting other industries that might use these wastes directly or by reprocessing. Many hours of technical discussions, technical personnel and innovative technology were required. The waste exchange was a technical hands-on "fee-free brokerage" effort towards the exchange of specific wastes and was not a clearinghouse for information on waste materials.

State regulations concerning recyclable hazardous wastes became effective on January 1, 1978. The disposer of hazardous wastes for which recycling is both economically and technically feasible may be required, amongst other provisions, to justify not having recovered or recycled useful waste products.

Chapter 6.5, Article 7, 25170 of the California Health and Safety Code Division 20, calls for the investigation of the market potential, and the feasibility of using hazardous wastes and the recovery of resources from hazardous wastes. The law lists extremely hazardous and hazardous wastes and materials. The law also requires the establishment of a clearinghouse to assist in the recovery of useful wastes.

Provisions of the law relating to resource recovery were implemented by Administrative Code Regulations, Title 22, Division 4, Article 12. These became effective in June 1979.

Currently, the Department of Health Services is continuing the program with one man working half-time, and is planning to increase its staff for expanded efforts.

Contact: Dr. Paul H. Williams Ph.D.
Waste Management Specialist III
Department of Health Services
Hazardous Materials Management Section
2151 Berkeley Way
Berkeley, California 94704
(415) 540-2043

Date: March 1980

4.15 Waste Materials Clearinghouse Environmental Quality Control Inc. Indianapolis, Indiana

The Waste Materials Clearinghouse Catalog is published and distributed by Environmental Quality Control, Inc. (EQC), a non-profit corporation. EQC's objective is the "improvement of the quality of the environment in Indiana with due consideration for a healthy and expanding economy."

The clearinghouse was started in 1978 and the first catalog was published in August 1978. The clearinghouse is operated as an information exchange in a passive manner. Wastes from all industries without any restrictions in geographical area are accepted. Only materials for which channels of disposal do not already exist are accepted for listing.

About 50 items are being listed as either wanted or available, with about 2 to 3 new listings per month. Each catalog elicits from 35 to 50 inquiries.

The items are coded for confidentiality as "A" for available or "W" for wanted; followed by a sequential number and then by two digits for the year, e.g. A10-78.

The clearinghouse is managed by one person for about one-third time plus 2 hours per week of hired secretarial assistance. Data are kept on 3x5 cards and a computerized mailing system is used.

The clearinghouse catalog, which has a distribution of 450, is free. A listing charge of $25 is made per item published for two consecutive quarters.

Contact: Mr. Noble L. Beck
Clearinghouse Director
EQC Waste Materials Clearinghouse
1220 Waterway Boulevard
Indianapolis, Indiana 46202
(317) 634-2142

Date: March 1980

4.16 Industrial Waste Information Exchange Columbus, Ohio

The Industrial Waste Information Exchange is operated by the Columbus Industrial Association, a 160 corporate membership non-profit association. The information exchange service was started in the autumn of 1977, with publication of listings quarterly.

Operation of the exchange, confidentiality and coding of listed waste materials, objectives and disclaimers of responsibility, etc. are similar to the subsequently described Industrial Waste Information Exchange operated by the New Jersey State Chamber of Commerce in Newark, New Jersey, in Section 4.17 following.

The number of listings totaled 9 (January 1979) as shown in Figure 4.16-1. This is a relatively small number of listings due to the small (30 mile) geographical radius served, the small number of members of Columbus Industrial Association, little publicity of the service offered, and the small number of manufacturing industries in and near Columbus, Ohio.

A one-time charge of $5 is made for 12 months of listings. The exchange is operated by a technically skilled manager and a secretary, each of whom spend approximately 5 percent of their time on the waste exchange. Data are kept in files.

The current status of the program is one of dormancy, since listings and mailings have not been made for almost one year.

Contact: Mr. Newton A. Brokaw
Executive Director
Columbus Industrial Association
1646 West Lane Avenue
Columbus, Ohio 43221

Date: March 1980

4.17 Industrial Waste Information Exchange Newark, New Jersey

The Industrial Waste Information Exchange was started in May 1978 by the New Jersey State Chamber of Commerce, which funds and operates the service. The objectives of

COLUMBUS INDUSTRIAL ASSOCIATION

1515 WEST LANE AVENUE • COLUMBUS, OHIO 43221 • TELEPHONE 486-6741

January, 1979

INDUSTRIAL WASTE INFORMATION EXCHANGE

The Resource Conservation and Recovery Act makes new and critical examination of "waste" a potentially valuable activity. Our IWIE exists to assist management to realize the fullest value from "waste resources."

This industrial waste information exchange was established by the Association as a direct service to industry and as an indirect environmental and resource service to the general public.

It is the purpose of the IWIE to put waste users in touch with waste producers toward the goal that waste disposal expense might be minimized and value in waste might be realized to the greatest extent.

Listing No. 79-1

Material Available

A1 - Dilute Sulfuric Acid (5-8%); approximately 4,000 gallons per day; Columbus, Ohio.

A3 - Stainless Steel Scrap, various sizes, gauge material; approximately 20,000 pounds per month; loose; Columbus, Ohio.

A4 - Cold roll scrap offal, size .68 gauge, 3" to 6" wide, 34" long; 14,000 pieces per month; loose; Columbus, Ohio.

A5 - Wood skids of various sizes; about 60 skids a day; loose; Columbus, Ohio.

A6 - Spent Nickel Catalyst containing approximately 10% nickel, 40% vegetable oil; Columbus, Ohio.

A7 - Spent Bleaching Clay containing approximately 35% vegetable oil; Columbus, Ohio.

Material Wanted

W1 - Plastic scrap; PVC or vinyl film or sheeting scrap (unsupported); any quantity in boxes, barrels, or bales; Cleveland, Ohio.

W2 - Polyethylene scrap, any form, even mixed with paper or other materials; 10-15 tons per day; loose or baled; Montreal, Quebec.

Figure 4.16-1

the exchange are to attract new members and to provide a service to the members. The exchange was also designed to promote reuse and recycling of industrial waste materials.

The exchange emphasizes that..."there is no governmental involvement whatsoever with this State Chamber-sponsored program. The activity is entirely a private operation with no governmental participation."

The exchange operates in a passive manner, with very little technical knowledge. The exchange circulates a quarterly publication to about 12,500 people and organizations. The subscription fee is $5 per year, with a $5 charge per listing per year.

Wastes are coded as material available (A) or wanted (W), followed by an exchange code number and then a classification number in one of 16 categories as follows:

1. Acids
2. Caustics
3. Alkalis (lime, kiln dust)
4. Solvents
5. Oils: (Describe)
6. Fuel valve hydrocarbons
7. Chlorinated hydrocarbons
8. Spent Catalysts
9. Non-ferrous metals
10. Ferrous metals
11. Sulfides
12. Minerals
13. Plastic scrap
14. Salts
15. Inert material
16. Others

The coding system and manner of operation enables confidentiality. The exchange does not participate in negotiations and is not responsible for determination of the character or content of any item listed, nor the determination of what may constitute a hazardous substance or create a hazardous condition. The Exchange will not make recommendations with respect to any legal requirements, particularly for the storage, handling, transportation, or disposal of what may be defined as hazardous substances.

Information provided on waste products is supplied by the offerer. Neither the New Jersey State Chamber of Commerce, the Industrial Waste Information Exchange, nor any member thereof makes any warranty, expressed or implied, as to the accuracy of description, the fitness for a particular purpose, or the marketability of any item offered through this program.

Illustrative listings are shown in Figure 4.17-1. Current listings total about 25 items wanted and 95 items available. About 10 new listings are received each month.

The Exchange serves New Jersey primarily, with some listings from New York and Pennsylvania. It serves all

ILLUSTRATIVE LISTINGS

NEW JERSEY INDUSTRIAL WASTE INFORMATION SERVICE

MATERIAL AVAILABLE

Code No.	Classif. No.	Material	Quantity	Location
A-1-2	1	Acid, 15% nitric, 5% hydroflouric, 5% metallic impurities, balance water.	1,000 gals/mo.	Northern, New Jersey
A-1-14	2	Ammonia/water-approx. 12% NH_3	3,000 gals/mo.	Southern, New Jersey
A-1-21	4	Miscellaneous clean solvents - Toluene, Xylene, Benzene mix, etc.	3 drums/mo.	New York, New York
A-1-23	5	Waste hydraulic oil, water contaminated.	6 drums/mo.	Philadelphia area.

MATERIAL WANTED

W-1-5	5	Waste oil; no lacquers or thinners.	10 drums/mo.	Northern, New Jersey
W-1-8	10	Mixed nonferrous metals, miscellaneous sizes and forms.	any amount	Central, New Jersey
W-1-9	12	Sulfides, mixed composition.	2 tons/wk.	Southern, New Jersey
W-1-15	14	Thermoplastic scrap waste.	5 tons/mo.	Northern, New Jersey
W-1-17	17	Waste materials; chemicals, residuals metals, paper, wood, etc.	any amount	N.E. U.S.

Figure 4.17-1

industries and accepts any materials for listing.

The Exchange is operated part-time by one man and one secretary. Records are kept in one 3-ring binder.

Contact: Mr. Ludlum
New Jersey State Chamber of Commerce
5 Commerce St.
Newark, New Jersey 07102
(201) 623-7070

Date: March 1980

4.18 Mecklenburg County Waste Exchange Charlotte, North Carolina

The Mecklenburg County Waste Exchange is sponsored and administered by the Mecklenburg County Engineering Department. It is a county effort for recycle of wastes versus landfilling. The program is supported by taxes and some of the costs are defrayed by income from the sale of recyclable wastes.

The Waste Exchange uses a dual approach for its program. The first phase for the program is the operation of High School Campus Recycle Centers. About seven out of the eleven high schools in the county participate, and they handle paper, glass, ferrous and non-ferrous metals. Hazardous wastes are excluded from all of their programs. The proceeds from the sale of recycled materials are split; with 50 percent going to the county and 50 percent to the participating schools.

The second phase of the program is a Waste (Information) Exchange. This program covers a 100-mile radius and extends into some 14 counties. It acts as a clearinghouse for waste generators and users. The bulletin with about 50 listings, is mailed to about 450 subscribers. The bulletin is published on a random basis or about quarterly. The exchange accepts all types of wastes from all industries. It receives about 10 listings per month. The service is free and listers' names are kept confidential. About 9 percent of the listings are match-ups.

Data are kept in separate folders for each county, and listings are coded with a letter for each county; then with a number, based on the sequence of submittal. The wastes are listed in columns as either available or wanted.

The exchange is operated by 4 people full-time, one secretary one-quarter time plus citizens' committees who help with the High School Campus Recycle Centers. The director of the exchange is a scientist and the others involved have more limited skills.

In 1979, the High School Campus Recycle Centers earned a total of about $25,000 with half going to the schools and half to the county. The Information Exchange had an operating budget of $18,000 for the year.

The Mecklenburg County Engineering Department is cooperating with still another recycle effort. It is currently accumulating its own waste oils, in drums, in preparation for an oil re-refinery that is under construction. The re-refinery is being built and will be operated by the North Carolina State Prison Enterprises. The possibility of incorporating waste oils into the High School Campus Recycle Center program is likely, and these collected waste oils will be re-refined.

Contact: Mr. Roy Davis
Resource Recovery Analyst
Mecklenburg County Engineering Dept.
1501, I-85 North
Charlotte, North Carolina 28216
(704) 374-2770

Date: March 1980

4.19 Union Carbide Corporation Investment Recovery Department New York, New York

In 1964, Union Carbide set up a corporate Investment Recovery Department to actively market surplus materials and equipment. In 1971, the Department was expanded to develop markets for damaged goods, off-spec or obsolete products, by-products and residues, spent catalysts, metallic wastes, slimes, sludges, and flue dusts. The Surplus Materials Group and the Surplus Equipment Group are located in South Charleston, West Virginia. The Surplus Products Group is located in New York City. The objective of the Investment Recovery Department is to obtain cash through sale of surplus materials, products (including by-products) and equipment.

The Investment Recovery Department serves Union Carbide (UCC) profit centers by arranging for transfer of

"surplus" within the Carbide organization, or sale outside of Carbide. To promote internal transfers, the South Charleston Group circulates a monthly Surplus Property Report and a Surplus Materials Report to every UCC location. These include listings of both SURPLUS - AVAILABLE and SURPLUS - WANTED. In addition, there is a catalog at each UCC location which is kept up-dated. The Surplus Products Group deals almost exclusively in sales outside of the UCC organization. The types of materials they handle are for the most part non-amenable to internal transfer. Surplus reports are distributed to all Union Carbide plant managers plus about 400 secondary materials dealers and corporate customers. Reports are distributed, and transactions are completed on a worldwide basis.

The Surplus Products Group looks primarily for direct sales, although with certain materials, e.g. ones containing platinum, cobalt or silver, they may transfer to a refiner who recovers the metals and sends them back to UCC in return for a toll fee. This practice is, however, relatively rare.

About 70 percent of the materials handled by Surplus Products are steady streams; spent catalysts and by-products of various kinds. About 30 percent are so-called "wind-falls"; e.g. a bad batch of ethanol was recently produced as a result of a plant accident. The Surplus Products people saw a possible outlet in the new gasahol plants, and eventually made the sale.

Surplus by-product streams for which there is not presently an established secondary market present the greatest challenge. Often a new use has to be developed. The Surplus Product Group has the engineering, technical, business and marketing skills to conceive of such uses and convince customers of their benefits.

The possibility of recovering a portion of capital investment - conversion of surplus material assets to cash - was the original driving force. With growing environmental regulations, the possibility of avoiding disposal costs provided an added incentive.

In 1973, the Surplus Products Group alone sold over 40 million pounds of materials, recovering almost $1.25 million in cash income and disposal cost avoidance. The Surplus Equipment and Surplus Materials Group generate much higher income (around $15 million/year).

For every dollar spent by the Investment Recovery Group, $20 to $25 is returned to UCC. The return is calculated as the sum of "green" dollars - cash revenues; and "brown" dollars - costs avoided for disposal, storage, etc.

The Surplus Products Group actively solicits business from plants. They travel extensively, and work with both plant managers and environmental protection officers who know the details of their waste streams. The Surplus Products Group reviews all proposed new process and environmental protection systems, to determine the marketability of intermediate streams and to suggest alternate designs that might lead to more easily marketable by-products.

The Investment Recovery Department is staffed with 36 full-time people, with extensive skills in chemistry, engineering, processing, marketing and law.

Data on waste materials is maintained in a card-filing system plus a company-owned computerized matching and retrieval system. A coding system is used that identifies waste or surplus materials by geographical region, material, available or wanted, and by date.

Contact: Mr. G. F. Petit
Surplus Products - Investment Recovery Dept.
Union Carbide Corporation
270 Park Ave.
New York, New York 10017
(212) 551-3661

Date: March 1980

4.20 Chemical Recycle Information Program Houston, Texas

The Chemical Recycle Information Program was started in January 1977 and is sponsored by the Houston, Texas Chamber of Commerce. The program's objective is "to provide a confidential means to transfer information on waste (spent) chemicals to potential users and thereby encourage the conservation of valuable resources through reuse and to reduce the air pollution which would arise from processing raw materials."

Waste chemical generators or their potential users may register, in strict confidence, the products being offered and/or sought with the Chemical Recycle Information Service. Prospective users identify themselves to offerers or seekers by requesting additional information in writing. The program staff forwards any requests to the offerer or seeker. It is the responsibility of the offerer or seeker to contact the respondents and to negotiate a transfer if he wishes to do so.

The Houston Chamber of Commerce does not participate in negotiations.

The inventory of waste chemicals is published each month. Information on availability of a currently or newly listed waste chemical should be transmitted to the Houston Chamber of Commerce by the 25th of each month. A $10 per year registration fee is charged for each waste chemical either offered or sought. The subscription fee for the monthly inventory list is $15 per year, plus 6 percent sales tax. There are approximately 60 subscribers.

Information provided on waste chemicals are supplied by the offerer. Neither the Houston Chamber of Commerce, the Chemical Recycle Service, nor any member thereof makes any warranty, expressed or implied, as to the accuracy of description, the fitness for a particular purpose, or the marketability of any waste material offered through the program.

The waste materials are categorized in 17 classifications as shown on the "Product Information Form" in Figure 4.20-1. A sample page from the September 1979 inventory list is shown in Figure 4.20-2. Information on match-ups is not actively sought. The number of items listed vary from 25 to 30 each month.

The program was started as a service to Texas Gulf Coast industry, but is available to anyone from any location. The service is not a profit-making venture.

Each listing is identified by a code using either "S" or "O" for materials sought or offered, followed by two digits for the order of receipt. Data is kept in file folders.

The program is staffed on a part-time basis by the Director and one secretary for about one day per month each. Skills are of managerial nature.

Contact: Mr. Jack Westney
Staff Executive
Houston Chamber of Commerce
1100 Milam Bldg., 25th Floor
Houston, Texas 77002
(713) 651-1313

Date: March 1980

PRODUCT INFORMATION FORM AND SUBSCRIPTION FORM

Organization: _____

Mailing Address: _____ Zip _____

Name of Contact: _____ Telephone: _____

( ) Subscription of Listing Service ($15.00)

Waste chemical is being ( ) offered ( ) sought

Waste Chemical Classification: Please select best classification of waste chemical(s) so that the listings can be easily grouped in the inventory. Identify each waste listed below by number adjacent to appropriate classification.

Classifications:

1. Acids
2. Caustics
3. Alkalis (lime, kiln dust)
4. Solvents
5. Oils:
   - 5a. Water soluble
   - 5b. Lubricating
   - 5c. Heat transfer
6. Fuel value hydrocarbons
7. Chlorinated hydrocarbons
8. BS & W
9. Spent catalysts
10. Non-ferrous metals
11. Ferrous metals
12. Sulfides
13. Minerals
14. Plastic scrap
15. Salts
16. Inert material
17. Others: _____ _____ _____

Description of Waste Chemical Being Offered or Sought:

[Example: Class. _____
Item: Methanol/Water approximately 20 wt. % methanol, 1% Organic Impurities, Balance Water, has sweet pungent odor

Availability: 20,000 gallons/month (current, future)
Location: _____

Class.____

Class.____

Fees: Subscription - $15.00/yr. Product Registration - $10.00/yr./product
Make checks payable to: Chemical Recycle Information Program
Houston Chamber of Commerce
1100 Milam Building, 25th Floor
Houston, Texas 77002

Identification No._____

Total Enclosed _____

Please use additional sheets as required.

Figure 4.20-1

25TH FLOOR
1100 MILAM BUILDING
HOUSTON, TEXAS 77002
(713) 651-1313

Houston
CHAMBER OF COMMERCE

SEPTEMBER 1979 INVENTORY LIST

CHEMICAL RECYCLE INFORMATION PROGRAM

A SERVICE TO GULF COAST INDUSTRY

ITEMS OFFERED

IDENT. NO. O-3
ITEM : CLASS I
15% Nitric Acid, 5% Hydroflouric Acid, 5% Metallic Impurities, (4.5% Fe. 0.1% Cr., 0.3% other), Balance Water
AVAILABILITY: 4,000 gallons/month current, 8,000 gallons/month future
LOCATION : Local

IDENT. NO. O-4
ITEM : CLASS 15
$BaSO_4$ 85%, $CaCO_3$ 9%, $Mg(OH)_2$ 5%, and sand 1%. Solids in slurry with 25% NaCl solution @ 1.25 sp. gr.
AVAILABILITY: 45,000 pounds/month solids.
LOCATION : Local

IDENT. NO. O-5
ITEM : CLASS 2
AVAILABILITY: Ammonia/Water - approx. 12% NH_3
LOCATION : 6,000 gallons/month (current, future)
Local

IDENT. NO. O-7
ITEM : CLASS 17
Spent clay: Natural bleaching earth absorbed with approximately 50% tallow by weight.
AVAILABILITY: 50,000#/month
LOCATION : Local

IDENT. NO. O-10
ITEM : CLASS 6 (Fuel value hydrocarbon)

Hydrocarbon solvents (primarily kerosene) Wt. %	80-90
Aluminum alkyls and aluminum alkyl halides, Wt. %	5-20
Metallic aluminum (finely-divided powder), Wt. %	1- 3
Total aluminum, Wt. %	4- 7
Chloride (contained in aluminum alkyl chlorides), Wt. %	1.5-5.0
Iodide (contained in aluminum alkyl iodides), Wt.%	0-2.0
Vapor pressure, mm Hg. @ 70°F.	1-10
Heating value, BTU/lb.	18000-20000
Thousands of pounds/year	2000-2200

AVAILABILITY:
LOCATION : Local

Figure 4.20-2

4.21 The American Alliance of Resources Recovery Interests Inc. (AARRII) Albany, New York

The Process Industries Division of AARRII conducts an Industrial Waste Information Exchange as one aspect of dealing with the management of industrial wastes. The objective of the Process Industries Division is to initiate cooperation among companies in the process industries for new, economically-feasible waste disposal solutions to save energy, resources and the environment.

The Industrial Waste Information Exchange Program was developed with the assistance and facilitative support (no funding) of the New York State Department of Commerce, and was initiated in March 1979.

The exchange is a clearinghouse for information on industrial waste materials available or wanted for further use. Wastes offered and wanted are published periodically as listings, in a coded form for confidentiality. Written inquiries are provided by the Exchange to the listing person who then initiates further contact. The anonymity of the lister and confidentiality of the information are thus protected and transactions are privately negotiated between lister and inquirer without further Exchange involvement.

Bulletins are mailed free with a charge of $6 to list each waste material. Repeat listings are charged $3. AARRII members are not charged for listings. Annual dues for membership in one of AARRII's 15 Divisions vary from $50 to $2,000. Membership in the Process Industries Division is $1,000 annually.

A listing form and sample listings are shown following in Figures 4.21-1 and 4.21-2.

Contact: Mr. John Flandreau
AARRII
111 Washington Ave.
Albany, New York 12210
(518) 436-1557

Date: March 1980

PROCESS INDUSTRIES DIVISION
THE AMERICAN ALLIANCE OF RESOURCES RECOVERY INTERESTS INC.
111 Washington Avenue, Albany, N.Y 12210

Industrial Waste Information Exchange

☐ ⇦ INDUSTRIAL WASTE AVAILABLE

INDUSTRIAL WASTE WANTED ⇨ ☐

CHECK ONE ONLY

Please Submit Separate Form for Each Listing — Feel Free to Make Copies!

DESCRIPTION OF WASTE MATERIAL — See Over For Sample Listings

Describe the material as you would like it listed, in terms commonly used for such materials, keeping in mind that the reader will want to know % solids, % metals, chemical composition, etc.

_____

_____

_____

_____

Give the following information if not included above: (check where appropriate)

TYPE OF MATERIAL: ☐ acids ☐ alkalis ☐ organic chemicals/solvents ☐ oils/waxes ☐ catalysts ☐ metals/metal sludges ☐ minerals ☐ inorganic chemicals ☐ plastics/rubber ☐ paper/products ☐ textile/leather ☐ food ☐ other

FORM OF MATERIAL: ☐ solid ☐ liquid ☐ gas

HOW STORED: ☐ bulk ☐ bag ☐ tank ☐ drum ☐ carton

CONDITION: ☐ raw ☐ processed ☐ concentrated ☐ diluted _____ % solids

QUANTITY/FREQUENCY: _____ ☐ lbs. ☐ tons ☐ gal. ☐ cu. ft. ☐ lin. ft. ☐ per month ☐ per year

LOCATION (as it should be listed): ☐ Western N.Y. ☐ Central N.Y. ☐ Eastern N.Y. ☐ Southern N.Y. ☐ Long Island ☐ Other: _____

THE UNDERSIGNED
☐ HAS AVAILABLE or ☐ DESIRES TO OBTAIN } THE MATERIAL AS DESCRIBED ABOVE
☐ REQUESTS EXCHANGE LISTING FOR THIS MATERIAL
☐ WOULD LIKE TO RECEIVE THE QUARTERLY BULLETIN OF LISTINGS

Billing Data

New Listing @ $6.00 _____

Repeat Listing @ $3.00 _____

Total Enclosed _____

☐ AARRII Member (No Charge)
☐ Please Bill Me

COMPANY NAME: _____

COMPANY CONTACT: _____

ADDRESS: _____

CITY: _____ ZIP _____

TELEPHONE: _____ SIC NO. _____

DATE: _____

I understand that the name/address of my firm will be kept in strict confidence and any listing in the Exchange Bulletin will be by code number; that the Exchange will not be involved in any transaction; and that the Exchange makes no warranty about the information or materials listed.

Signature of Company contact or Officer: _____

Send to: AARRII WASTE INFORMATION EXCHANGE, 111 Washington Avenue, Albany, N.Y. 12210 (518) 436-1557

Figure 4.21-1

HOW THE EXCHANGE WORKS

- THE EXCHANGE is a clearing house for timely information on industrial waste materials available or wanted for further use.
- Anyone wishing to dispose of or obtain such waste submits to AARRII a description of the material.
- AARRII publishes quarterly, in coded form, for confidentiality, a listing of wastes offered and wanted.
- On receiving inquiries in writing, THE EXCHANGE provides the name(s) of the inquirer(s) to the listing person who then initiates further contact. The anonymity of the lister and confidentiality of the information are thus protected and transactions are privately negotiated between lister and inquirer without further EXCHANGE involvement.

SAMPLE LISTINGS

MATERIAL AVAILABLE

Code ID	Material	Quantity	Location
AZ-7	Trimmings from decorative polyvinyl-chloride films	2,000 lbs per week in 700 to 1,000 lb. containers	Eastern, N.Y.
AX-8	Caustic — 15% Solids, Lime sludge from water treatment clarifier — Ca(OH)(2) with small amounts of iron and various other mineral impurities	100 tons per year	Western, N.Y.
AB-1	Ore sludge containing approximately 48% Manganese Oxide, 30% Iron Oxide, 3% Tungsten Oxide, 2% Aluminum Oxide on dry basis (Moisture about 25%)	30,000,000 lbs stockpiled; 300,000 lbs. per month	Central, N.Y.

MATERIAL WANTED

WZ-1	Used X-Ray or Photographic Hypo (Fixer) and/or Film	Not specified	Southern, N.Y.
WZ-2	Waste Solvents — Ketones, Esters, Aromatics, Aliphatics, Chlorinated and Blends	15,000 gal. per week	Long Island
WB-3	Strong neutralizing acid product. Customer needs all specifications.	Approx. 3,000 lbs. per day	Central, N.Y.

NOTICE

AARRII makes no warranty, expressed or implied, as to the fitness of any listed product for a specific purpose, or to its marketability, or composition, or what may constitute hazardous substances or conditions. The EXCHANGE does not become involved in negotiations. ALL TRANSACTIONS MUST BE MADE DIRECTLY BETWEEN THE PARTIES INVOLVED.

HELP YOURSELF AND HELP YOUR INDUSTRY SOLVE THE WASTE DISPOSAL PROBLEM!

Figure 4.21-2

4.22 ORE Corporation - "The Ohio Resource Exchange" Cleveland, Ohio

ORE was started in May 1979 by Mr. Richard L. Immerman, its president. ORE is a private sector, for-profit, professional organization serving industry by marketing their by-product waste materials. With emphasis on hazardous wastes, ORE agressively markets these materials to other potential users. ORE publishes a catalog of information about available and desired waste materials which is circulated to a large number of companies in many industries. The lister's identity is kept confidential by coding the listings.

Listings are made free; and if a transaction is completed, a negotiated in-advance fee is paid to ORE. The catalog subscription is also free to qualified individuals.

ORE serves the United States and Canada. It serves all industries and lists all materials. Approximately 80 percent of its listings are potentially hazardous wastes.

ORE emphasizes waste exchange as an ideal method for resource recovery of energy and raw materials.

Contact: Mr. Richard L. Immerman
ORE Corporation
2415 Woodmere Drive
Cleveland, Ohio 44106
(216) 371-4869

Date: March 1980

5.0 EXISTING AND POTENTIAL AREAS OF UNITED STATES FOR WASTE EXCHANGES AND WASTE EXCHANGE SEMINARS

An appraisal of available information on industrial waste generation, both hazardous and non-hazardous, has been made in order to conduct waste exchange seminars and institute waste exchange programs in areas of the United States where they will be of most use and have the highest chance for success. The previous section of this report on match-ups has identified and analyzed those materials which have made recurring successful waste exchanges. This section of the report identifies a broader spectrum of industrial sectors and wastes which may have potential for exchanges and transfer. This analyses will indicate those states, and Standard Metropolitan Statistical Areas (SMSA's) of the country which are believed to have high potential for the operation of waste exchanges and accompanying seminars.

In an earlier EPA-sponsored study on waste exchanges (Ref. 1), wastes recognized as most likely to have components of potential value were:

- wastes having high concentrations of recoverable metals
- solvents
- alkalis
- concentrated acids
- catalysts
- oils
- combustibles (for fuels)

The results of surveys conducted during this study indicate that organic and inorganic chemical residues, plastic residues and textiles, leather and rubber manufacturing residuals should be added to this list.

States and regions of the country whose candidate waste exchange materials contained all or some of these components were then given consideration as potential areas for waste exchange programs and seminars.

A series of studies sponsored by the U.S. EPA (Ref. 2 to 14) identified the solid and hazardous wastes from 12 major industries. The industrial categories included in this survey are listed in Table 5.0-1. Using the EPA studies as a data base, a list of states with high volumes of wastes has been compiled. These are shown in Table 5.0-2. In order for the waste to appear on the state list, the state must be among the top four to six generators.

TABLE 5.0-1

INDUSTRIAL CATEGORIES USED FOR A SURVEY OF AREAS SUITABLE FOR WASTE EXCHANGES AND SEMINARS

Storage & Primary Batteries
Electroplating & Metal Finishing
Ferrous Smelting and Refining
Iron & Steel
Iron & Steel Foundries
Ferroalloys
Non-ferrous Smelting & Refining
Primary Lead
" Copper
" Aluminum
" Antimony
" Mercury
" Titanium
" Tungsten
Secondary Copper
" Lead
" Aluminum
Alkali and Chlorine
Inorganic Pigments
Sulfuric Acid
Aluminum Compounds
Potassium and Sodium Compounds
Petroleum Refining
Pharmaceuticals
Leather Tanning and Finishing
Electronic Components
Textiles
Special Machinery

TABLE 5.0-2

Summary List of States with Significant Quantities of Solid and Hazardous Wastes

ALABAMA -
- Primary Aluminum (Potliners, Skimmings, Dust)
- Iron and Steel (Slag, Sludge, Dust, Scale, Pickle Liquor)

ARIZONA -
- Primary Copper smelting and Refining (Slag, Sludge)

CALIFORNIA -
- Storage Battery (Reject) Scrap Cells, Sludge)
- Primary Mercury (Calcine Residue)
- Primary Tungsten (Sludge, Digestion Residue)
- Iron and Steel (Slag, Sludge, Dust, Scale, Pickle Liquor)
- Secondary Lead (Slag)
- Secondary Aluminum (Sludge, High Salt Slag)
- Petroleum Refining (Various Refining Residues - see note 1)
- Electronic Components (Solvents, Plastics, sludge, oils, paint waste)
- Special Machinery (Solvents, oils, acid/alkali, grindings)
- Paint and Allied Products (Solvents, spoiled batches, spills, sludges)

DELAWARE -
- Sulfuric acid (Sludge)
- Organic Chemicals (various and diverse residues - see note 2)

FLORIDA -
- Storage Battery (reject) Scrap cells, sludge) (Ni-Cd)
- Primary Battery (sludge) mg-carbon
- Aluminum Compounds (sludge)
- Potassium and Sodium Compounds (spent brine, sludge)

GEORGIA -
- Secondary Copper (slag)
- Titanium Pigments (ore residue, sludge)
- Potassium and Sodium Compounds (spent brine, sludge)
- Textiles (fiber, vegetable matter, sludge, flock, salvage, dye and chemical containers, selvage)

IDAHO -
- Primary Lead Smelting and Refining (slag, sludge)
- Primary Zinc Smelting and Refining (slag, sludge)
- Primary Antimony (spent Anolyte)

ILLINOIS -
- Primary Battery (reject/scrap cells) (Mercury)
- Electroplating and Metal Finishing (metal hydroxide sludges)
- Iron and steel making (slag, sludge, dust, scale, pickle liquor)
- Iron and steel foundries (slag, sludge, dust, sand)

TABLE 5.0-2 continued-2

ILLINOIS continued -
- Primary Zinc (slag, sludge)
- Secondary Copper (slag)
- Potassium and Sodium Compounds (spent brine, sludge)
- Petroleum Refining (various refining residues - see note 1)
- Pharmaceutical (org. sludge, filter and carbon solvents, metal cmpds. returned goods, mycelium)
- Electronic Components (solvents, plastic, sludge, oils paint waste)
- Special Machinery (solvents, oils, acid/alkali, grindings)
- Paints and Allied Products (solvents, spoiled batches, spills sludges)

INDIANA -
- Storage Battery (reject/scrap cells, sludge)
- Iron and steel making (slag, sludge, dust, scale, pickle liquor)
- Secondary Lead (slag)
- Secondary Aluminum (sludge, high salt slag)
- Pharmaceutical (org. sludge, filter and carbon, solvents, metal compounds, returned goods, mycelium)

IOWA -
- Primary Battery (reject/scrap cells) (carbon-zinc)

KENTUCKY -
- Primary Aluminum (potliners, skimmings, dust)
- Sulfuric Acid (sludge)

LOUISIANA -
- Alkali and Chlorine Industry (brine muds, sludge)
- Sulfuric acid (sludge)
- Aluminum Compounds (ore residue, sludge)
- Petroleum Refining (various refining residues -see note 1)
- Organic Chemicals (various and diverse residues - see note 2)

MARYLAND -
- Primary Copper Electrolytic Refining (sludge)
- Chrome colors & other Pigments (sludge)

MASSACHUSETTS -
- Leather Tanning and finishing (leather trim and shavings, finishing residues, organic sludge)
- Electronic Components (solvents, plastic, sludge, oils, paint waste)
- Special machinery (solvents, oils, acid/alkali, grindings)

MICHIGAN -
- Electroplating and metal finishing (metal hydroxide sludges)
- Iron and steel making (slag, sludge, dust, scale, pickle liquor)
- Iron and steel foundries (slag, sludge, dust, sand)
- Alkali and chlorine industry (brine muds, sludge)

TABLE 5.0-2 continued-3

MISSISSIPPI -
Titanium Pigments (ore residue, sludge)

MISSOURI -
Storage Batteries (reject/scrap cells, sludge)
Cd-AgO; Zn-AgO
Primary Lead smelting and refining (slag, sludge)

MONTANA -
Primary Lead smelting and refining (slag, sludge)
Primary copper smelting and refining (slag, sludge)
Primary Aluminum (potliners, skimmings, dust)
Primary Antimony (slag)

NEVADA -
Primary Mercury (calcine residue)
Primary Titanium (chlorinator and condenser sludge)

NEW JERSEY -
Primary copper (slag, sludge)
Secondary Copper (slag, ")
Chrome color & other pigments (sludge)
Petroleum Refining (various refining residues - see note 1)
Pharmaceuticals (org. sludge, filter & carbon, solvents, metal compounds, returned goods, mycelium)
Electronic components (solvents, plastics, sludge oils, paint waste)
Textiles (fiber, veg. matter, sludge, flock, dye & chemical containers, selvage)
Special Machinery (solvents, oils, acid/alkali, grindings)
Paints and allied products (solvents, spoiled batches, spills sludges)
Organic Chemicals (various and diverse residues - see note 2)

NEW YORK -
Primary Battery (Mercury) (scrap cells/furnace residue)
Electroplating and metal finishing (metal hydroxide sludges)
Iron and steel making (slag, sludge, dust, scale, pickle liquor)
Primary Tungsten (sludge, digestion residue)
Chrome colors & other pigments (sludge)
Pharmaceuticals (org. sludge, filter aid, carbon, solvents, metal compounds, returned goods, mycelium,
Leather tanning and finishing (leather trim and shavings, finishing residues, organic sludge)
Electronic Components (solvents, plastics, sludge, oils, paint waste)
Textiles (fiber, vegetable matter, sludge, flock, dye and chomical containers, selvage)
Special machinery (solvents, oils, acid/alkali, grindings)

TABLE 5.0-2 continued-4

NORTH CAROLINA -
Storage Batteries (reject/scrap cells, sludge)
Cd-AgO; An -AgO
Primary Batteries (reject/scrap cells)
(carbon-zinc)
(alki-manganese) (reject/scrap cells)
(mercury) (" " ")
(mg/carbon) (sludge)
(Zn-AgO) (reject/scrap cells)
Textiles (fiber, vegetable matter, sludge, flock, dye and chemical containers, selvage)
Organic chemicals (various and diverse residues - see note 2)

OHIO -
Storage batteries (reject/scrap cells, sludge)
(Ni-Cd)
Primary Batteries (reject/scrap cells)
(carbon-zinc)
Electroplating and metal finishing (metal hydroxide sludges)
Iron and steel making (slags, sludges, dusts, scale, pickle liquor)
Iron and steel foundries (slag, sludge, dust, sand)
Primary Titanium (chlorinator and condenser sludge)
Primary Tungsten (sludge, digestion residue)
Secondary Aluminum (sludge, high salt slag)
Titanium pigments (ore residue, sludge)
Other white pigments (sludge)
Paints and allied products (solvents, spoiled batches, spills, sludg

OKLAHOMA -
Primary zinc (sludge, retort residue)
Aluminum compounds (sludge)

PENNSYLVANIA -
Storage Batteries (reject/scrap cells, sludge)
Iron and steelmaking (slags, sludges, dusts, scales, pickle liquor)
Iron and steel foundries (slag, sludge, dust sand)
Primary Zinc smelting and refining (sludge, retort residue)
Primary Tungsten (sludge, digestion residue)
Secondary Copper (slag)
Secondary Lead (slag)
Secondary Aluminum (sludge, high salt slag)
Petroleum refining (various refining residues -see note 1)
Pharmaceuticals (org. sludge, filter aid, carbon, solvents, metal compounds, returned goods, mycelium)
Electronic Components (solvents, plastics, sludge, oils, paint waste)
Textiles (fiber, vegetable matter, sludge, flock, dye and chemical containers, selvage)

TABLE 5.0-2 continued-5

RHODE ISLAND -
Storage Batteries (scrap/reject cells, sludge)
Cd-AgO; Zn-AgO
Primary Battery Zn-AgO (reject/scrap cells)

SOUTH CAROLINA -
Textiles (fiber, vegetable matter, sludge, flock, dye and chemical containers, selvage)

TENNESSEE -
Primary Battery (reject/scrap cells)
(alkaline-manganese)
Primary Aluminum (potliners, skimmings, dust)
Titanium pigments (ore residue, sludge)
Potassium & sodium compounds (spent brine, sludge)
Organic chemicals (various and diverse residues - see note 2)

TEXAS -
Storage Battery (reject/scrap cells, sludge)
Primary Battery - Mg-carbon (sludge)
Primary Lead (slag, sludge)
Primary Zinc " " , retort residue)
Primary Copper Electrolytic refining (sludge)
Primary Aluminum (potliners, skimmings, dust)
Primary Antimony (slag)
Secondary Lead (slag)
Alkali and chlorine (brine muds, sludge)
Sulfuric acid (sludge)
Aluminum Compounds (ore residue, sludge)
Petroleum refining (refining residues -see note 1)
Paints and allied products (solvents, spoiled batches, spills, sludges)
Organic chemicals (various and diverse residues - see note 2)

UTAH -
Primary copper smelting and refining (slag, sludge)

VERMONT -
Primary Battery (Zn-AgO) reject/scrap cells

VIRGINIA -
Organic chemicals (various and diverse wastes - see note 2)

WASHINGTON -
Primary Aluminum (potliners, skimmings, dust)

WEST VIRGINIA -
Alkali and chlorine industry (brine muds, sludge)
Chrome colors & other pigments (sludge)

TABLE 5.0-2 continued-6

WISCONSIN -

Primary battery	- reject/scrap cells		
(carbon-zinc)			
(alk-manganese)	"	"	"/furnace residue
(mercury)			
(Zn-AgO)	"	"	"

Leather tanning and finishing (leather trim and shavings, finishing residues, organic sludge)

Source: "Assessment of Industrial Hazardous Waste Practices". (References 2-14)

TABLE 5.0-2 - Notes

1. Petroleum Refining Residues
   - Neutralized HF Alkylation Sludge
   - Coke Flues
   - Fluidized Catalytic Cracking
   - Catalyst Fires
   - Lube Processing Filter Clays
   - API Oil-Water Separator Sludge
   - Non-Leaded Product Tank Sludge
   - Slop Oil Emulsion Solids
   - Cooling Water Sludge
   - Biological Sludge
   - Lime Treatment Sludge (Boiler Feedwater Treatment)
   - Kerosene Filter Clays
   - Exchange Bundle Cleaning Sludges
   - Dissolved Oil Air Flotation Float
   - Crude Storage Tank Sludge
   - Cooling Tower Sludge
   - Leaded Product Storage Tank Sludge

2. Organic Chemical Residues
   - Liquid Heavy Ends
   - Liquid Still Heavy Ends
   - Heavy Ends from Solvent Recovery
   - Spent Acid and Caustic
   - Heavy Ends from Fractionating Towers
   - Still Bottoms
   - Filter Cake
   - Sludges

It must be kept in mind that all industries are not included in this compilation. The detailed EPA industrial surveys (Ref. 2 to 14) from which Table 5.0-2 was compiled were primarily concerned with hazardous wastes. Thus, many industries without hazardous wastes, such as food and kindred products, are not included in the compilation. Nevertheless, the survey is important in that many of the wastes listed in Table 5.0-2 are classified as hazardous and strong candidates for recovery and recycle as opposed to traditional methods of disposal. These wastes also contain components identified previously as likely to have potential value.

A relatively few number of states are seen to dominate with respect to diversity of industry, producing an array of candidate materials for waste exchanges. These states are:

California	Ohio
Illinois	Pennsylvania
New Jersey	Texas
New York	

A set of secondary states not as rich in waste diversity, but also having large volumes of candidate wastes include the following:

Florida	Michigan
Georgia	Montana
Idaho	North Carolina
Indiana	Tennessee
Louisiana	Wisconsin
Massachusetts	

It will be noticed that two relatively rural states, Idaho and Montana, are included in the secondary listing. The reason is, these states have primary metal smelting and refining industries. There is actually very little diversity in types of wastes from these industries (i.e. slags, sludges).

In a similar manner, a number of rural states produce large volumes of waste rock and tailings of highly-questionable, limited exchange value (Arizona, Utah, New Mexico, Colorado). Mining wastes have not been included in Table 5.0-2 listings for this reason. Primary metal smelting and refining listings have been retained because these operations result in residues which may have metal concentrations meriting recovery and/or processing through waste exchanges (i.e. electrolytic sludges/slimes, metal-enriched pollution control sludges and dusts).

Once the listing of states was completed, SMSA's within major and secondary states were examined for the purpose of suggesting candidate areas for operating waste exchanges and for waste exchange seminars. Shaded portions of Figure 5.0-1 shows the SMSA areas which are recommended.

Proceeding from the west coast, the San Francisco-Oakland area is a logical choice for a waste exchange serving the large number of SMSA's in Central California. The Los Angeles-Long Beach area would serve the industry associated with the Southern California region.

The large petrochemical industrial complex of the Texas Gulf region could be well served by seminars and an exchange in the Houston-Galveston SMSA. In a similar manner, waste seminars and waste exchanges in the New Orleans-Baton Rouge area would be useful. This could also serve the Mobile, Alabama area.

Seminars and waste exchanges are recommended for the large industrial complex in the Chicago area. An exchange located in Chicago could serve the Milwaukee SMSA as well as the large number of SMSA's around Chicago. A waste exchange and seminar in the Detroit area would serve the automobile and related industries of Michigan.

A waste exchange in Cincinnati could reasonably serve the Dayton, Columbus areas of southern Ohio and perhaps southern Indiana.

Pittsburgh could serve the highly iron and steel oriented region extending from Pittsburgh, northwest to Cleveland and including Akron, Youngstown and other industrial SMSA's.

The iron and steel and chemicals dominated Buffalo-Niagara Falls SMSA could benefit greatly from a waste exchange and associated seminars. An upstate New York exchange and seminars in the Syracuse-Albany areas appears appropriate.

One or more waste exchanges are most certainly appropriate for the huge industrial complex of refineries, chemical plants and other industries extending from New York City to Wilmington, Delaware. Likewise, seminars and a waste exchange in the vicinity of Boston could serve the industrialized SMSA's of New England.

A waste exchange serving the chemicals, metals and electronics industries of Virginia appears appropriate in the Richmond vicinity. The predominantly textile and chemicals oriented industries of central North Carolina

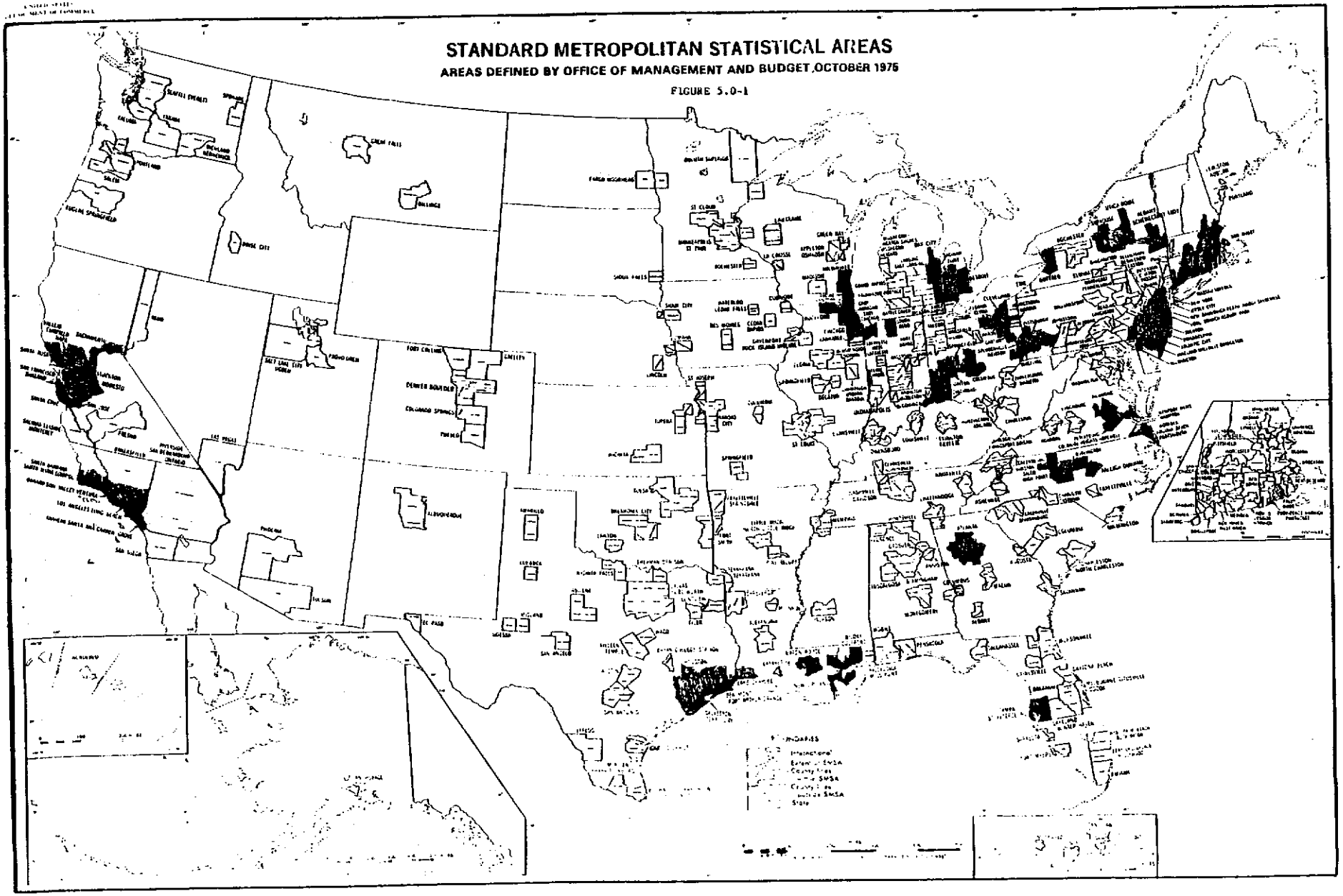


Figure 5.0-1 Standard Metropolitan Statistical Areas Suitable for Waste Exchanges - shaded areas.

would be served by seminars and an exchange located within the Burlington SMSA complex.

The textiles and inorganic chemicals industries of Georgia could be served by an exchange in Atlanta. This exchange may serve the northern Alabama industrial area of Birmingham-Tuscaloosa, although a waste exchange for this area may also be appropriate. A waste exchange in the vicinity of Tampa, Florida may also be considered.

Although the previous discussions have attempted to identify major states and areas for waste exchanges, the possibilities (and realities) for waste exchange in other states and areas must not be ignored. Table 5.0-3 lists major industries of each state thereby providing further insight into other waste exchange opportunities.

Energy Recovery - Many of the wastes in present waste exchange listings and having potential for listing are entirely or substantially organic. Examples include pallets, scrap plastic resins, oils, solvents, carbon filters and off-specification organic products. Under the present conditions of fuel shortages and mounting energy costs which are not expected to abate, it would seem highly opportune for waste exchanges to explore the use of exchange listed products in waste-to-energy facilities. The compatibility of these wastes with energy recovery facilities would, of course, have to be evaluated on an individual basis.

Thus, as example, many chlorinated hydrocarbons and polyvinyl chloride plastics with high calorific value which yield hydrochloric acid (HCl) fumes, must be scrubbed when at significant concentrations. Many highly toxic compounds such as PCB's and chlorinated insecticides must be carefully incinerated at high temperatures and relatively long residence time. These compounds would not be accepted in normal waste-to-energy installations.

Many food and paper processing, and wood industry wastes are expected to be prime candidates for waste-to-energy installations. The most essential prerequisite is that the calorific value (i.e. net calorific value) of the dried material results in significant positive heat value.

Many municipalities and/or industries throughout the United States have waste-to-energy installations on line, in construction or in various stages of planning. The status of these projects as of March 1980 was reported by the National Center for Resource Recovery, Washington, D.C. and is enclosed as Appendix I. Although these projects

TABLE 5.0-3

SUMMARY LIST OF MAJOR INDUSTRIES BY STATE

STATE	INDUSTRIES
NORTHEAST	
Maine	Paper; leather; food.
N.H.	Elec. equip., mach. exc. elec., paper.
Vt.	Mach. exc. elec., fabricated metal; paper.
Mass.	Mach. exc. elec., elec. equip., instruments.
R.I.	Misc. mfg., fabricated metal; primary metal.
Conn.	Chemicals; print and publishing; instruments.
MIDDLE ATLANTIC	
N.Y.	Print and publish., instru'ts; mach. exc. elec.
N.J.	Chemicals; food; elec. equip., mach. exc. elec.
Pa.	Primary metal; mach. exc. electrical; food.
EAST NORTH CENTRAL	
Ohio	Trans. equip., mach. exc. elec., fab. metal.
Ind.	Elec. equip., primary metal; trans. equip.
Ill.	Mach. exc. elec., food; fabricated metal.
Mich.	Trans. equip., mach. exc. elec., fab. metal.
Wis.	Mach. exc. elec., food; paper; fab. metal.
WEST NORTH CENTRAL	
Minn.	Mach. exc. elec.; food; fab. metal; elec. equip.
Iowa	Mach. ecx. elec.; food; chemicals; elec. equip.
Mo.	Trans. equip.; food; chemicals; mach. exc. elec.
N.Dak.	Mach. exc. elec.; food; print and publishing.
S.Dak.	Food; mach. exc. electrical; lumber.
Nebr.	Food; mach. exc. elec.; elec. equip.; chemicals.
Kans.	Food; mach. exc. electrical; chemicals.
SOUTH ATLANTIC	
Del.	Food; rubber; primary metal; mach. exec. elec.
Md.	Food; primary metal; electronic equip.
D.C.	Print and Publishing; food; fabricated metal.
Va.	Chemicals; tobacco; food; electronic equip.
W.Va.	Chem.; prim. metal; stone, clay, glass prod.
N.C.	Textiles; tobacco; chemicals; mach. exc. elec.
S.C.	Textiles; chemicals; apparel; mach. exec. elec.
Ga.	Textiles; trans. equipment; food; paper.
Fla.	Food; elec. equip.; chemicals; trans. equip.
EAST SOUTH CENTRAL	
Ky.	Mach. exc. elec.; chemicals; elec. equip.; foods.
Tenn.	Chemicals; food; mach. exc. elec.; apparel.
Ala.	Primary metals; paper; textiles; chemicals.
Miss.	Trans. equip.; apparel; chemicals; food.

continued -

TABLE 5.0-3 continued

STATE	INDUSTRIES
WEST SOUTH CENTRAL	
Ark.	Food; electronic equip.; paper; chemicals.
La.	Chemicals; petroleum; food; furniture.
Okla.	Mach. exc. electrical; food; fabricated metal.
Tex.	Chemicals; petroleum; mach. exc. electrical.
MOUNTAIN	
Mont.	Lumber; food; stone, clay, glass products.
Idaho	Food; lumber; chemicals.
Wyo.	Petroleum; food; stone, clay, glass.
Colo.	Food; instruments; fabricated metal.
N.Mex.	Food; electronic equip.; stone, clay, glass.
Ariz.	Mach. exc. elec.; elec. equip.; primary metal.
Utah	Mach. exc. electrical; food; trans. equip.
Nev.	Stone, clay, glass; food; print and publishing.
PACIFIC	
Wash.	Trans. equipment; lumber; food; furniture.
Oreg.	Lumber; food; paper; instruments.
Calif.	Trans. equip.; food; elec. equip.; mach. exc. elec.
Alaska	Food; lumber; printing and publishing.
Hawaii	Food; print and publishing; stone, clay, glass.

Source: Statistical Abstract
of the United States, 1979
U.S. Dept. of Commerce
Bureau of the Census

have been built to burn municipal trash for energy, it is entirely conceivable that large volumes of selected industrial wastes provided on a regular basis could become appropriate feedstock.

It is of interest to note that with the exception of Texas and Georgia, all of the states previously identified as having high potential for waste exchanges also have one or more waste-to-energy installations either in operation or planned.

Table 5.0-4 summarizes the status of United States Waste Information Exchanges by state. Based on the foregoing criteria of industries, waste materials and potential for waste energy recovery, a list of 14 states having a distinct need for waste exchanges and seminars was compiled. Six of these 14 states already have operating waste information exchanges. Massachusetts, with a New England exchange being planned, brings the number to seven out of 14 having exchanges in varying stages of operation.

It should be noted that an additional seven states that already have operating waste exchanges had a lesser need for establishing a waste information exchange according to our criteria.

The seven remaining states shown in the last column of Table 5.0-4 would be ideal primary candidates for seminars on, and establishment of, waste information exchanges. These are:

1. Louisiana
2. Illinois
3. Michigan
4. Pennsylvania
5. Virginia
6. Alabama
7. Florida

TABLE 5.0-4

STATUS AND REQUIREMENTS OF STATES FOR WASTE INFORMATION EXCHANGES

STATES THAT HAVE A NEED FOR WASTE INFORMATION EXCHANGES	STATES THAT ALREADY HAVE WASTE INFORMATION EXCHANGES	STATES THAT ARE SUITABLE CANDIDATES FOR SEMINARS AND WASTE INFORMATION EXCHANGES
California	California	
Texas	Texas	
Louisiana		Louisiana
Illinois		Illinois
Michigan		Michigan
Ohio	Ohio	
Pennsylvania		Pennsylvania
New York	New York	
Massachusetts	Massachusetts*	
Virginia		Virginia
North Carolina	North Carolina	
Georgia	Georgia	
Alabama		Alabama
Florida		Florida
	Washington	
	Oregon	
	Iowa	
	Missouri	
	Minnesota	
	Tennessee	
	New Jersey	

* New England Regional Commission is starting up a waste information exchange.

5.1 Waste Exchange Programs by Industrial Trade Associations

The distinct tendencies of existing waste exchanges to concentrate in particular types of material categories, and to depend upon private sponsorship and funding, suggests a strategy whereby industrial trade associations could actively promote waste exchanges. Thus, for example, the chemicals industry is a major souce of materials for waste exchanges, and its trade associations could increase the volume of exchanges significantly. The following trade associations, or better yet, a "consortium" of trade associations is advanced as having high potential for promoting and implementing materials exchange within the chemicals industry:

Chemical Manufacturers Assoc. - Washington, D.C.
Chemical Specialties Mfrs. Assoc. - Washington, D.C.
Drug, Chemical and Allied Trade Assoc. - Bayside, N.Y.
Fire Retardant Chemicals Assoc. - Westport, Conn.
Pesticide Formulators Assoc., Washington, D.C.
Pulp Chemical Assoc. - New York, N.Y.
Synthetic Organic Chemical Mfrs. Assoc. - Scarsdale, N.Y.
National Agricultural Chemicals Assoc. - Wash. D.C.
American Petroleum Institute - Washington, D.C.
American Petroleum Refiners Assoc. - Washington, D.C.
American Petroleum Re-Refiners - Washington, D.C.

Another group of Trade Associations which would appear to benefit from a consortium to promote waste exchanges are the primary and secondary metals industry associations:

American Iron and Steel Institute
The Aluminum Assoc.
Lead Institute
Zinc Institute
Aluminum Recycling Assoc.
Ferroalloy Assoc.
American Foundrymen
Secondary Lead Smelters Assoc.
National Assoc. of Recycling Industries
National Assoc. of Metal Finishers

Other trade associations or groups of trade associations in various industry sectors (textiles, wood and pulp, rubber, plastics) are also candidates for promotion and establishment of waste exchanges. These are shown following:

TRADE ASSOCIATIONS

ABRASIVES
Coated Abrasive Manufacturers Institute

AGRICULTURE
National Agricultural Chemicals Assoc.

ALUMINUM
The Aluminum Association
Aluminum Recycling Assoc.

ASBESTOS
A/C Pipe Producers Assoc.
Assoc. of Asbestos-Cement Pipe Producers

ASPHALT
Asphalt Emulsion Mfrs. Assoc.
Asphalt Roofing Mfrs. Assoc.

BARRELS
Associated Cooperage Industries of America Inc.

BATTERIES
Independent Battery Mfrs. Assoc.

CHEMICALS & CHEMICAL INDUSTRY
Chlorine Institute, New York, N.Y.
Manufacturing Chemists Assoc., Washington, D.C.
Chemical Specialties Mfrs. Assoc. Inc., Wash., D.C.
Drug, Chemical and Allied Trade Assoc. Inc., Bayside, N. Y.
Fire Retardant Chemicals Assoc., Westport, Conn.
Pesticide Formulators Assoc., Washington, D.C.
Pulp Chemical Assoc., New York, N.Y.
Synthetic Organic Chemical Mfrs. Assoc., Scarsdale, N.Y.
National Agricultural Chemicals Assoc., Wash. D.C.
National Assoc. of Pharmaceutical Mfrs., New York, N.Y.
Pharmaceutical Manufacturers Assoc., Washington, D.C.

PETROLEUM

American Petroleum Institute, Washington, D.C.
American Petroleum Refiners Assoc., Wash., D.C.
Assoc. of Petroleum Re-Refiners, Wash., D.C.

METALS, METAL SLUDGES

National Assoc. of Recycling Industries, New York, N. Y.

LEATHER

Leather Industries of America, New York, N.Y.
Tanners Council of America, New York, N.Y.

METALS

Aluminum Recycling Assoc.
Electrochemical Society Inc.
Ferroalloys Assoc. Inc.
Zinc Institute Inc.
Lead Institute Inc.
National Assoc. of Metal Finishers, Chicago, Illinois

PAPER

American Paper Institute, New York
Technical Assoc. of the Pulp and Paper Industry, Atlanta, Georgia

PLASTICS - NARI

RUBBER - NARI

Rubber Mfrs. Assoc. Inc., Washington, D. C.

TEXTILES

American Dye Mfrs. Institute
Felt Mfrs. Council
Man-made Fiber Products Assoc.

6.0 SEMINAR SPEAKERS

A list of potential seminar speakers was compiled, based on their experience and familiarity with waste exchanges and related subjects. The speakers were categorized into six classes of experience with waste exchanges. These are:

1. Industry
2. Exchange Manager
3. Consultant
4. Broker
5. Attorney
6. General

The list of speakers is shown tabulated according to experience and the ten U.S. EPA Regions, in Table 6.0-1. A directory of names and addresses are shown in Appendix II.

Some of the candidates, even though listed in Table 6.0-1 according to their home or office address in U.S. EPA Regions, should no doubt be called on as seminar speakers outside their EPA region because of their extraordinary experience or knowledge.

TABLE 6.0-1

LIST OF CANDIDATE SEMINAR SPEAKERS

Candidate Speaker	Waste Exchange Experience Category					
	Industry	Exchange Manager	Consultant	Broker	Attorney	General
U.S. EPA Region I						
S. Keyes Walworth						X
John A. Cunningham	X					
John Kehoe	X		X			
Robert C. Terry, Jr.			X			
Joan B. Berkowitz			X			
Robert G. Taylor			X			
U.S. EPA Region II						
G.F. Petit	X	X				
James E. Knap	X	X				
Bob Kelly						
John Flandreau		X				
Robert L. Schulz		X				
Marjorie L. Hart	X					
Peter Alevra	X					
Charles A. Ballard	X					
Alfonse M. D'Amato						X
Ira Freilicher	X					
Sidney P. Mudd	X					
Robert M. Schiffer	X					
J.T. Engster		X				
Ken Kearney		X				
Ludlum		X				
Edward Isenberg		X	X			
Richard P. Leonard			X			
Howard Ness	X					
William Balgord			X			
Donald J. Kuhn			X			

TABLE 6.0-1 Continued - 2

Candidate Speaker	Waste Exchange Experience Category					
	Industry	Exchange Manager	Consultant	Broker	Attorney	General
U.S. EPA Region III						
E. R. Sullivan			X			
Edward Ostrowski	X					
Harvey Alter	X					
T.F.P. Sullivan					X	
Marshall Lee Miller					X	
U.S. EPA Region IV						
Ernest C. Blankenship		X				
Roy Davis		X				
Bert Fridlin		X				
W. Frank Victory		X				
U.S. EPA Region V						
Noble Beck		X				
William Petrich		X	X	X		
Richard L. Immerman		X		X		
Marian S. Simmons						X
Tom Hurvis		X		X		
Jess Starkey		X		X		
James T. Sheilds		X	X			
James P. Donaldson		X	X			
James W. Polich	X					
John L. Parker					X	
Ted Reese			X			X
Ken Kixmoeller		X	X			
U.S. EPA Region VI						
H. Nugent Myrick		X	X			
Jack Westney		X				
Bentley B. Mackay, Jr.			X			X

TABLE 6.0-1 Continued - 3

Candidate Speaker	Waste Exchange Experience Category					
	Industry	Exchange Manager	Consultant	Broker	Attorney	General
U.S. EPA Region VII						
Oscar S. Richards		X				
Edward O. Sealine		X	X			
Wilson A. Kluckman		X	X			
David E. Murray		X				
Dennis Lynch	X	X				
M. M. Fine		X				
U.S. EPA Region IX						
Paul H. Williams		X	X			
Carl G. Schwarzer	X	X	X			
Leo Brokaw		X				
Leonard Stefanelli	X					X
Paul Palmer	X	X	X			
Robert Beatty	X					
Frank S. Patrinostra		X	X			
U.S. EPA Region X						
Delyn Kies		X	X			
Jack Peabody	X					X
Judy Henry		X	X			
Jerry Powell		X	X			
Dave Clark		X				
William R. Bree			X			
Larry Gray			X			
Michael Zibit			X			
Foreign						
Robert Laughlin		X	X			

7.0 CONCLUSION

The exchange and reuse of waste materials, in addition to protecting the environment, results in disposal cost savings; conservation of raw materials, along with the energy to process raw materials; the reuse of energy-rich waste materials such as waste oils and wood wastes. Significant quantities of waste materials are being recycled, reused and salvaged.

Nearly a decade of waste exchange experience has shown its usefulness in reducing the amount of solid wastes and unsalvageable waste materials. Public education and seminar programs should foster the improvement of existing waste exchanges and encourage the establishment of new waste material and information exchanges.

Waste exchanges do not offer the only solution to solid and hazardous waste disposal problems, but offer one of the least cost, most environmentally and socially sound approaches to this complex problem.

The inherent distrust of government management of waste exchanges in the United States, along with the apparent success of privately run exchanges suggests that operations should be encouraged to remain in the private sector. However, the public/government interest can be served by recycling or reclamation of materials that might otherwise be disposed of in the environment. In the case of hazardous wastes, avoidance of land disposal, as effected by waste transfer and reclamation, serves as a means of protecting public health and welfare.

In order to increase the percentage of hazardous wastes which are successfully transferred, incentives to generators, users, private waste exchange operators, or others, are recommended for consideration. Incentives could take the form of tax credits on successfully transferred materials contained in hazardous waste lists issued under RCRA or by individual states. Strict rules would be necessary, however, to ensure that exchanged hazardous materials do not pose a threat to human health in recycle usage. In a similar manner, materials which are used as fuel could be eligible for tax credits based on their calorific value.

A direct establishment of waste exchanges by the Federal and State governments is not recommended. Information seminars in various regions of the country are felt to be important catalysts in explaining the opportunities and advantages which waste exchanges offer for private enterprise and affiliated Trade Associations.

The impetus of present waste disposal rules and regulations, especially RCRA should provide incentives for waste generators to seek clearinghouse services for the exchange of wastes rather than absorb the increased cost of environmentally acceptable disposal.

The government can promote the establishment of waste exchanges through low cost loans, tax credits and technical assistance. Regional EPA offices should be able to advise business interests with specifics regarding opportunities for establishing waste exchanges, including the identification of candidate industries and materials. Regional offices of EPA and the Department of Commerce through the Small Business Administration could assist qualified interests in obtaining the necessary funding and technical know-how for start-up or expansion of exchanges.

8.0 REFERENCES

1) "Waste Clearinghouses and Exchanges: New Ways for Identifying and Transferring Reusable Industrial Process Wastes" Robert C. Terry et.al., Arthur D. Little Inc., Report SW-130C prepared for U.S. Environmental Protection Agency, 1976.

2) Battelle-Columbus Laboratories, "Assessment of Industrial Hazardous Waste Practices; Electroplating and Metal Finishing Industries-Job Shops," U.S. Environmental Protection Agency, in preparation, to be distributed by the National Technical Information Service.

3) WAPORA, Inc., "Assessment of Industrial Hazardous Waste Practices: Paint and Allied Products Industry Contract Solvent Reclaiming Operations, and Factory Application of Coatings," Environmental Protection Publication SW-119c, U.S. Environmental Protection Agency, PB-251 669 (1976).

4) WAPORA, Inc., "Assessment of Industrial Hazardous Waste Practices-Special Machines Manufacturing Industries," U.S. Environmental Protection Agency, Publication SW-141C (March, 1977).

5) Jacobs Engineering Company, "Assessment of Industrial Hazardous Waste Practices in the Petroleum Refining Industry," U.S. Environmental Protection Agency, in preparation, to be distributed by the National Technical Information Service.

6) Gruber, G.I., "Assessment of Industrial Hazardous Waste Practices, Organic Chemicals, Pesticides, and Explosives Industries," Environmental Protection Publication SW-118c, U.S. Environmental Protection Agency, PB-251 307 (April, 1975).

7) Versar, Incorporated, "Assessment of Industrial Hazardous Waste Practices, Storage and Primary Batteries Industries," Environmental Protection Publication SW-102c, U.S. Environmental Protection Agency, PB-241 204 (January, 1975).

8) Calspan Corporation, "Assessment of Industrial Hazardous Waste Practices in the Metal Smelting and Refining Industry," U.S. Environmental Protection Agency, Publication SW-145c 4 (April, 1977).

9) Versar, Incorporated, "Assessment of Industrial Hazardous Waste Practices, Textiles Industry," U.S. Environmental Protection Agency, Publication SW-125c (June, 1976).

10) Foster D. Snell, Inc., "Assessment of Industrial Hazardous Waste Practices, Rubber and Plastics Industry," US. Environmental Protection Agency, in preparation, to be distributed by the National Technical Information Service.

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11) Shaver, R.G., et al., "Assessment of Industrial Hazardous Waste Practices; Inorganic Chemicals Industry," Environmental Protection Publication SW-104c, U.S. Environmental Protection Agency PB-244832 (March 1975).

12) SCS Engineers, Inc., "Assessment of Industrial Hazardous Waste Practices-Leather Tanning and Finishing Industry," U.S. Environmental Protection Publication SW-131c (November, 1976).

13) Arthur D. Little, Inc., "Pharmaceutical Industry: Hazardous Waste Generation, Treatment, and Disposal," Environmental Protection Publication SW-508, U.S. Environmental Protection Agency, 1976.

14) WAPORA, Inc., "Assessment of Industrial Hazardous Waste Practices - Electronic Components Manufacturing Industry" U.S. Environmental Protection Agency Publication SW-140c (Jan. 1977).

APPENDIX I

RESOURCE RECOVERY ACTIVITIES

Special Feature
RESOURCE RECOVERY ACTIVITIES

March 1980
Volume 10, Number 1

NCRR BULLETIN

THE JOURNAL OF RESOURCE RECOVERY

National Center for Resource Recovery, Inc.

RESOURCE RECOVERY ACTIVITIES

National Center for Resource Recovery, Inc.
1211 Connecticut Ave. N.W., Washington, D.C. 20036

For several years, NCRR has been tracking resource recovery activities in the U.S. and publishing periodic summaries. Because of the growing interest in systems to moderate solid waste disposal problems while recovering recyclables and energy products—plus a growing number of projects being undertaken—we have adapted the listing to a regular feature in every other issue of the *NCRR Bulletin*.

The listing is broken down into four segments for ease of review: (1) capital-intensive energy and materials recovery facilities that are built, operating, in shakedown, under construction or in contract-signing stages; (2) smaller, controlled-air or modular combustion projects; (3) methane recovery from sanitary landfills projects; and (4) jurisdictions where commitments have been reported to undertake resource recovery projects. In addition to the systems listed here, a number of communities are magnetically separating ferrous metals and conducting source separation programs for old newspapers, etc.

Although every effort has been made to make this report complete and up-to-date, the dynamics of resource recovery are such that the status of projects can change at any time. For clarification or additional information, therefore, we suggest that you write directly to the contacts listed.

We are grateful for the review and input by the various project representatives, as well as that from local, state and federal officials, particularly the U.S. Environmental Protection Agency and the U.S. Department of Energy.

LOCATION	KEY PARTICIPANTS	PROCESS	OUTPUT	REPORTED CAPACITY	REPORTED CAPITAL COSTS (MILLIONS OF $)	STATUS	CONTACT
Akron, Ohio	City; Glaus, Pyle, Schomer, Burns & DeHaven; Ruhlin Const. Co.; Babcock & Wilcox Co. (boiler supplier); Teledyne National (operator)	Shredding; air classification; magnetic separation; burning RDF in semi-suspension, stoker-grate boiler	Steam for urban and industrial heating and cooling; ferrous metals	1000 TPD	51[a]	In shakedown; fully operational in March 1980	Dave Chapman 203 Municipal Bldg 166 South High St. Akron, Ohio 44308
Albany, N.Y.	City and 10 nearby communities; Smith & Mahoney (designer/project mgr.)	Shredding; magnetic separation; burning in semi-suspension, stoker-grate boiler; nonferrous recovery from boiler ash	RDF; ferrous metals; steam for urban heating and cooling; nonferrous metals	750 TPD	22	Construction completed in March 1980; shakedown to begin in April; steam generating facility operational in 1981	Patrick Mahoney Smith & Mahoney 40 Steuben St. Albany, N.Y. 12207
Ames, Iowa	City; Gibbs, Hill, Durham & Richardson, Inc. (designer)	Baling waste paper; shredding; magnetic separation; air classification; screening; other mechanical separation	Refuse-derived fuel for use by utility; baled paper; ferrous metals; aluminum, other nonferrous metals	200 TPD 50 TPH	6.19[b]	Operational since 1975	Arnold Chantland, Dir. Dept. of Public Wor City Hall 5th and Kellog St. Ames, Iowa 50010
Baltimore, Md.[c]	City; EPA	Formerly Landgard® process, now modified significantly by Baltimore City; includes shredding; pyrolysis; steam production; water quenching	Steam for use by city utility	600 TPD	30.1	Plant operating 24 hrs/day, 6 days/week	Ed May Baltimore City Pyrolysis Plant 1800 Annapolis Rd Baltimore, Md. 21230

LOCATION	KEY PARTICIPANTS	PROCESS	OUTPUT	REPORTED CAPACITY	REPORTED CAPITAL COSTS (MILLIONS OF $)	STATUS	CONTACT
Baltimore County, Md.	County; Maryland Environmental Service; Teledyne National (designer/operator)	Shredding; air classification; magnetic separation	RFD; ferrous metals; glass for secondary products; aluminum	600-1500 TPD	8.4	Operational; recovering ferrous metals and producing secondary shredded and pelletized RDF; glass and aluminum recovery operational	Kenneth Cramer Teledyne National 117 Church Lane Cockeysville, Md. 21030
Braintree, Mass.	City (owner/operator); Camp, Dresser & McKee, Inc. (designer)	Mass burning	Steam; producing ½ million lbs/day; selling ½ of steam produced to Art & Leather Co.	250 TPD	2.8	Operational since 1971	Edward Courcher Supt. Braintree Thermal Waste Reduction Center Ivory Street Braintree, Mass. 02184
Bridgeport, Conn.	Conn. Resources Recovery Authority; Occidental Petroleum Corp. and Combustion Equipment Assoc. (designer/operator)	Shredding; magnetic separation; air classification; froth flotation	Eco-Fuel II™ (Powdered fuel) for use in utility boiler; ferrous metals; nonferrous metals; glass	1800 TPD	53[c]	Construction complete; startup has begun; Eco-Fuel II™ in production and being test burned at United Illuminating Co.	Ed Kelly, Dir., Corporate Communications Combustion Equipment Assoc. 555 Madison Ave New York, N.Y. 10022
Chicago, Ill. (Northwest Incinerator)	City; Metcalf & Eddy, Inc. (designer)	Waterwall combustion	Steam for Brach Candy Co.; ferrous metals	1600 TPD	23	Operational since 1971; steam delivery expected to be on line in 1980	Emil Nigro Supervising Engr Bureau of Sanitation Room 704—City Hall Chicago, Ill. 606
Chicago, Ill. (Southwest Supplementary Fuel Processing Facility)	City; Ralph M. Parsons Company and Consoer, Townsend & Assoc. (designers)	Shredding; air classification; magnetic separation	RDF for use by utility; ferrous metals	1000 TPD	19[d]	Temporarily off-stream to review experience to date and evaluate future operations	(Same as previous listing)
Columbus, Ohio	City; Alden E. Stilson Assoc. (designer)	Shredding; magnetic separation; burning of shredded refuse with supplemental coal in semi-suspension, stoker-grate boiler to produce steam; generation of electricity from steam	Electricity for City customers	2000 TPD	127	Equipment being purchased; site preparation began July 1979; piling begun for foundations; operational in late 1981	Henry Bell, Supt Div. of Electricity 50 W. Gay St. Columbus, OH 4
Dade County, Fla.	County; Black Clawson/Parsons & Whittemore, Inc. (designer)	Hydrasposal™ (wet pulping); magnetic and other mechanical separation	Steam for utility to produce electricity; glass; aluminum; ferrous metals	3000 TPD	165[e]	Contracts signed between County, P&W and Fla. Power & Light; pollution control bonds sold by state; construction began April 1979; completion scheduled for April 1981	Dennis Carter Asst. County Mgr Room 911 Dade County Courthouse 73 W. Flagler St Miami, Fla. 331
Detroit, Mich.	City	Shredding; air classification; magnetic separation; dedicated boilers	Steam and/or electricity for use by Detroit Edison; ferrous metals	3000 TPD	125	Negotiating with Combustion Engineering, Inc./Waste Resources Corp., prior to contract signing; steam to be purchased by Detroit Edison; State of Michigan environmental impact statement being prepared	Michael Brooks Dept. of Public City of Detroit City-County Bldg Room 513 Detroit, Mich. 4

LOCATION	KEY PARTICIPANTS	PROCESS	OUTPUT	REPORTED CAPACITY	REPORTED CAPITAL COSTS (MILLIONS OF $)	STATUS	CONTACT
Duluth, Minn.	Western Lake Superior Sanitary District (operator); Consoer, Townsend & Assoc. (engineer)	Shredding; magnetic separation; air classification; secondary shredding; fluidized bed incineration of RDF and sludge	RDF; ferrous metals; steam for heating and cooling of plant and to run process equipment	400 TPD of MSW; 340 TPD of 20% solids sewage sludge	19[f]	Start-up & shakedown in Spring 1980	John Klaers Western Lake Superior Sanitary Dist. 27th Ave. West & The Waterfront Duluth, Minn. 55806
East Bridgewater, Mass.	City of Brockton and nearby towns; Combustion Equipment Assoc.; East Bridgewater Assoc.	Shredding; air classification; magnetic separation; other mechanical separation	Eco-Fuel II™ for industrial boiler; ferrous metals	550 TPD being processed	10-12	Operational since 1977; plant has served as pilot operation for production of Eco-Fuel II™	(Same as Bridgeport, Conn.)
Glen Cove, N.Y.	City (owner/operator); William F. Cosulich and Ernest F.W. Frank (designers)	Mass burning in stoker-fired furnace with vacuum filtered sewage sludge	Steam for electricity for use at sewage plant	225 TPD	32 ($20 M for mass burning unit; $12 M for sewage plant)	Sewage plant and incinerator unit under construction	Mike Grieco Director of Public Works City Hall, Bridge St. Glen Cove, N.Y. 11542
Hampton, Va.	City; NASA Langley Research Center; U.S. Air Force at Langley Field; J.M. Kenith Co. (designer/builder)	Mass burning	Steam for use by NASA Langley Research Center	200 TPD	9.4	Boilers, roofing & siding installed; pumps, motors, & controls being installed	Frank H. Miller, Jr. Dir. of Public Works Hampton, Va. 23669
Harrisburg, Pa.	City; Gannett, Fleming, Corddry and Carpenter, Inc. (designer)	Waterwall combustion; bulky waste shredding (steam driven); magnetic separation; sewage sludge burning	Steam for utility-owned district heating system and for City-owned sludge drying system; ferrous metals	720 TPD	8.3	Operational since Oct. 1972; steam sale to utility began Dec. 1978; sludge drying facility started early 1980	Paul W. Bricker Gannett, Fleming, Corddry and Carpenter, Inc. P.O. Box 1963 Harrisburg, Pa. 17105
Hempstead, N.Y.	Town; Hempstead Resource Recovery Corp. (Div. of Black Clawson/Parsons & Whittemore, Inc.) (owner/operator)	Hydrasposal™ (wet pulping); magnetic and mechanical separation; burning of RDF product in air-swept spout spreader stoker boilers	Electricity from utility-owned turbine generators; color-sorted glass; aluminum; ferrous metals	2000 TPD (150 TPH)	115	In shakedown	D.C. Cullingham V.P. & Gen. Mgr. Hempstead Resources Recovery Corp. P.O. Box 4014 Roosevelt Field Station Garden City East, N.Y. 11530
Lakeland, Fla.	City (operator and joint owner with Orlando Utility Commission); C.T. Main, Inc. (power plant designer); Horner & Shifrin, Inc. (waste processing plant designer)	Shredding; magnetic separation; burning RDF with coal	Steam to produce electricity for use by City of Lakeland and Orlando Utility Commission; ferrous metals	300 TPD	5	Equipment purchased; construction begun; shakedown expected in mid-1981	Claude Hiers Supt. of Industrial Engineering & Business Affairs Box 368 Lakeland, Fla. 33802
Lane County, Ore.	County; Allis-Chalmers Corp. (designer); Western Waste Corp. (operator)	Shredding; air classification; magnetic separation	RDF; ferrous metals	500 TPD	2.1[g]	Off-stream due to explosion in Nov. 1979; to be operational in mid-1980	Mike Turner Adm. Analyst Lane County Solid Waste Mgt. Div. Environmental Mgt. Dept. 125 East 8th Ave. Eugene, Ore. 97401
Madison, Wis.	City and M.L. Smith Environmental (designer); Madison Gas & Electric Co. (RDF user)	Shredding; magnetic separation; separation of combustibles and non-combustibles; secondary shredding air swept	RDF for use by Madison Gas & Electric Co.; ferrous metals	400 TPD (max.) (200 TPD being processed)	2.5[h]	Process plant & boiler firing facility operational	Gary Boley Div. of Engineering Room 115 City-County Bldg. Madison, Wis. 53709

LOCATION	KEY PARTICIPANTS	PROCESS	OUTPUT	REPORTED CAPACITY	REPORTED CAPITAL COSTS (MILLIONS OF $)	STATUS	CONTACT
Milwaukee, Wis.	City, (to expand to surrounding Milwaukee County areas); Americology Div. of American Can Co. (owner/operator); Bechtel, Inc (designer)	Shredding; air classification; magnetic and other mechanical separation	RDF for use by utility; bundled paper and corrugated; ferrous metals; aluminum; glassy aggregate	1600 TPD	18 (Plus 4.2 at Wisconsin Electric Power Co.)	Now operational at design capacity; RDF utilization problem at WEPCO due to boiler slagging on coal only, under evaluation; $4.6 million production improvement program held in abeyance pending evaluation	George Mallan Dir. of Operations & Marketing Americology American Can Co. GOP #8 Greenwich, Conn. 06830
Monroe County, N.Y.	County (owner); Raytheon Service Co. (designer)	Shredding; air classification; magnetic & other mechanical separation; froth flotation	RDF for use by utility; ferrous metals; nonferrous metals; mixed glass	2000 TPD	60.2[1]	Construction complete; startup began Sept. 1979	Howard Christens Dir. of Solid Waste Department of Pu Works 110 Colfax St. Rochester, N.Y. 14606
Nashville, Tenn.	Nashville Thermal Transfer Corp.; I.C. Thomasson & Assoc., Inc. (designer)	Thermal combustion	Steam for urban heating and cooling	400 TPD 7 days per week	24.5	Operational since 1974; recently upgraded two boilers to 530 TPD capacity each	Milton E. Kirkpat Exec. V.P. & Gen. Mgr. Nashville Therma Transfer Corp. 110 First Ave. So Nashville, Tenn. 37201
Newark, N.J.	City; Combustion Equipment Assoc. and Occidental Petroleum Corp. (designers and operators)	Shredding; air classification; magnetic and other separation	Eco-Fuel II® for use by utility; ferrous metals; aluminum	3000 TPD (in 1000 TPD modules; to serve Newark's 700 TPD and surrounding community)	70 (for 3000 TPD) (initially 1000 TPD with a cost of $25 million including fuel user conversion)	Final contract signed 1977; site preparation began in Dec. 1978	(Same as Bridgep Conn.)
New Orleans, La.	City, Waste Management, Inc. (owner/operator); National Center for Resource Recovery, Inc. (designer/implementer)	Shredding; air classification; magnetic and other mechanical separation	Ferrous metals; aluminum and other nonferrous metals; glass	700 TPD	9.1[1]	Shredding/landfilling operational; recovering ferrous; aluminum, other nonferrous metals, glass in shakedown	Clifford Scineau Deputy Director Dept. of Sanitati City Hall New Orleans, La 70112
Niagara Falls, N.Y.	Hooker Energy Corp. (Hooker Chemicals & Plastics Corp.) (owner/operator)	Shredding; magnetic separation; burning shredded refuse	Steam and electricity for use by company complex; ferrous metals	2200 TPD	74 (appx.)	75% complete; mechanical completion April 1980	James Green Media Relations Hooker Chemica MPO Box 728 Niagara Falls, N 14302
Norfolk, Va. (U.S. Naval Station)	U.S. Navy (owner); Navy Public Works Center (operator); Metcalf & Eddy, Inc. (designer)	Mass burning in waterwall furnace	Steam (40,000 lbs/hr.) for use by Naval Station	360 TPD (two boilers, operated alternately)	2.2	Operational	Causey Simmon Head, Utilities Dept., Navy P Works Center Norfolk, Va. 23
Oceanside, N.Y.	Township of Hempstead (owner/operator); Charles R. Velzy (designer)	Mass burning in waterwall furnaces	Steam (60,000 lbs/hr.) in-plant use for electricity generation	750 TPD	9	Operational since 1965	Al Albanese Supt., Sanitatic Township of He stead 1600 Merrick F Merrick, N.Y. 1
Orange County, Fla. (Walt Disney World)	U.S. Department of Energy, Idaho Operations Office; Reedy Creek Utilities Co.	Lagging pyrolysis incineration	High temperature water for heating and cooling	100 TPD	11 (appx.)	Demonstration plant; final design complete; groundbreaking scheduled for June 1980	Carl P. Gertz Project Mgr. U.S. Dept. of Energy 550 Second St Idaho Falls, Id 83401

LOCATION	KEY PARTICIPANTS	PROCESS	OUTPUT	REPORTED CAPACITY	REPORTED CAPITAL COSTS (MILLIONS OF $)	STATUS	CONTACT
Pinellas County, Fla.	County; Florida Power Corp; UOP, Inc.	Mass burning	Electricity; ferrous metals, aluminum and other nonferrous metals recovered after burning	14,000 tons per week	140	Final financial arrangements prior to bond sale; projected to begin construction this year; operational 1983	Don F. Acenbrack, Dir. Solid Waste Dept. of Public Wor and Utilities Pinellas County 315 Court St. Clearwater, Fla. 33516
Pompano Beach, Fla.	Waste, Management, Inc.; U.S. Dept. of Energy; Jacobs Engineering Co. (designer)	Shredding; air classification; magnetic and other mechanical separation; anaerobic digestion of air classified light fraction with sewage sludge	Methane gas; carbon dioxide	50-100 TPD	3.65	Demonstration plant; operational	Peter J. Ware, Proj. Mgr. Waste Management 900 Jorie Blvd. Oak Brook, Ill. 605
Portsmouth, Va. (Norfolk Naval Shipyard)	U.S. Navy (owner); Public Works Dept., Norfolk Naval Shipyard	Mass burning in waterwall furnace	Steam (30,000 lbs/hr) for use by facilities at Naval Shipyard	160 TPD (two-80 TPD boilers; operated alternately)	4.5	Operational since 1976	Pete Cunanan NAVFAC ENG COM Environmental Quality Division Norfolk, Va. 2351
Portsmouth, Va. (Southeastern Tidewater Energy Project)	Southeastern Public Service Authority of Va.; Henningson, Durham & Richardson (architect/engineer); Day & Zimmerman (construction manager); Norfolk Naval Shipyard	Shredding; air classification; ferrous & nonferrous metals separation; burning RDF in semi-suspension, stoker-grate boiler	RDF; ferrous metals; nonferrous metals; steam & electricity for Shipyard	2000 TPD	144.9	Design 40% complete; site acquired; Environmental Impact Assessment approved; contract for sale of steam & electricity to Shipyard undergoing approval; construction to begin in early 1981	Durwood S. Curlin Executive Director Southeastern Tide water Energy Project 18 Koger Executiv Center, Suite 12 Norfolk, Va. 2350
San Diego County, Calif.[a]	County; Occidental Petroleum Corp. (designer/operator)	Shredding; air classification; magnetic and other mechanical separation; froth flotation; pyrolysis	Pyrolytic oil, ferrous and nonferrous metals; glass	200 TPD	EPA—4.2 County—2 Occidental Petroleum 8.3	Demonstration plant; operations suspended after initial testing; further possible funding and modification being considered	John S. Burke, Dep. Dir. Solid Waste Dept. of Sanitatic and Flood Cont 5555 Overland A San Diego, Calif. 92123
Saugus, Mass.	Thirteen communities including Saugus and part of northern Boston; RESCO (owner/operator)	Waterwall combustion; magnetic separation	Steam for electrical generation and industrial use; ferrous metals	1200 TPD (two boilers with 600-TPD capacity each)	50	Operational since 1975; expansion being considered	Joseph Ferrante Wheelabrator-Fry Inc. Liberty Lane Hampton, N.H. 0
Tacoma, Wash.	City (owner/operator); Boeing Engineering (designer)	Shredding; air classification; magnetic separation	RDF; ferrous metals	500 TPD	2.5[b]	Operational since 1979	Bill Larson, Proj. Mgr. Refuse Utility 740 St. Helens A Room 304 Tacoma, Wash.
Wilmington, Del.[a]	Delaware Solid Waste Authority; EPA; Raytheon Service Co. (designer)	Shredding; air classification; magnetic and other mechanical separation; froth flotation; aerobic digestion	Ferrous metals; nonferrous metals; glass; RDF; humus	1000 TPD municipal solid waste co-processed with 350 TPD of 20% solids digested sewage sludge	71.3[c] 7.4 from EPA OSW; 21.3 from EPA Water Prog; 7.1 from State matching grants; remainder from the Authority through sale of revenue bonds	Groundbreaking Aug. 1979; construction begun; startup expected in Nov. 1981	Pasquale S. Can Chief Engineer Delaware Solid Waste Author P.O. Box 981 Dover, Del 199

The following localities are either operating or constructing small modular combustion units to produce steam from mass combustion of municipal solid waste:

LOCATION	MANUFACTURER	REPORTED CAPACITY (TPD)	REPORTED CAPITAL COSTS (MILLIONS OF $)	STATUS	CONTACT
Auburn, Maine	Consumat	150	3.2	Design contract, funded by DOE, signed; energy use and operator contracts signed; construction began Aug. 1979; startup planned for Nov. 1980	Robert Belz Public Works Auburn City Hall 45 Spring St. Auburn, Maine 04210
Blytheville, Ark.	Consumat	75 to be processed	N/A	Temporarily shut down for installation of additional units	Tom Little, Mayor City Hall Blytheville, Ark. 72315
Crossville, Tenn.	Smokatrol	60	1.11	In shakedown; undergoing modifications	Nelson C. Walker Gen. Mgr. Environmental Services Corp. P.O. Box 765 Crossville, Tenn. 38555
Dyersburg, Tenn.	Consumat	100	2	Under construction; startup scheduled in early 1980	Alderman Bob Kirk Colonial Rubber Dyersburg, Tenn. 38024
Genesee Township, Mich.	Consumat	100	2.0	Began operations in Feb. 1980	Hanumanthaiya Marur, P.E. Township Engineer 7244 North Genesee Rd. Genesee, Mich. 48437
Groveton, N.H.	Environmental Control Products	24	N/A	Operational since 1975	Rick Coville Groveton Paper Mill, Inc. Groveton, N.H. 03582
Lewisburg, Tenn.	CICO	60	N/A	Under construction; to be in operation in July 1980	John O. Lambert City Manager 505 Ellington Pkwy., Rt. 1 Lewisburg, Tenn. 37091
North Little Rock, Ark.	Consumat	100	1.45	Operational 1976-1979; presently undergoing modifications. City awarded contract to Consumat Systems, Inc., for modifications and long-term operation; scheduled to re-open in March 1980	Mike Butner President U.S. Recycle Corp. P.O. Box 7561 Little Rock, Ark. 72217
Osceola, Ark.	Consumat	50	1.1	Began operations in Jan. 1980	R.E. Prewitt, Mayor City Hall Osceola, Ark. 72370
Pittsfield, Mass.	Vicon Recovery Assoc. (Enercon designed incinerators)	240	6.2[m]	Construction to be completed in Sept. 1980	Joseph J. Domas, Jr. President Vicon Recovery Assoc. P.O. Box 100 Butler Center Butler, N.J. 07405
Salem, Va.	Consumat	100	1.9	Operational in 1979	William Paxton, Jr. City Mgr. P.O. Box 869 Salem, Va. 24153
Siloam Springs, Ark.	Consumat	16	.4	Operational since Sept. 1975 (Presently being used as incinerator only)	Al Varwig, Dir. Sanitation Dept. 410 North Broadway Siloam Springs, Ark. 72761

In addition to the systems listed above, projects are underway to recover methane-containing gas mixtures from sanitary landfills which can be purified to pipeline quality:

LOCATION	KEY PARTICIPANTS	OUTPUT: GAS PRODUCED (MILLION FT³/DAY)	REPORTED CAPITAL COSTS (MILLIONS OF $)	STATUS	CONTACT
Azusa, Calif.	Azusa Land Reclamation Co. (wholly owned subsidiary of the Southwestern Portland Cement Co.)	Low BTU gas	N/A	Began operations in April 1978	Ralph Rule Southwestern Portland Cement Co. 3055 Wilshire Blvd. Los Angeles, Calif. 90010
Clearmeadow, N.J.	Sanitary Landfill, Inc.; Public Service Electric & Gas Co.; Hoeganaes Corp.	Medium BTU gas; 1.0	N/A	Began operation in 1979; raw landfill gas used in-plant by Hoeganaes Corp.	Ken Matson Public Service Electric & Gas Co. of N.J. 80 Park Place Newark, N.J. 07101
Monterey Park, Calif.	Getty Synthetic Fuels, Inc.; Operating Industries, Inc.; Southern California Gas Co.	High BTU gas; 4.0	N/A	Operational August 1979	Frederick C. Rice Getty Synthetic Fuels, Inc. 2750 Signal Parkway Signal Hill, Calif. 90806
Mountain View, Calif.	City of Mountain View; EPA; Pacific Gas & Electric Co.; Dept. of Energy	High BTU gas; 0.5	0.85	Demonstration plant; currently operating and producing 0.25 MMSCFD of treated gas with a HHV of 750-800 BTU/SCF	Max Blanchet Pacific Gas & Elec. Co. 245 Market St. San Francisco, Calif. 94106
Palos Verdes, Calif.	Getty Synthetic Fuels, Inc.; Los Angeles County Sanitation District; Southern California Gas Co.	High BTU gas; .75	N/A	Operational since June 1975	(same as Monterey Park, Calif
Staten Island, N.Y. (Fresh Kills Landfill)	Brooklyn Union Gas Co., Inc.; New York City Resource Recovery Task Force; N.Y. State Energy Research and Development Authority; U.S. Dept. of Energy; Leonard S. Wegman, Inc.		N/A	Burner test of landfill gas in scaled-down furnace completed; construction begun on landfill gas electricity-generating facility to be on-line in summer 1980 for a one-year test, supplying 100 KW of electricity for on-site use	Anthony Giuliani Brooklyn Union Gas Co., Inc. 195 Montague St. Brooklyn, N.Y. 11201
San Valley, Calif. (Sheldon-Arleta Landfill Gas Recovery Project)	City of Los Angeles Departments of Public Works and Water & Power	Low BTU gas; 2.8	2.5	Operational	Mike Miller Sanitary Engineer L.A. Bureau of Sanitation Room 1410, City Hall East Los Angeles, Calif. 90012

The following localities reportedly are in advanced planning stages for resource recovery facilities, have issued Requests for Proposals, or are negotiating with bidders/contractors:

Appleton, Wis.
Beverly, Mass.
Calumet City, Ill.
Cincinnati, Ohio
Cuyahoga County, Ohio
Dubuque, Iowa
Gallatin, Tenn.
Hartford, Conn. (and surrounding area)
Honolulu, Hawaii
Martinez, Calif.
Memphis, Tenn.
Menlo Park, Calif.
New York, N.Y.
North Andover, Mass
North Hempstead, N.Y.
Oklahoma City, Okla.
Oyster Bay, N.Y.
Peabody, Mass
Rhode Island (state)
St. Paul, Minn.
San Diego, Calif.
San Leandro, Calif.
South/Central Conn.
Springfield, Mass. (and surrounding area)
Springfield, Mo.
Staten Island, N.Y.
Toledo, Ohio
Tulsa, Okla.
Westchester County, N.Y.

APPENDIX II

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DIRECTORY OF CANDIDATE

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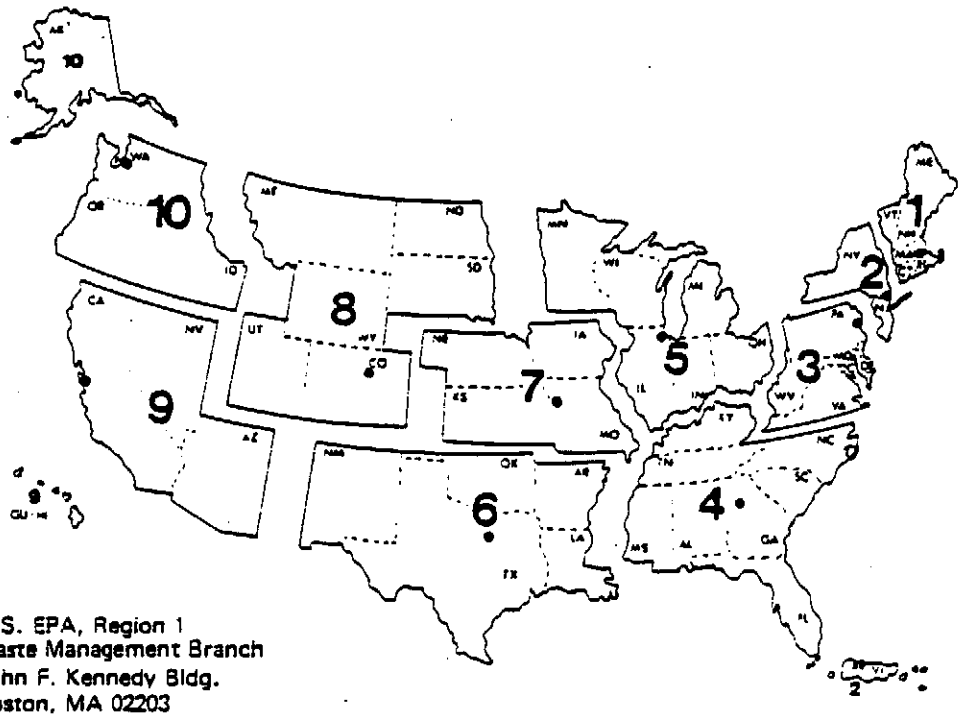

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