PROCEEDINGS OF

THE NATIONAL CONFERENCE ON WASTE EXCHANGE

Sponsored by

The Florida Chamber of Commerce
The Florida State University
and
The U.S. Environmental Protection Agency

March 8–9, 1983
Tallahassee, Florida

Edited by
Roy C. Herndon, The Florida State University

EPA

THE FLORIDA CHAMBER

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PREFACE

Typically conference proceedings are a collection of papers submitted by participants. The actual contribution of the individual participant at the conference may or may not be reflected by the paper submitted. Nevertheless, this collection of papers is usually the product by which the success of the conference is judged.

The real worth of a conference, however, can hardly be measured simply in terms of the quality of the papers, since the papers could be distributed and evaluated without having a conference at all. The real value of a conference is to be measured in terms of the questions, discussions, and ideas that evolve when a group of individuals set for themselves the task of defining and resolving a problem. It is in this spirit that the National Conference on Waste Exchange was conceived and delivered, and it is in this spirit that we hope it will be judged.

The Conference Proceedings have been structured in a way which reflects the participatory nature of the conference. We have consolidated and integrated the presentations and comments into what we feel is an accurate reflection of the conference activities. The first section entitled an "Overview of the Waste Exchange Concept" contains material that is essential for a full understanding of the conference implications. For this reason, as well as the fact that this is the first national conference on waste exchange, we have intentionally expanded this section to assist those not familiar with the waste exchange concept. The other sections present the ideas, questions, and discussions appropriate to the general topic areas defined by the Conference Agenda (Appendix A).

It would be impossible to conduct a conference of this kind without the combined contributions of many people at all stages of planning and execution. Technical matters of seating, meals, electronics and overall facilities planning were provided by the staff of the Florida State Conference Center. Special appreciation is extended to Ms. Suzanne Harrell and Ms. Lori Cohen for flexibility and cooperation in all phases of preparation. Preconference and postconference administration and clerical assistance were provided by Conference staff and by the Institute of Science and Public Affairs at Florida State University. Ms. Hunter Barnett and Ms. Mary Melton deserve special mention in this regard. In addition, registration, preconference correspondence, and various other aspects of preparation were carried out in a highly professional manner by Ms. Rose Zongker (FSU), Ms. Geraldine Wyer (EPA), Mr. John Moerlins (FSU) and Mr. Christopher Teaf

(FSU). Required printing was performed by Executive Printing Company, Tallahassee.

Many of the conference participants generously gave of their time and energy in reviewing and commenting on the proceedings as they were developed. Their contributions are gratefully acknowledged.

Support for the conference, both financial and otherwise, was provided by: the Florida State University, the Florida Chamber of Commerce, the U.S. Environmental Protection Agency, and the Southern Waste Information Exchange.

Finally, our sincere appreciation is extended to the moderators, panelists, and participants who shared their experiences regarding waste exchange and resource reuse. The conference answered many questions while at the same time posed some new ones which will require further deliberations if the concept is to continue developing. It is through a continuous and open exchange of ideas that successes can best be nurtured and mistakes avoided.

Roy C. Herndon, Florida State University
Editor and Conference Coordinator

SUMMARY

The problems associated with the economical and safe disposal of solid wastes have grown increasingly complex as industry has developed sophisticated manufacturing processes and provided a wide variety of products to the marketplace. Research aimed at providing solutions to the disposal problem has generally acknowledged that a single approach to encompass disposal of all types of wastes is impractical, particularly for hazardous wastes. Waste transfer or exchange between firms, as an alternative to the well-established techniques of land disposal, incineration, chemical stabilization, and neutralization/detoxification, shows promise in regions which possess the proper industrial make-up and geographic concentration of industry.

A waste exchange can be defined as an operation that engages in transfer of either information concerning waste materials or the waste materials themselves. There are both similarities and differences between this concept and the traditional purchase or reuse of industrial by-products. In both cases, an industrial process generates, in addition to its principal products, some material that is not usable by the generating company. In cases where this material has some

inherent, recognized value, it is known as a by-product, and is sold or reused if the value justifies the costs of transport, handling or recycling. If the material has no typically recognized value, it has in the past been termed a waste and is generally discarded. The waste exchange seeks to facilitate prospective transfers of these "wastes," the economics of which are dependent on availability of other raw materials, disposal costs, transport costs, and purity of the waste stream.

Several conditions explain the need for waste exchange in industrial relations. Large companies with skilled chemical engineers are likely to find many recycling opportunities within their own manufacturing operations. However, the utility of an exchange arises because even engineers in large corporations are not likely to recognize all waste transfer possibilities available with firms outside of their own industry. Moreover, technical innovation to provide new uses or value in scrap or discarded materials does not occur in all industries simultaneously. Medium-sized or small companies often lack the time and expertise to find reuses for the majority of their wastes. Several variations on the basic waste exchange concept are in operation throughout the world. These variations can be broadly classified into two groups: information

exchanges (clearinghouses) and material exchanges. The distinction between the two categories is based on the degree to which the exchange involves itself in the transactions between waste generators and waste users.

The clearinghouse, in most cases, takes a passive role in the exchange process. Its function is to inform and bring together waste generators and waste users through a publication of some type. Referrals are initiated by publishing listings of wastes offered and wastes wanted. The clearinghouse handles inquiries about these listings and refers the inquirer to the listing company. All negotiations concerning details of the potential exchange are handled directly by the two companies.

All of the existing material exchanges are located in the United States and are run as profit-making enterprises.

Waste exchanges were first organized in Europe where depletion of readily available natural resources and limited land disposal areas forced manufacturers to find alternative sources of raw materials. The earliest exchange was started in England during World War II, and the idea has since spread to Scandinavia, France, Germany, Austria, Italy, Belgium, and other areas of Europe. Exchanges have also been organized in

Canada, Israel, and Australia. All of these foreign exchanges are information clearinghouses and most of them are operated by trade organizations, primarily in the chemical industry.

Several exchanges were started in the United States in the mid-1970s. Most of these U.S. exchanges are information clearinghouses. Material exchanges are the major innovation in the waste exchange concept to be developed in the United States.

Surplus materials, equipment, scrap metals, and discontinued products, as well as traditional "wastes", may enter the exchange cycle. "Investment recovery" has been used to describe the entire process of recycling and reuse within some industries. This term further emphasizes the point that facilitation of waste exchange, rather than waste exchanges per se, is the goal of this conference.

It is possible to view each segment of the materials transfer continuum as either a catalyst or inhibitor of the system. The optimal climate is one in which all parties (including generators, waste exchanges, brokers, governmental agencies, and users) are actively encouraging the concept so that it has the greatest opportunity for success.

In addition to the direct transfer of materials, some firms have investigated or instituted process modifications designed to allow for or enhance the reuse potential of by-products generated during regular manufacturing processes. Some of these changes can be quite modest while others require more planning and evaluation to realize their economic possibilities. Examples of modifications which have been successful in the past include: substitution of reclaimed acid for typical virgin electroplating acids; source separation and segregation of various materials; concentration and volume reduction; modification of raw material specifications to allow substitution of minimally lower quality inputs; intermediate reactions designed to modify waste stream components; tighter process control to take advantage of by-product (not waste) streams; education of plant management and employees about the benefits of resource reuse.

An active role must be taken by parties in all phases of the resource reuse cycle. Opportunities must be sought out and recognized, good design and planning should be specifically encouraged, and direct economic incentives for resource reuse should be provided. Agencies in a position to do so should not only verbally encourage exchange and resource reuse, but

should also create financial incentives where possible, including tax exemptions on transferred materials and facilitated permitting for firms engaged in legitimate recycling.

Each situation involving a secondary material and its reuse potential must be viewed in light of three specific considerations: technical, practical, economic. Of these, the economic factors often bear most heavily on the corporate decision to recycle.

The issue of confidentiality remains controversial. A strong point in its favor is the fact that confidentiality protects the proprietary interests of generators and limits the direct identification of specific firms which are generating a particular material. In the case of for-profit exchanges or brokerage services, it was judged imperative that the identity of the source and user remain confidential in order to protect both parties and to allow the negotiations to be brought to a successful conclusion. Both of these points were challenged by those who suggested that confidentiality was overdone and that in the case of many firms, waste generation information was already available to the public through agency waste reporting processes. Optional confidentiality was identified as a recent trend in some waste exchanges. Potential liability

was identified here as a primary reason for nonparticipation by industry in waste transfer. It was suggested that some type of certification of recyclers be instituted to protect the user. Even though raw material costs represent large expenditures, and although significant savings can often be realized by the substitution of secondary raw materials, serious production problems may be encountered if materials are inadequately characterized or misrepresented.

Collection and transfer facilities could serve as consolidation points for reusable materials. Legal complications arising from the contract signed by generator and disposer, however, often limit what can be done with a waste material at a transfer facility. Historically, disposal firms have tended to emphasize secure and final disposal (e.g., secure landfilling) as the most attractive option without offering reuse as an alternative. This protects generator, transporter, and disposer. This situation is likely to persist in the absence of incentives for disposal firms to alter this attitude.

Expectations of industry with regard to resource reuse and waste transfer can be summarized in terms of four requirements:

1. Participation in a waste exchange must be uncomplicated and cost-effective. The exchange itself must be reputable and reliable.

2. Alternatives to conventional treatment and disposal methods which are presented by a waste exchange must be ethical and cost-effective.

3. The exchange should have as wide an audience of potential users as possible and should have extensive contacts in the waste management field in order to be aware of all waste management options.

4. The generator must know where and in what form his waste is being reused or disposed.

There are numerous examples of cooperation between exchanges in the U.S. and abroad. However, not all exchanges believe cooperation is in their best interest. Suggestions for areas of potential cooperation include:

- o common data base shared on regional or national level
- o trading of listings between exchanges for catalog distribution
- o network of regional contacts for information referral
- o licensing or some other formal standardization of exchanges to ensure maintenance of quality of service.

Other ideas were presented that would provide an impetus to the development or expansion of waste exchanges. One suggestion was to make the use of a broker, a waste

exchange, a recovery facility, or an in-house treatment unit mandatory before a generator would be allowed to go to a disposer. Exchanges would also benefit from public information programs concerning waste exchange and resource reuse. Through cooperation, waste exchanges can launch a more effective public awareness campaign, and they can also share technical, legal and environmental information that may be mutually beneficial.

An address by Dr. John Skinner which reviews the EPA position regarding resource reuse in the context of solid waste regulation is contained in Section V.

There are several impediments to exchange from the point of view of the generator. Many generators do not recognize opportunities for recycling nor do they know the pertinent regulations. They may also be uncertain about whether a particular waste is hazardous. Some generators fear that if their waste is listed on a waste exchange, their competitors will be able to discover secrets of their production processes. Generators also may not want to become involved in what they view as "another business." Potential liability for mismanagement of waste was identified repeatedly as a barrier to generator participation in waste

exchanges. Unfavorable economics are another barrier to successful exchange. Transportation difficulties are compounded if the wastes are hazardous and/or transported across state lines.

The fact that regulations are both complicated and constantly changing, particularly with regard to the issue of whether a substance is hazardous or not, is also a problem. Furthermore, there are technical impediments to the recycling of certain materials. Even if the technology is available, it may not be economical. Related to this is the problem that, with the exception of technical publications, no means exist for communicating new recycling processes. The passivity of most waste exchanges was viewed as an impediment to successful exchange. Other barriers to successful exchange were raised that primarily affect recyclers rather than waste exchanges per se. The belief was expressed that excessive regulation can put undue pressure on small businesses. The most extreme consequences of excessive regulation were considered to be bankruptcy of small firms, unemployment, shifting of the recycling field into the realm of fewer large companies, or illegal dumping.

The incentives for successful exchange were also discussed. One benefit is the amount of energy saved by using existing rather than new materials. An Argonne National Laboratory report states that the amount of energy saved by one waste exchange over two and one-half years was 10×10^9 BTU. It is calculated that a savings of 10^{12} BTU per year (the equivalent of 100,000 barrels of oil) would result if 50 exchanges five times as large or as effective as that one existed. A seemingly obvious incentive is the saving in cost over the cost of disposal. Currently there are taxes levied for producing hazardous wastes, but typically no tax incentives, credits or advantages are given to those who recycle wastes.

Many state and federal laws have already been passed to encourage recycling and resource reuse. Under RCRA, states are mandated to develop programs to assist in the development of methods of disposal of solid waste that are environmentally sound and that maximize the reuse of valuable resources. The federal government is required to provide technical and financial assistance to the states and to encourage cooperation among the various levels of government and private industry.

Several states have passed laws to encourage alternative approaches to waste management. Some states require counties to establish their own resource recovery facilities. It was suggested that exchanges work with the federal, state, and local governments to encourage the development of programs that help to meet the spirit of existing laws. Several specific ways for government to encourage waste exchange were suggested.

Ways in which waste exchanges and recyclers can facilitate and encourage waste exchange were described. These methods may be taken by individual organizations or they may be taken collectively through a national association.

A variety of legislative and legal issues affect waste exchange. Since the passage of RCRA, several bills have been introduced to encourage resource reuse through economic incentives. One provides tax advantages for equipment that would reduce or eliminate waste; the other provides tax advantages for energy recovery or savings involving industrial waste usage. Proposed changes in the federal regulations on the reuse and recycling of hazardous wastes will make it easier and less expensive to recycle in some areas and more difficult in others.

The trend at the state level has been to tax (through surcharges) municipal solid waste as opposed to industrial waste. Florida is considering expansion of the exemption from sales taxes on resource recovery equipment to all resource recovery operations. Some states have tax laws that apply directly to recycling of industrial waste. In New Jersey, a tax advantage is given for waste that is recycled. A tax is levied on generators of hazardous waste in Florida that is related to the cost of disposing, treating, or storing of that waste. Tax incentives remain controversial. Another legislative trend that may result in an incentive for recycling is the idea under consideration in California, that of banning liquid wastes in landfills.

Because federal regulations promulgated under RCRA do not establish legal liability, possible legal problems are of concern to anyone in the chain of custody of a hazardous material. In recent court decisions, liability under Superfund and RCRA has been construed as joint and several. This trend has a potential impact on waste exchanges, although brokers and exchanges may not be liable if they keep waste out of their legal possession. Superfund makes provisions for indemnity clauses to be entered into between parties, but these

clauses do not insulate a party from liability. The generator may sue the other party if the contract is broken, but the generator may still be held liable under joint and several liability.

Some recyclers expressed the concern that the quality of the waste they receive may not meet the parameters specified in the contract. A clear answer, short of extensive laboratory testing, was not decided upon. Associated with the concern for product quality is the perceived reputation of various persons managing the waste. Because of joint and several liability, generators and recyclers must be concerned about the reputation of one another. In addition, both the generator and the recycler need to be concerned about the credentials of the transporter. Such a situation may encourage long-term arrangements between firms.

Concern was expressed that there are no provisions to recycle waste from Superfund clean-up activities, although opportunities clearly exist for some recycling activity. Individuals with this concern should contact the EPA regional office and that they also express their concern to EPA's Office of Solid Waste.

Advantages of a national association for waste exchange were discussed in a preliminary session on the first day of the conference. These included facilitation of communication among members, lobbying at state and federal levels, documentation or licensing of members as legitimate operators, and dissemination of technical, legal, and environmental information on recycling. A national waste exchange may not be reasonable, workable, or desirable, but a trade association which represents state or regional exchanges could be a useful entity. Trade associations have more effective input into the political process than individuals. Government officials frequently do not have the time to meet with as many individuals as they would like, but individuals can have their voice heard through trade associations. Associations may provide many other useful functions in addition to lobbying.

Several tasks must be accomplished before such an association can be established. The scope, purpose, and function of the association must be determined. Next, it must be decided what group will be included in the association. The consensus seemed to be that initially the membership of the association should be broadly defined to include all groups and that the association develop a code of ethics. It was also

suggested that the association include members from outside the U.S. as well.

Representatives from several waste exchanges met informally early in the final day of the conference and agreed to exchange catalogs, investigate the standardization of waste categories, and work toward a universal coding scheme that would maintain user confidentiality while providing consistency in listing information.

A resolution was made to form a national association "for waste exchange and resource reuse." The session ended with the agreement that a committee would be organized to prepare a position paper to define tasks that need to be accomplished. The position paper should identify the need for and functions of the association. After these are specified, other aspects of the association such as structure, by-laws, membership requirements, and code of ethics may be proposed.

I. OVERVIEW OF THE WASTE EXCHANGE CONCEPT

Introduction

The problems associated with the economical and safe disposal of solid wastes have grown increasingly complex as industry has developed sophisticated manufacturing processes and provided a wide variety of products to the marketplace. Research aimed at providing solutions to the disposal problem has generally acknowledged that a single approach to encompass disposal of all types of wastes is impractical, particularly for hazardous wastes. Waste transfer or exchange between firms, as an alternative to the well-established techniques of land disposal, incineration, chemical stabilization, and neutralization/detoxification, shows promise in regions which possess the proper industrial make-up and geographic concentration of industry. It will not eliminate the need for treatment and disposal operations, but it can provide a valuable option within the waste management picture. The generator benefits from the potential sale of the waste material as well as the avoided disposal cost, and the user benefits from the reduced raw material costs. More subjective social benefits include decreased natural resource consumption, decreased energy

required for raw material processing, and decreased requirements for traditional disposal or treatment facilities.

Transfer of by-products or surplus material with recognized value has been an industry practice for some time. However, maximum success of the waste exchange concept often involves a third party (or transfer agent) to coordinate referrals, to provide technical information, and to maintain confidentiality if necessary. This third party can assist in recognizing potential uses of products, facilitating contact between generators and potential users who are not familiar with each others' industries, and providing confidentiality to generators who might be reluctant to reveal process information.

A waste exchange can be defined as an operation that engages in transfer of either information concerning waste materials or the waste materials themselves. There are both similarities and differences between this concept and the traditional purchase or reuse of industrial by-products. In both cases, an industrial process generates, in addition to its principal products, some material that is not usable by the generating company. In cases where this material has some inherent, recognized value, it is known as a by-product, and is

sold or reused if the value justifies the costs of transport, handling, or recycling. If the material has no typically recognized value, it has in the past been termed a waste and is generally discarded. The waste exchange seeks to facilitate prospective transfers of these "wastes," the economics of which are dependent on availability of other raw materials, disposal costs, transport costs, and purity of the waste stream.

Several conditions in industry emphasize the need for waste exchanges. Large companies with skilled chemical engineers are likely to find many recyling opportunities within their own manufacturing operations. However, the utility of an exchange arises because even engineers in large corporations are not likely to recognize all waste transfer possibilities available with firms outside of their own industry. Moreover, technical innovation to provide new uses or value in scrap or discarded materials does not occur in all industries simultaneously. Finally, medium-sized or small companies often lack the time and expertise to find reuses for the majority of their wastes.

Types of Waste Exchanges

Waste exchanges can be divided into two basic types, information exchanges (or clearinghouses) and material ex-

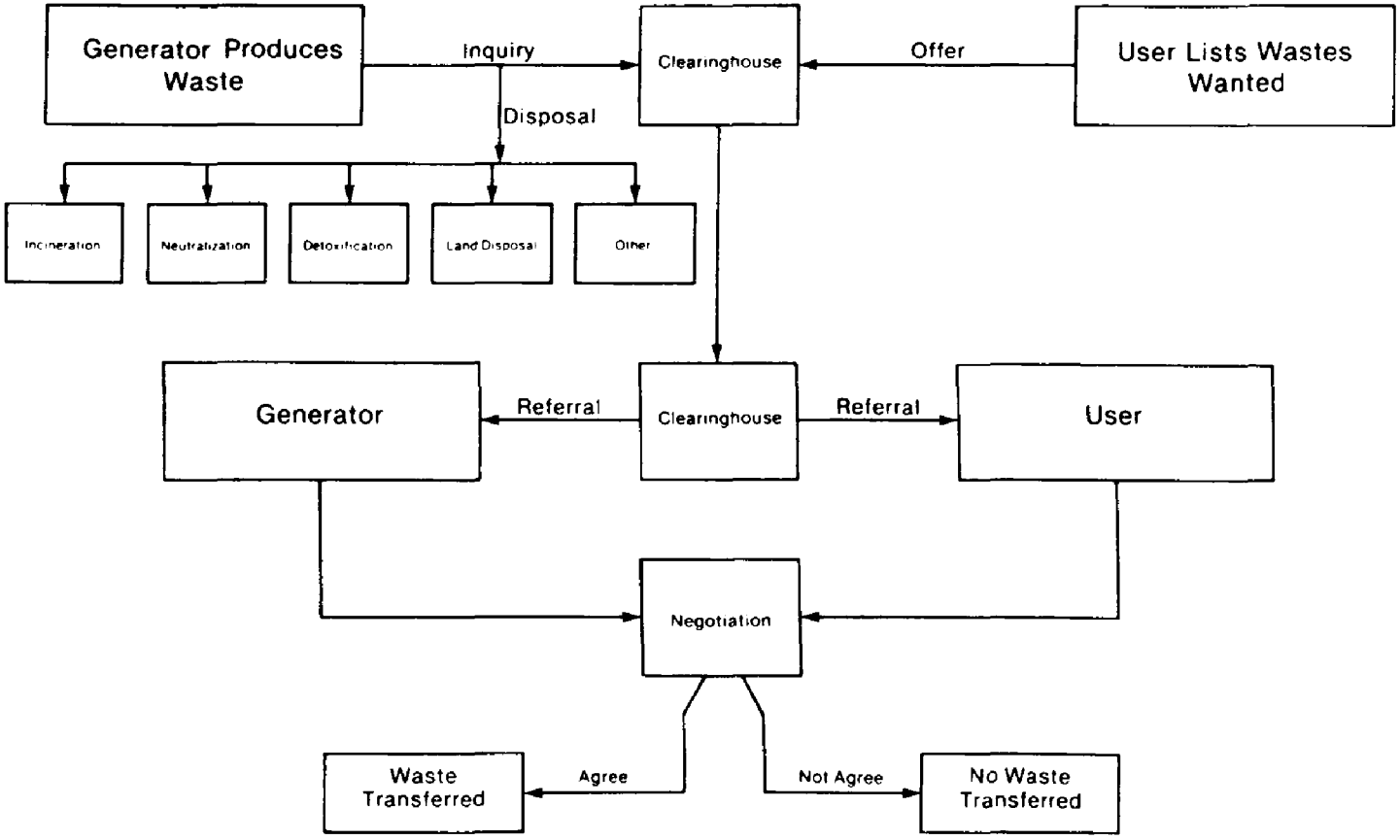
changes. Of course, a combination of these types of services is also possible. There are some similarities in operation between the categories; however, the two types differ fundamentally in the degree of involvement which the exchange has in interactions between waste generators and waste users.

The clearinghouse type of waste exchange typically takes a relatively passive role in the exchange process. The function of the clearinghouse is to inform and bring together waste generators and waste users through publication of some type of catalog and through other means such as phone or computer communication. Once this referral is made and the contact between groups is established, the clearinghouse usually takes no further action. Figure I-1 summarizes this relationship.

Referrals are initiated by publishing detailed descriptions of wastes offered and wastes wanted. These listings are circulated in a variety of clearinghouse publication formats. The clearinghouse handles inquiries about these listings and refers the inquirer to the listing company. All negotiations concerning details of the potential transfer are then handled directly by the two companies. Materials commonly listed by information exchanges include acids and alkalis, solvents, oils,

Figure 1-1

SAMPLE INFORMATION CLEARINGHOUSE OPERATION



surplus chemicals, metals, paper and wood, plastics, and rubber products. In addition, categories of waste management services available may be included to provide catalog users with information on other opportunities such as transport, disposal, laboratory analysis, and recycling of waste materials.

Several areas of concern are common to information clearinghouse operations. One of the most important is maintenance of confidentiality for the listing firms. Many companies are hesitant to identify themselves or release specific information about their waste streams. The reason is that, in many cases, details of manufacturing processes, problems, and production rates can be deduced from waste stream data. This information may be valuable to a firm's competitors or to governmental agencies interested in the enforcement of regulations. Whether this is a legitimate concern is unclear, as the information can often be obtained in other ways. However, many firms identify this concern for confidentiality as an area of primary interest in initial contacts with a waste exchange.

In order to protect the confidentiality of companies which submit listings, various coding systems have been devised. These codes provide general information about the type

and amount of waste involved, the geographic location, and the frequency of the waste's availability. These coded details are usually sufficient to allow a potential buyer to decide whether to seek further information through the exchange. In addition, a system of universal coding has been proposed which incorporates valuable information about generator, location, material and volume in a single string of digits. Such a system, if instituted, would encourage cooperation among waste exchanges by making the various information bases compatible. However, its use presently is not widespread. Several exchanges now publish selected listings from other waste exchanges to facilitate potential transfers. Contacts are generally referred to the waste exchange from which the listing originated.

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

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

Due to the inherently passive nature of the information exchange, assessing the efficiency of its efforts is a third difficulty. Once a referral is made the clearinghouse usually takes no further action in the exchange process. Therefore, it is difficult for an exchange to determine whether a referral was successful. Some clearinghouses conduct surveys to previous listers in order to determine the number of successful exchanges that have occurred. However, low response rates on most of these mail surveys result in incomplete data. One United States clearinghouse estimates ten to fifteen percent of their listings result in successful transfers. A recent survey of all firms listing with the Southern Waste Information Exchange indicates that the potential for transfer depends largely on the individual case. Further, some categories of waste have much better success rates than others.

It has been suggested that these three problems, and perhaps others inherent in the clearinghouse process, can be reduced by more direct personal interaction between the clearinghouse staff and participating firms--in short, an

active rather than a passive information exchange. There are several benefits to active participation. For example, industry executives may have more confidence in the ability of a listing service to keep information secure if they know and trust the exchange personnel. Once this confidence has been developed and a good reputation established, less resistance should be encountered in convincing firms to list their wastes. For the same reason, more cooperation in assessing the success of the clearinghouse is usually gained as a result of this more personal interaction with active firms.

Clearinghouses receive financial support from a variety of sources. These sources include non-profit industrial trade associations, chambers of commerce, universities, and other governmental entities. In this situation, the clearinghouse becomes an additional service offered to members and is supported in part by membership dues, or, in some cases, a surcharge is added to the dues of those members using the service. Support through an existing organization has the benefit of reducing operating costs of the exchange in several ways:

1) managerial, technical, and clerical staff can operate the exchange as a part of their other duties,

2) additional office space is usually not necessary,

3) technical advisors are often readily accessible,

4) if the association publishes a periodical, some printing facilities and distribution lists may already be available.

Many exchanges also charge a nominal fee for listing materials or services with the exchange. These charges are used to cover direct costs of catalog publication. This financial arrangement has the advantage of spreading the base of support over the most actively participating firms and does not place undue burdens on any one group. It also allows partial support by a variety of trade associations or chamber of commerce-type groups so that the membership of all organizations may benefit directly while each only pays a small share of the operating costs of the exchange.

A few information clearinghouses operate as self-supporting, profit-oriented entities. These are generally operated in a much more active manner than the non-profit exchanges. This type of operation requires more managerial time and talent to attract subscribers and users. Furthermore, additional staff time is needed, and higher office costs are usually incurred. A commission on successful transfers is

usually charged to recover these costs. Services of this type are rare at this time.

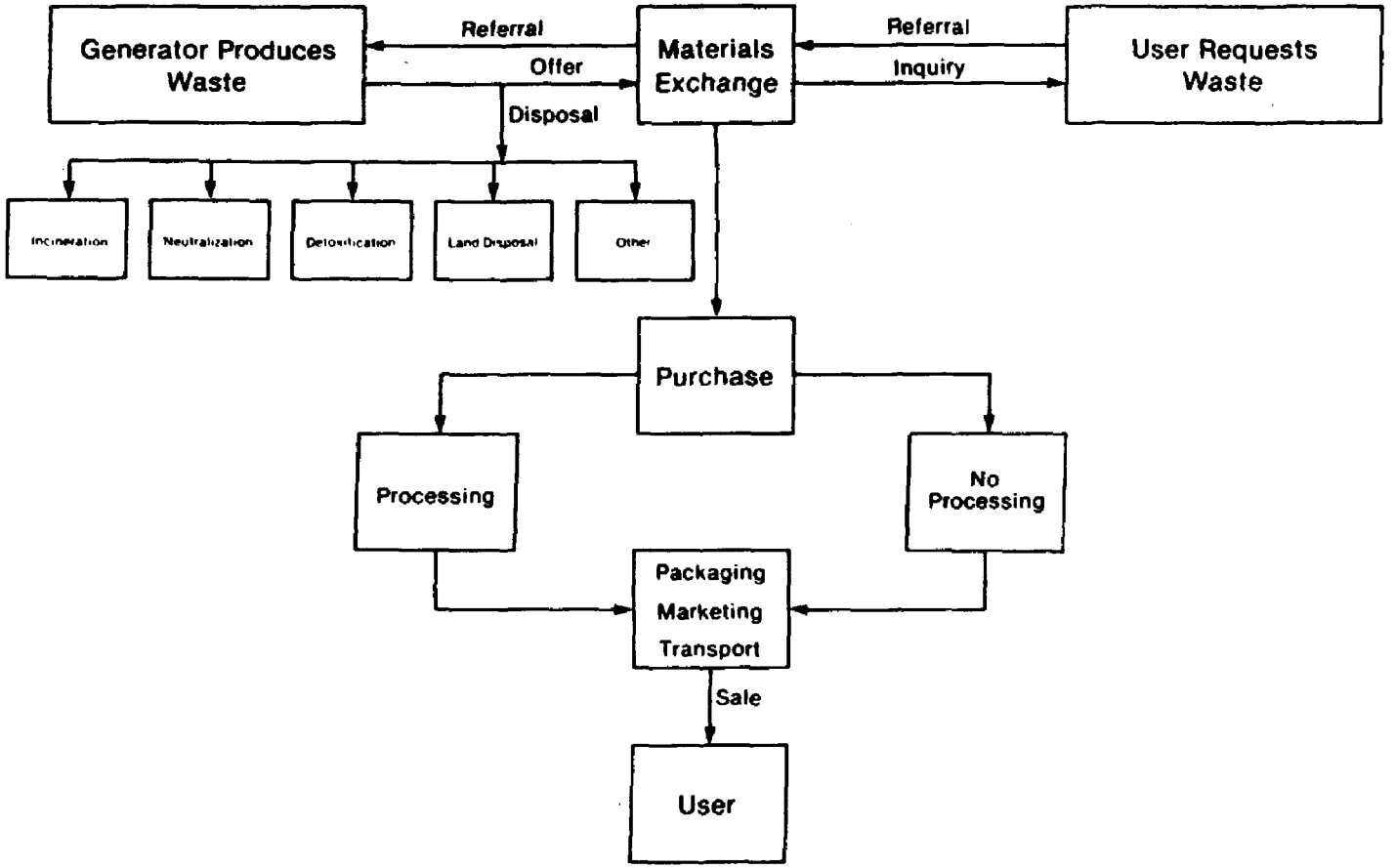
Few government subsidized and operated information clearinghouses exist, although government funds have assisted in the initiation of some exchanges. This is largely due to the perceived confidentiality problem. Many companies feel that public access to governmental agency information precludes confidentiality and security of information. Also governmental support may lead users to think that the information they provide could be used for regulatory purposes. This concern was not shared by all participants.

Material Exchange

Material exchanges differ from information exchanges in that they act as a direct brokerage service between waste generators and waste users (Figure I-2). The degree of involvement in waste transactions varies widely among material exchanges. Some act as an agent, actively seeking a buyer or seller for a particular material. Other material exchanges take possession of the material and perform whatever functions are required to complete a transfer. Analysis, reprocessing, repackaging, or transport are sometimes subcontracted out to other companies.

Figure1-2

SAMPLE MATERIALS EXCHANGE OPERATION



Existing material exchanges tend to accept and transfer a more restricted range of wastes than information clearinghouses, although this is clearly dependent on market factors at any given time. The exchange must be able to identify wastes with sufficient value in order to cover costs and provide a profit. This judgment is critical to the survival of the exchange. The wrong decisions may cause a problem similar to that faced by information clearinghouses: that is, accumulation of non-transferable inventory. This situation is more serious for the material exchanges, however, as it stands to incur substantial costs (due primarily to the time spent trying to move the material) on storage of these accumulated untransferable wastes.

The fixed costs of operating a material exchange are typically higher than those of a clearinghouse. Often a more comprehensive waste handling service is offered and, as a result, a greater amount of time is required to manage the technical, legal, and business operations. Sometimes expensive waste handling equipment must be purchased and maintained.

There are only a few material exchanges in operation at this time. All of these are located in the United States and

are run as profit-making enterprises. All of these exchanges charge a commission or buy the material outright based on the estimated value of a successful transfer.

Dual Capability Exchanges

Another possibility includes the potential for dual-capability waste exchanges, which combine the advantages of both clearinghouses and pure materials exchanges. An operation of this kind might be run by a non-profit organization with a large information handling component and a limited material handling component.

The materials handling component might be a reason to devise innovative ways of using or combining wastes and modifying production processes. This would require an experienced and creative staff of technical and business advisors. The information handling component could be expanded from making simple referrals to developing a broad base of reputable subcontractors that could be contacted when necessary. These subcontractors would be in such occupations as transportation, laboratory analysis, reprocessing, and other related fields. This represents an expanded version of the capabilities of some current clearinghouse operators. Cooperation between clearinghouse and brokerage services in a geographic

region could provide functionally the same range of services by combining a large volume information component with a versatile well-coordinated service component available by direct referral.

Historical Overview of Waste Exchanges

The following discussion presents an overview of the development of waste exchanges in both the United States and other countries as a result of a survey conducted in 1980-1981. A limited amount of specific information is included in order to highlight significant developments in foreign waste exchange operations. More detailed information on each of the exchanges mentioned can be found in Table I-1.

Foreign Exchanges

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

TABLE I-1

CHARACTERISTICS OF EUROPEAN AND CANADIAN WASTE EXCHANGES

Foreign Exchange	Service Area	Initiation	Govt. Funding	Confidential	Sub-scription Fee	Approximate Circulation	Frequency of Publication
CWME (Canada)	Inter-national	11/77	YES	YES	YES	5,700	Bimonthly
UK WME (UK.)	National	1974-1980	NO	YES	YES	6,000	Quarterly
NIMRA (UK.)	National	1942	NO	NO	YES	2,000	Monthly
SWE (Switzerland)	National	2/1973	NO	YES	NO	600	Monthly
CIAE (Austria)	National	2/1973	NO	YES	NO	--	Monthly
FWE (Austria)	National	7/1974	--	NO	--	--	Monthly
NWE (Sweden)	Inter-national	11/1973	NO	YES	Annual Dues	--	Quarterly
TWME (Italy)	National	5/1978	NO	YES	NO	3,000	Quarterly
ANIC (Italy)	National	3/1973	NO	--	YES	--	Weekly
WEI (Israel)	National	9/1976	YES	YES	NO	--	Monthly
MWDA (Australia)	Regional	3/1977	YES	YES	NO	--	Quarterly
IWES (Australia)	Regional	2/1978	YES	YES	NO	--	Quarterly
ANRED (France)	National	1976	YES	YES	NO	Over 25,000	Quarterly
VCI (Germany)	Inter-national	1973	NO	YES	NO	--	Bimonthly
DIHT (Germany)	Inter-national	1974	NO	YES	YES	700,000	Monthly
VNCI (Netherlands)	National	4/1972	NO	YES	NO	--	Monthly
FICB (Belgium)	National	11/1972	NO	YES	YES	1,000	Semi-weekly
OBEA (Belgium)	National	12/1978	YES	YES	NO	1,000	Bimonthly

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

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

The Nordic Waste Exchange was also established in 1973. This clearinghouse is a cooperative effort of the Federations of Industry in the four Scandinavian countries: Denmark, Norway, Finland, and Sweden. Part of the funding during the early years of the Nordic Exchange came from the Nordic intergovernmental organization, Nordisk Industrifond. The

federations of industry of these four countries now completely subsidize the exchange.

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

An information exchange was started in Canada in 1973. Three organizations have managed this exchange during its history. It is currently operated by Ontario Research, a nonprofit organization. The exchange has received some government sponsorship. This clearinghouse handles information on all types of wastes and equipment from all geographical areas in Canada. It is one of the few exchanges that actively pursues information on the success of its efforts. In two years of operation under Ontario Research (1979-1981), the Canadian exchange estimated that 95,000 tons of waste per year were successfully transferred. The estimated value of this annual transfer is approximately 3.7 million Canadian

dollars. Organic compounds and metals were the materials transferred with greatest success.

Three more clearinghouses were established in Europe in 1974. The West German exchange (DIHT) and the Austrian Federal Waste Exchange were begun by their respective national chambers of commerce. The third exchange was the United Kingdom Waste Exchange (UKWME). This exchange tried to initiate an extensive computer data handling program under government funding. Attempts were made to make the exchange self sufficient. Failure of this endeavor resulted in removal of the government subsidy in January, 1980 and, hence its termination. The exchange may be revived by an industrial organization. UKWME compiled extensive data on successful waste transfers from 1974 to 1979.

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

The Metropolitan Waste Disposal Authority in New South Wales, Australia, introduced a waste exchange in 1977. This

exchange avoids listing equipment and materials with established markets. Confidentiality is maintained, but listing firms are required to notify the exchange of successful transfers.

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

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

central and local governments, industry, and environmental and consumer groups.

United States Exchanges

The following section highlights the development of waste exchanges in the United States.

The Union Carbide Corporation set up its Investment Recovery Department in 1964 to market surplus equipment and materials. This department was expanded in 1969 to include chemicals, metals, and other wastes. The Department looks for transfers within the Union Carbide Corporation or, secondarily, sales outside the corporation. This operation is not strictly an exchange in that wastes from other organizations are not accepted for transfer. However, it does represent the introduction of the materials exchange concept and the marketing of wastes to reduce disposal or storage costs.

In 1973, Zero Waste Systems of California was founded as a waste information exchange. ZWS was later reorganized into a material exchange. The company takes possession of wastes (usually chemicals) and reprocesses or repackages them to meet specific market needs.

Another material exchange, The Exchange, was started in 1975 in Boston. The Exchange was a profit-making enter-

prise which did not take possession of wastes. It has since ceased operation.

The initial clearinghouse in the United States was started in St. Louis in 1975 by the St. Louis Regional Commerce and Growth Association. In 1979 the Kansas City Chamber of Commerce joined in co-sponsorship and the name was changed to the Midwest Industrial Waste Exchange (MIWE). Subsequently, several smaller midwestern waste exchanges have joined operations with the MIWE.

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

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

Four clearinghouses were started in 1977. The Houston Chamber of Commerce organized the Chemical Recycle Infor-

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

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

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

Newark and is sponsored and operated by the State Chamber of Commerce. The Indiana exchange is operated by Environmental Quality Control, Inc., a non-profit corporation based in Indianapolis in cooperation with the MIWE.

In late 1978, the World Association for Solid Waste Transfer and Exchange (WASTE) began operation in San Francisco, California. This is a non-profit organization that provides a comprehensive waste information service. Computerized files of several types of waste and waste management information are maintained. Although the service is still incorporated, the central function has moved to Connecticut and the name has been changed to the "World Association for Safe Transfer and Exchange." At the time of this writing, activity has declined considerably due to high costs.

The Mecklenburg County Waste Exchange was initiated in North Carolina in 1978 and serviced firms within a 200-mile radius of that county. In 1981, sponsorship of this exchange was transferred to the Urban Institute at the University of North Carolina-Charlotte and service was expanded to include all of North Carolina and South Carolina. This change in sponsorship formed the Piedmont Waste Exchange.

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

The Ohio Resource Exchange (ORE) of Cleveland, Ohio, a materials exchange, was founded in May, 1979. This was a profit-making organization that specialized in hazardous and potentially hazardous wastes. It is no longer in business.

In 1980 several exchanges were initiated including the Florida Waste Information Exchange (FWIX), which regionalized its operations in 1982 to become the Southern Waste Information Exchange serving the southern United States. The Pennsylvania Waste Exchange (now operating through the Northeast Industrial Waste Exchange) and the Tennessee Waste Exchange also began operation in 1980. Formed in 1980, the New England Materials Exchange in Kennebunk, Maine, was a for-profit operation coordinated by a private analytical laboratory, initially set up as a service to clients. A change in

operation has taken place and it is now operated in conjunction with a board of representatives from various local industries.

ICM Chemical Corporation, a materials brokerage service based in Jacksonville, Florida, initiated operations in 1981. The Colorado Waste Exchange in Denver, a clearinghouse and a for profit exchange operated by Pacific Environmental Service, began operations in 1981. The Northeast Industrial Waste Exchange, started in 1981 by the Manufacturers Association of Central New York and the Central New York Regional Planning and Development Board, serves the northeastern United States. Also initiated in 1981 but since terminated was the National Waste Exchange based in Silver Spring, Pennsylvania. The Great Lakes Regional Waste Exchange recently (1982) began serving industry in the Michigan area.

Other waste exchanges which have been formed since 1980 include the Atlantic Coast Exchange (North Carolina), the Virginia Waste Exchange, and the California Waste Exchange.

Comparison of Development of United States and Foreign Exchanges

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

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

Many operational similarities are observed between European and American information clearinghouses. Nearly all information exchanges, whether American or European, have the same basic structure. They are generally operated in a passive manner, usually only making referrals, not partici-

pating in transfer negotiations. Most preserve the confidentiality of listing companies by coding published information and requiring written inquiries. The majority of clearinghouses are run by trade organizations or chambers of commerce.

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

Probably the most significant difference in the waste exchange concept to be found in the United States is the materials exchange. These profit-making waste brokerages are absent in Europe. The profit motive clearly provides incentive to the exchange to actively seek new uses for wastes that would normally be discarded.

II. WASTE MATERIALS SUITABLE FOR EXCHANGE

Although the section title suggests only recovery of discarded materials, the recycling of other commodities is also a potential resource for industry. A more accurate term might be "Investment Recovery" because the concept of resource reuse can easily be applied to surplus equipment, unused supplies, and discontinued products as well as wastes traditionally requiring disposal. For this reason, a primary emphasis of this section is how to facilitate or enhance waste exchange, rather than how to improve operations of waste exchanges per se.

Overcoming the existing lack of knowledge concerning waste management alternatives is necessary in order to get generators and users or brokers together for their mutual benefit. It is possible to view each segment of the materials transfer continuum as either a catalyst or inhibitor of the system. The optimal situation is one in which all parties (including generators, waste exchanges, brokers, governmental agencies, and users) are actively favoring the concept so that it has the greatest opportunity for success.

The universe of potentially transferrable materials is large. The following is a list of items identified by conference participants as materials known to have potential value. They can be grouped in a variety of ways; however, no groupings were made for purposes of this document.

Solvents (chlorinated, other)
Used oils
Alkali (greater than 10% caustic)
Etching and electroplating solutions
Circuit boards
Pickling acids and other acids
Phenols
Paints
Inks
Trap grease (also vegetable oil skimmings and meat oil)
Laboratory reagents
Metal sludges (and in solution)
Precious metals
Spent catalysts
Auto batteries
Plastics
Automobile tires
Textile scrap
Paper and wood waste
Glass
Pressurized gas cylinders
Vegetable cuttings
Seafood processing waste
Municipal solid waste
Industrial sludge
Industrial waste water
Drums and other metal or plastic containers
Waste hydrocarbons
Caustic soda
Popcorn
Wood pallets
Organic and inorganic chemicals (off-grade, obsolete, or in leaking containers)

Carbon/graphite
Mercury

In addition to the direct transfer of some of these materials, some firms have investigated or instituted some process modifications designed to allow for or enhance the reuse potential of by-products generated during regular manufacturing processes. Some of these changes can be quite modest while others require more planning and evaluation to realize their economic possibilities. Examples of modifications which have been successful in the past include: substitution of reclaimed nitric acid for typical virgin electroplating acids; source separation and segregation of various materials; concentration and volume reduction; modification of raw material specifications to allow substitution of minimally lower quality inputs; intermediate reactions designed to modify waste stream components; tighter process control to take advantage of by-product (not waste) streams; education of plant management and employees about the benefits of resource reuse.

In-plant education is probably the most important step in the recycling process since opportunities for resource reuse often are not recognized until they are pointed out. Waste

exchanges, brokerage firms, and in-house investment recovery departments can all play a role in educating generators and potential users. Personnel from the waste exchange, brokerage firm, or in-house investment recovery department should visit the generator's facility. During a site visit, the broker or in-house investment recovery specialist can look for materials currently being stored or disposed of. In addition potential recycling opportunities may exist through, for example, energy recovery, material recovery, or substitution for raw materials or other process materials. Following this, it is necessary to provide the generator with cost-effective and technical means by which to recycle his materials. This requires expertise in consultation with industry which could be a service provided by waste exchanges. Such a plan will help to overcome mistrust and fear of future liability on the part of the generator. Also, regulatory agencies should clarify their positions concerning waste transfer. This means that agencies in a position to do so should not only verbally encourage exchange and resource reuse, but should also create financial incentives where possible, including tax exemptions on transferred materials and facilitated permitting for firms engaged in legitimate recycling.

In summary, an active role must be taken by parties in all phases of the resource reuse cycle. Opportunities must be sought out and recognized, good design and planning should be specifically encouraged, and direct economic incentives should be provided. It is in this way that generators can be motivated, users can be located, and environmentally sound alternatives to traditional waste management practices can be encouraged.

III. EXPECTATIONS OF INDUSTRY AND COMMERCE IN WASTE EXCHANGE ACTIVITY

A primary objective of any activity that promotes and encourages resource reuse is to increase the number and magnitude of transactions of secondary materials. As pointed out in Section I two basic types of exchanges are currently in operation: passive and active. Passive exchanges function primarily by distributing a catalog of available and wanted wastes to an audience of potential suppliers and users. Active exchanges search for materials, sellers, and buyers. Regardless of the nature of such an organization, members of industry and commerce have requirements that influence their decisions whether to participate in a waste exchange and to what extent their participation is appropriate. Each situation involving a secondary material and its reuse potential must be viewed in the light of three specific considerations before a decision is made to recycle:

1. Technical - At the production end, aspects of process modification and segregation must not be too burdensome. At the user end, process modification must be cost effective and the purity, consistency, volume, and regularity of the supply

must meet specifications. This is typically the most well-defined step and one where the initial and most severe obstacles are encountered.

2. Practical - From a convenience standpoint, does the changeover in suppliers and comparative novelty of the concept discourage a firm from participating? This may be an area where meetings between plant management and waste exchange personnel can help in resolving some of these concerns. Does concern for liability influence the decision to participate?

3. Economic - Do the costs of process modification, costs of transport, advertising for a source or user of the material, and increased inconvenience of using secondary raw materials justify the cost savings realized? The answers to these questions will influence whether or not a firm will pursue further the solution to the technical and practical problems.

Many comments were made during this session regarding the needs and expectations of firms investigating resource reuse, particularly through established waste exchanges. The

majority of the questions and comments concerned confidentiality of information, generator liability and its limitations, reasons for reluctance to participate in waste exchange, and suggestions on how to make the system operate to the benefit of industry.

The issue of confidentiality remains controversial. Although most exchanges maintain confidentiality as a general policy, many representatives at the conference expressed the opinion that perhaps it was unnecessary. A strong point in its favor is the fact that confidentiality protects the proprietary interests of generators and limits the direct knowledge of which firms are generating a particular material. In the case of for-profit exchanges or brokerage services, it is imperative that secrecy be maintained in order to allow negotiations, including discussions of fees, to be brought to successful conclusions. Both of these points, though, were challenged by those who suggested that confidentiality was not that important. For many firms, waste information reported to EPA and state agencies already contains extensive information on waste generation available to the public. In response to the comment that a generator would like to select those firms with which he does business and therefore requires confiden-

tiality from a waste exchange, it was suggested that optional confidentiality be instituted. This has been a recent trend in some waste exchanges.

Although liability was discussed at several junctures during the sessions, it was identified here as the primary reason for nonparticipation by industry in waste transfer. Firms were concerned with problems involving use of waste materials as secondary raw materials and subsequent difficulties if incidents occurred as a result of transport or storage of the materials for which they might become liable under existing regulations. Anyone transferring a waste should inspect and audit potential users of the waste to ensure that the intended uses are legitimate and are being carried out. It was also suggested that some type of certification of recyclers be instituted. One panel member reported that a recent informal survey of large Florida firms also identified uncertainty of quality and frequency of supply as important reasons for reluctance to participate in waste transfer. Even though raw material costs represent large expenditures, and though significant savings can often be realized by the substitution of secondary raw materials, serious production problems may be

encountered if materials are inadequately characterized or misrepresented.

It was suggested that transfer facilities, which act as collection points enroute for treatment or disposal facilities, could serve as sources for reusable materials. There are several reasons, however, why this may not be possible. Generator storage limitations often preclude the sufficient accumulation of valuable materials so that they can be exchanged in the first place. In the past, firms also have not typically known enough about the precise constituents of their waste stream to allow consolidation at a transfer facility. Consequently, analysis would need to be carried out at the transfer facility since it may not be possible to arrange an exchange based on generator information alone. Legal complications arising from the contract signed by generator and disposer, however, often limit what can be done with a waste material at a transfer facility. Historically, disposal firms have tended to emphasize secure and final disposal (e.g., secure landfilling) as the most attractive option without offering reuse as an alternative. Some participants believed that this protects generator, transporter, and disposer from continuing liability, while others said that liability could be

reduced by recycling. All things considered, neither option is without some liability. The disposal option, however, is likely to persist in the absence of incentives for disposal firms to alter this attitude.

The expectations of industry with regard to resource reuse and waste transfer, particularly through waste exchanges, can be summarized in terms of three requirements:

1. Participation in the exchange must be uncomplicated and cost-effective. The exchange itself must be reputable and reliable.
2. Alternatives to conventional treatment and disposal methods which are presented by a waste exchange must be ethical and cost-effective.
3. The exchange should have as wide an audience of potential users as possible. The exchange should also have extensive contacts in the waste management field in order to be aware of all waste management options.

The education of generators and users about available opportunities for resource reuse, as well as liability considerations, were identified by participants as major concerns in the promotion of resource reuse and waste exchange.

IV. COOPERATION AMONG EXCHANGES

The session began with the question "is cooperation among exchanges the key to effective service"? Because not everyone who operates a waste exchange believes cooperation is in their best interest, the question was later modified to "what form of cooperation is appropriate for the various exchanges and what forms of cooperation can be beneficial to all waste exchanges?"

There are currently numerous examples of cooperation among waste exchanges, both in the United States and abroad. For example, in Germany the magazine Chemical Industry lists items from the waste exchanges of many other European countries. The Great Lakes Regional Waste Exchange in Michigan lists, in the magazine Great Lakes Waste and Pollution Review (published by the Waste Systems Institute of Michigan), wastes from other exchanges operating in the six-state region and in neighboring Canadian provinces. Interested parties are referred to the exchange where the listings originated.

Ways to make exchanges more efficient and to increase cooperation among them were discussed. Simply publishing a

catalog of listings quarterly or every six months is considered too infrequent for many potential waste exchange users. Generators, for example, may not have the facilities to store the waste for long periods of time. Furthermore, if the waste is hazardous, after 90 days generators are subject to regulation under RCRA as a storage facility. EPA's proposed rule regarding the definition of "solid waste" which was discussed in Section V of these proceedings may change this requirement. The view was expressed that people should be able to list wastes and to get listings of available wastes more immediately--by telephone or through a modem, which could be used to provide a computer printout. If exchanges cannot afford to have a person answer the phone, it was suggested that an answering service be used.

A common data base established and shared on a regional, national, or even international level would be extremely useful insofar as it would enlarge the potential market and lead to more successful exchanges. It was pointed out that the World Association for the Safe Transfer and Exchange (WASTE) already has the software in place for such a data base. Waste exchanges could also tie into existing computerized data bases maintained by regulatory agencies

and private businesses to search waste streams for recyclable materials. Use of a computerized data base by and among waste exchanges raised a more fundamental issue: there is no uniform system for listing wastes--different exchanges use different systems of classifying and listing wastes. The need for a standard classification system must be addressed prior to establishing a common data base among exchanges. The 1980 EPA study entitled Waste Exchanges: Background Information (SW 887.1) was suggested as a possible source for standardization.

Communication among exchanges could be facilitated by establishing a network of regional contacts within which information could be exchanged. Network members would inform each other of their areas of specialization so that referrals could be made when appropriate. Using, for example, the model of a real estate licensing service, a similar service might be developed to ensure that member exchanges are reliable and responsible. Such a licensing service could help prevent disreputable exchanges from inpugning the reputations of other exchanges and thereby effectively inhibiting resource reuse.

Other ideas were presented that, if implemented, would provide an impetus to the development or expansion of waste exchanges. One suggestion was to require the use of a broker, a waste exchange, a recovery facility, or an in-house treatment unit before a generator would be allowed to ship waste to a disposer. It was pointed out that this presents some obvious problems. Exchanges would also benefit from public information programs concerning waste exchange and resource reuse.

Specific benefits and barriers to cooperation among exchanges were discussed and are presented in Table IV.1. The requirement of manifesting hazardous waste before it can be recycled was seen as a barrier, especially for waste oil.

If waste exchanges present a united front, they can more effectively encourage waste exchange and resource reuse at both state and federal levels. Through cooperation, waste exchanges can launch a more effective public awareness campaign, and they can also share technical, legal, and environmental information that may be mutually beneficial. Sharing of listings, particularly among non-profit exchanges, appears to have few barriers, although a common coding system needs to be developed and accepted, especially if

computer data bases are used. Cooperation could be enhanced between non-profit and for-profit exchanges by providing for-profit exchanges with rewards for contributing to an exchange initiated through a non-profit organization. This arrangement would probably have to be worked out on a case by case basis.

TABLE IV-1

BENEFITS AND BARRIERS TO COOPERATION AMONG EXCHANGES

Benefits	Barriers
1. Exchange of ideas for solving common problems	1. Legal disincentives (liability)
2. Sharing of costs (e.g., for advertising or public announcements)	2. Requirement of manifesting hazardous waste
3. Increased exchange success rate	3. Increased operating costs of exchanges
4. Increased probability of finding a large volume of a particular waste	4. Costs of hauling long distances
5. More effective lobbying (at both state and federal levels)	5. Possible breach of confidentiality
6. Increased public awareness	6. Competition for a finite amount of funding
7. Environmental benefits	

V. RCRA REAUTHORIZATION AND NEW DEFINITIONS CONCERNING RESOURCE REUSE*

EPA has been working over the past year to determine what the agency's role should be in recycling and reuse of waste. The major question is "how can EPA inhibit those types of operations that should be inhibited while encouraging or at least not discouraging legitimate recycling?" Under RCRA, EPA has clear authority to regulate the recycling of hazardous waste. Experience has shown important reasons to do so. For example, a waste oil blender sold fuel containing PCBs and chlorinated hydrocarbons to apartment houses in New York City. Using contaminated waste oil as a dust suppressant has all the same potential for harm as when this waste is land disposed, as the state of Missouri has recently discovered. Times Beach, Missouri, is only one of many such sites in the state. The cost of purchasing homes in Times Beach alone is $35 million. Of the 61 imminent hazard cases filed so far under section 7003 of RCRA, one-third are recycling operations. Twenty of the first 160 interim priority sites on the Superfund list are also recycling operations. For example, the Chemdyne facility in Hamilton, Ohio will cost $3.5

*This section is essentially a summary of the comments made by Dr. John H. Skinner of U.S. EPA.

million just to clean-up the surface. The groundwater costs have not even been estimated. The Seymour site in Ohio will cost at least $30 million to clean up. These were not sham operations. The people were attempting to make money recycling wastes and were using what they considered to be good business practices. Many operations, however, went bankrupt, leaving the cost of clean-up to someone else. EPA is thus concerned about certain types of recycling operations.

The agency acknowledges that there are strong environmental reasons to encourage the legitimate and beneficial uses of hazardous waste. The act is after all called the "Resource Conservation and Recovery Act," and certain types of materials are very analogous to industrial products and virgin materials and should be treated as such. EPA is attempting to put together a regulatory scheme that focuses on those materials with potential for harm while exempting those for which commercial or market incentives will in all likelihood be sufficient to complete the recycling process.

In May 1980, EPA promulgated regulations on the reuse and recycling of hazardous wastes. There are a number of problems with these regulations. The regulations are very broad. Some products should be regulated more and some

should be regulated less. A proposal to amend these regulations will appear in the Federal Register (48 CFR 14472; April 4, 1983; 120-day comment period to close August 2, 1983). A free copy of the regulations may be obtained by calling the EPA RCRA/Superfund hotline (800-424-9346; in Washington, D.C. call 382-3000), and asking for the "redefinition of solid waste as it pertains to recycling and reuse."

The new regulations define certain activities as solid waste-related and then eventually as hazardous waste-related based both on the material itself and how it is managed. Five types of recycling activities currently are subject to regulatory control:

1. Placement of materials on land (use constituting disposal).
2. Burning waste or waste-derived fuels for energy recovery or using wastes to produce a fuel.
3. Accumulation of materials in a speculative matter (that is, when there is no clear market).
4. Accumulation of materials without sufficient turnover. (Seventy-five percent of the material must be recycled within one year or else the site must be regulated as a storage facility.)

5. Situations where reclamation occurs. In this instance, materials are recovered from waste or the waste itself is regenerated. This definition brings into regulatory control certain products and by-products. Regulation will apply only to listed wastes and sludges.

There are several exemptions to the above, including:

1. Waste reclaimed by the generator and reused by the generator.
2. Waste reclaimed and used by a reclaimer other than the generator.
3. Specific exemptions, for example, precious metals reclaiming and certain battery recycling activities.

Some materials are not considered solid waste in the first place and are thus not subject to regulation. These include:

a. Secondary materials used or reused as ingredients or feedstocks in a production process, for example, fly ash in manufacturing. These materials function as raw materials.

b. Secondary materials used as substitutes for raw materials in recovery processes that normally use raw mate-

rials as feedstocks. For example, use of secondary lead in a primary lead smelter.

c. Secondary materials used or reused as substitutes for commercial products.

d. Materials used in the same process that produced them (closed loop process -- same site, same process).

A waste exchange can exchange information without the exchange being regulated. A recycler is also exempt from regulation if he uses the material himself (see #2 above). The recycler who processes material and then sells it is not exempt. Listed wastes and sludges have to be manifested to the recycler. If they are stored on-site, they are subject to regulatory control. EPA's position is to support recycling, but to make sure recycling actually occurs (i.e., to make sure the waste is not left on site). Under RCRA in the hazardous waste area EPA's major responsibility is as a regulatory agency. A transfer site may collect waste, but the site would have to be regulated as a storage facility. Likewise, incineration is regulated but not prohibited. The question of whether an item used both as a feedstock and as fuel is subject to regulation was raised during discussion. The issue was not resolved. The

actual burning of some waste is also exempted from regulation, although EPA intends that this exemption be temporary.

Pending federal legislation may require the labeling of all fuels that contain hazardous wastes. Since the legislation has not passed, it is unclear whether this will require the listing of specific components in a fuel. (Conference participants thought that such a requirement would inhibit the recycling of oil, since large fuel blenders have hundreds of sources, making identification of all components difficult, if not impossible.) Waste oil itself is listed as a hazardous waste in eight states. In other states, it is not subject to the new regulations unless it has any of the four characteristics (ignitability, corrosivity, reactivity, toxicity) or if a hazardous waste is mixed into it. EPA is currently working on technical standards for the burning and recycling of waste oil, which should be available within the next 18 months. Waste oil will also be listed as a hazardous waste.

It must be remembered that state regulations may always be more stringent than federal regulations. For example, in Massachusetts waste oil is already considered a hazardous substance by the state.

In 1983 a uniform national manifest form will be promulgated that preempts all state manifests. The form will go into effect 180 days after promulgation. This will allow transport of wastes across state lines without the need for separate state manifests. However, the uniform manifest will not affect specific requirements at either pick-up or delivery points.

Under the new proposed definition of solid waste, EPA estimates that 5,000 recycling operations will be subject to less regulation at cost savings of $24 million. In many areas it will be cheaper and easier to recycle; in some others it will be more difficult.

In the discussion following the presentation, the spokesman for EPA indicated that he did not think the new regulation will substantially affect waste exchanges. The complexity of the regulations and the fact that they are still being developed was viewed as an impediment by some conference participants. EPA, however, believes that the changes in the regulations are warranted and that once they are in place the regulatory climate will become more predictable and effective.

VI. INCENTIVES/BARRIERS TO SUCCESSFUL EXCHANGE

At present the barriers to successful exchange appear to outweigh the incentives. There are several impediments to exchange from the point of view of the generator. Many generators do not realize what materials are suitable for recycling nor do they know the pertinent regulations. They may also be uncertain about whether a particular waste is hazardous. Some generators fear that if their waste is published on a waste exchange, their competitors will be able to discover secrets of their production processes. Generators also may not want to become involved in what they view as "another business." Potential liability was identified repeatedly as a barrier to generator participation in waste exchanges. Cradle-to-grave generator liability makes generators hesitant about losing control of their hazardous waste: they frequently prefer to manage it in a way which allows them to feel they have more control over the waste's fate than they would if the waste were reused. Generators also have a potential storage problem. Under RCRA there is a 90-day storage limit after which a permit to store waste is required. EPA's proposed rule regarding the definition of "solid waste"

discussed in Section V of these proceedings may change this requirement. Listings in waste exchanges may not even be published for 90 days. Storage of waste may also affect a generator's insurance burden.

Unfavorable economics are another barrier to successful exchange. Many wastes have a high volume but a low value, making it cost-ineffective to transport them, particularly over long distances. Transportation difficulties are compounded if the wastes are hazardous and/or transported across state lines. Companies involved in a waste transfer must pay other fixed costs in addition to transportation costs. There are costs related to price negotiations, material testing, and for any equipment or process modifications needed to handle the material. All these costs may be small on a per pound basis when large amounts of material are exchanged regularly, but the costs may become prohibitive when materials are available one time only, irregularly, or in small amounts.

The fact that regulations are both complicated and constantly changing, particularly with regard to the issue of whether a substance is hazardous or not, is also a problem. It was pointed out by one conference participant that both the

stringency and complexity of regulations will affect the exchange.

Furthermore, there are technical impediments to the recycling of certain materials. Even if the technology is available, it may not be economical. An Argonne National Laboratory publication entitled "Industrial Waste Exchange: A Mechanism for Saving Energy and Money" (1982) points out several areas where economical technology is needed: materials recovery from sludges, separation of close-boiling liquids, and separation of mixed plastic or fiber wastes. Related to this is the problem that, with the exception of technical publications, no means exist for communicating new recycling processes. Industrial processes change so rapidly that once a successful exchange has been established between a generator and a user, there is no way to guarantee that one side will continue to produce and another continue to use a particular material.

The passivity of most waste exchanges was also viewed as an impediment to successful exchange. Most exchanges do not actively market the waste. They do not take possession of the material. Hence, their function as a intermediary is limited.

Other barriers to successful exchange were raised that primarily affect recyclers rather than waste exchanges per se. The public's attitude toward waste, particularly hazardous waste, is negative. There is frequently local resistance to the building of hazardous waste management sites. Defining a material as a "waste" results in "spotlight" attention from numerous public agencies. Handling of "hazardous waste" may also result in problems with labor unions (for example, a clean-up on a dock). The belief was expressed that complex regulation can put excessive pressure on small businesses. This was considered unfortunate because many of the small firms are more efficient from a material transfer perspective in that they deal with single types of wastes or small amounts of waste. The most extreme consequences of excessive regulation were considered to be bankruptcy of small firms, unemployment, and shifting of the recycling field into the realm of fewer large companies.

Recyclers as well as generators have serious liability considerations. Preshipment sampling and analysis typically are not adequate to insure the continued quality of the waste received by recyclers. Obtaining a truly representative sample, even for a single barrel, is not always possible. It was

suggested that the recycler may specify parameters of what is acceptable in a contract, but even if these parameters are not met, it is not always possible to return the waste to the generator. Waste cannot be returned to the generator unless the generator is a licensed storage facility (EPA regulations, 40 CFR Part 262).

The incentives for successful exchange were also discussed. One benefit is the amount of energy saved by using existing rather than new materials. The Argonne report (p. 50) states that the amount of energy saved by one waste exchange over two and one-half years was 10×10^9 BTU. It is calculated that a savings of 10^{12} BTU per year (the equivalent of 100,000 barrels of oil) would result if 50 exchanges five times as large or as effective as that one existed. A seemingly obvious incentive is the saving in cost over the cost of disposal. Apparently, however, the cost of recycling is often comparable to the cost of disposal, particularly for hazardous waste. Currently there are taxes levied for producing hazardous wastes, but typically there are limitations on tax incentives or advantages given to those who recycle wastes. It was suggested that a tax incentive be given to those who recycle and a liability fund be established. Money

could be taken from the tax paid by waste generators and diverted to waste exchanges or recyclers to partially cover the regulatory burden.

VII. STRATEGIES TO ENCOURAGE AND FACILITATE WASTE EXCHANGE

This session focused on positive steps that may be taken by waste exchanges, recyclers, and government to encourage and facilitate waste exchange. Many laws have already been passed to encourage recycling and resource reuse. For example, RCRA has two basic purposes: (1) to protect human health and the environment from hazardous and other solid waste, and (2) to protect and preserve the natural environment through resource conservation and recovery. Under RCRA, states are also mandated to develop programs to assist in the development of methods of disposal of solid waste that are environmentally sound and that encourage the use of valuable resources. The federal government, under RCRA, is required to provide technical and financial assistance to the states and to encourage cooperation among the various levels of government and private industry. The view was expressed that in spite of the requirements of RCRA, the federal government has not encouraged resource recovery as fully as possible.

Many states have passed laws to encourage alternative approaches to waste management. Some states also require counties to establish their own resource recovery facilities.

Most of these facilities are aimed at refuse incineration and energy recovery. It was suggested that exchanges work with the federal, state, and local governments and encourage the development of programs that do, in fact, help to meet the spirit of existing laws.

Several specific ways for government to encourage waste exchange were suggested:

1. Educate generators about available options and about liability issues. Generators need to be aware of the economic and environmental advantages of waste exchange and resource reuse.
2. Educate the public about the hazardous waste problem.
3. Institute tax incentives to recycle waste materials.
4. Encourage the development of transfer stations.
5. Encourage members of industry to use existing facilities and services. The policy in some states of passing laws that go into effect several years in the future in order to allow for the building of necessary facilities was criticized. It was felt that someone cannot be expected to invest in these facilities before the market is there; on the

contrary, it was felt that if one creates the market the facilities will follow in normal course.

Waste exchanges and recyclers can also facilitate and encourage waste exchange in the following ways:.

1. Promote industry use of waste exchanges through seminars, trade shows, and direct mail advertising.
2. Encourage the development of new technologies to solve waste disposal problems through resource reuse, and encourage firms to utilize these methods.
3. Offer generators financial incentives and contract commitments to recycle waste materials.
4. Advertise exchange services in trade journals and through public service announcements. Currently, many exchanges do not extensively advertise their services. Advertising is not as expensive as commonly thought. For instance, an ad in the magazine Chemical Purchasing reaches 38,000 people and costs $25. It also may be possible to exchange ads with some magazines. Developing the advertisement takes time, which was

considered a problem for exchanges with limited manpower.

5. Document and advertise successful exchanges.
6. Adopt a common listing format among exchanges.
7. Develop a means of quick response, including provision of a ready list of wastes available.
8. Educate the community. Point out that reusing wastes is typically not more hazardous than the material for which it is a substitute.
9. Encourage participation in waste exchange organizations by public and private groups.

These steps may be taken by individual exchanges or they may be taken collectively through, for example, a national association for waste exchange.

VIII. LEGAL CONSIDERATIONS AND LEGISLATIVE TRENDS WITH REGARD TO WASTE EXCHANGE

There are legislative and legal incentives and disincentives to waste exchange and recycling. In 1976 Congress passed the Resource Conservation and Recovery Act (PL 94-580, RCRA). The emphasis of the act--despite its title--has not been on conservation or recovery of wastes. Certain hazardous wastes are exempted from regulation under RCRA when recycled, but some critics of the act believe more should be done to encourage recycling of hazardous waste. Since the passage of RCRA, several bills have been introduced to encourage recycling through economic incentives. Two of these bills would have promoted industrial recycling by means of tax incentives. One bill provided tax advantages for equipment that would reduce or eliminate waste; the other provided tax advantages for energy recovery or savings involving industrial waste usage. None of the bills passed. Although there are currently no federal tax incentives for recycling, there is a federal tax levied on hazardous waste generated. This tax serves as a modest incentive for recycling since waste that is treated and rendered nonhazardous is exempted from the tax.

The federal regulations on the reuse and recycling of hazardous wastes are being modified. The proposed changes (detailed in Section V) will make it easier and less expensive to recycle in some areas and more difficult in others.

States have also passed laws that affect recycling. The trend at the state level has been to tax (through surcharges) municipal solid waste as opposed to industrial waste. In some states municipal resource recovery operations are exempt from paying sales tax on resource recovery equipment. Florida is considering expansion of this exemption to all resource recovery operations. Some states have tax laws that apply directly to recycling of industrial waste. In New Jersey, for example, a tax advantage is given for waste that is recycled. A tax is levied on generators of hazardous waste in Florida and other states that is related to the cost of disposing, treating, or storing of that waste. Waste that is treated and rendered nonhazardous is exempted from the tax. This provision was designed to encourage in-plant treatment of wastes. Because this system relies on self-reporting, there are probably many hazardous waste generators of which the state is unaware and who are not paying the tax.

Tax incentives remain controversial. The belief was expressed that such incentives do not change the real cost of waste treatment and disposal, but that they merely shift the higher costs from one alternative to another. They may also encourage more capital intensive operations and discourage in-plant process modifications. Third, tax incentives may be viewed by the private sector as providing inequitable advantages to different firms.

Another legislative trend that may be an incentive for recycling is the idea under consideration in California, i.e., the banning of liquid wastes in landfills. In any case, the true costs of landfill disposal may not be reflected by the actual disposal costs, although in California the costs of liquids going into landfills has recently doubled, creating a distinct disincentive. If these costs were more in line with actual costs, generators would have more of an incentive for recycling. It must be remembered, however, that recyclers have to bear some increased costs of disposal themselves, since they also produce waste that must be disposed of.

According to the March 9, 1983, State/Local Report from the National Association of Recycling Industries, the states have also begun to respond to EPA's new definition of

solid waste and have begun to tighten their controls on recycling. The Maryland Department of Health and the New Jersey Department of Environmental Protection have proposed that only materials recycled at the generator's own facility be exempted from controls. In New York, the Department of Environmental Conservation is attempting to have aluminum dross listed as a hazardous waste even when it is recycled. According to lawyers for the department, "industrial and commercial by-products shipped for recycling should be assumed to be a waste until the generator proves otherwise." Similarly in Missouri a proposed rule classifies "by-products," as well as "spent materials" and "sludges," as wastes.

The field of hazardous waste has many legal concerns. Possible legal problems are of concern to anyone in the chain of custody of a hazardous material. The federal regulations promulgated under RCRA do not establish legal liability. Rather, they establish legal responsibility and delineate the limits of legal liability (fines and imprisonment) that the courts may impose. Generally, it is the courts that establish the extent of liability. In recent court decisions, liability under Superfund and RCRA has been construed as joint and several. All responsible parties, including generators, trans-

porters, disposers, and owners or operators of facilities, have been brought in by the EPA and the Department of Justice to bear the costs of clean-up and other relief. This trend has a potential impact on waste exchanges, although brokers and exchanges may not be liable if they keep waste out of their legal possession. In the future there will probably be more contractual agreements between generators or handlers and people to whom they transfer the waste, and between generators and haulers or owners/operators of disposal sites. Superfund in particular makes provisions for indemnity clauses to be entered into between parties, but these clauses do not insulate a party from liability. The generator does retain the right to indemnity from the person to whom the waste has been transferred. In other words, the generator may sue the other party if the contract is broken, but the generator may still be held liable under joint and several liability.

For generators, the legal problem with waste exchanges is that generators lose control of the waste. Their continued liability may influence a company's decision to become involved in a waste exchange. The question was raised concerning whether a waste generator who manifests wastes to either a broker or recycler is liable for the segregated

waste stream? The answer was a qualified yes. The generator's liability is not as severe if the material has been altered. The thrust of liability under Superfund and RCRA is on the hazardous waste component of the waste stream. However, even waste that may seem "clean" today may cause problems in the future.

Disposal, as well as recycling, may also cause legal problems for generators. For example, if a generator ships his waste to an approved disposal site and 15 years later the site closes without complying with regulations for closing, the generator may be held liable for his waste that leaks from the site. However, if the site is closed in accordance with regulations, liability is transferred under Superfund to a post-closure liability trust fund.

In the Florida law, there is a liability "escape clause." If a generator or transporter of hazardous waste complies with the law and with the applicable rules and regulations promulgated under the law and contracts with a licensed hazardous waste processing facility, then the generator or transporter is relieved from liability for those wastes upon receipt of a certificate of disposal from a licensed disposal facility. Currently, there is no licensed disposal facility in Florida.

This law has not been tested in the courts. Several cases cited in the January/February 1983 issue of Hazardous Materials and Waste Management suggest that generators may still be held liable even if they comply with all the regulations.

Some recyclers expressed the concern that the quality of the waste they receive frequently does not meet the parameters specified in the contract. Samples or test results submitted for precontract review are usually the "cream" and seldom reflect a true picture of the waste. For example, several phases of a waste may exist in a single drum and render representative testing nearly impossible. Suing the generator for breach of contract or returning the waste were not seen as feasible options. A clear answer, short of extensive laboratory testing, was not decided upon.

Associated with the concern for product quality is the uncertain credentials of various persons managing the waste. Because of joint and several liability, generators and recyclers must be concerned about the experience and reliability of one another. In addition, both the generator and the recycler need to be concerned about the reliability of the transporter. There are several means by which to check the credentials of the other parties involved in an exchange of waste. Site visits

are helpful, as is contacting firms who have done business with the party in question. Compliance with applicable state and federal regulations is another measure of reliability.

Concern was expressed that recycling was not a specific option for managing waste from Superfund sites, although opportunities clearly exist for some recycling activity. It was suggested that individuals with this concern contact the EPA regional office and that they also express their concern to EPA's Office of Solid Waste and Emergency Response.

Several questions, prepared by panel members, were not discussed because of time constraints. The questions are listed below:

1. How does a generator check the reputation of a company listed in an exchange catalogue?
2. Should a waste exchange catalogue specify liability to generator/exchanger?
3. Will incentives/disincentives such as landfilling bans or tax credits be necessary for waste exchange operations to continue?
4. What incentives can industry support which will enhance their cooperation with waste exchanges and the recycling effort?

5. Should a state agency be able to request a list of all firms that asked to be put in contact with a receiving firm if the receiving firm becomes involved in an enforcement/clean-up action?

6. Should waste exchanges that deal in actual material (i.e., materials exchanges) be required to notify the state (or EPA) and be subject to permit (storage) requirements? Current federal regulations require material exchanges (as storage facilities) to notify EPA and obtain a storage permit.

IX. NEED FOR A NATIONAL ASSOCIATION FOR WASTE EXCHANGE AND RESOURCE REUSE

Advantages of a national association were discussed in a preliminary session on the first day of the conference. These included facilitation of communication among members, lobbying at state and federal levels, documentation or licensing of members as legitimate operators, and dissemination of technical, legal, financial, and environmental information on recycling. A national waste exchange listing wastes from throughout the United States may not be reasonable or workable, but a trade association which represents exchanges could be a useful entity.

The National Association of Solvent Recyclers was described as a model of a national trade association. Trade associations have more effective input into the political process than individuals. For example, the National Association of Solvent Recyclers met with EPA officials concerning the recent redefinition of solid waste. Government officials frequently do not have the time to meet with as many individuals as they would like, but individuals can have their voice heard through trade associations. Lobbying may be achieved, for example, through the use of existing manage-

ment firms specializing in this area. This could be less expensive than establishing a separate office, and members of an existing firm may already have established personal contacts with government officials and members of Congress interested in recycling and resource reuse. The National Association of Solvent Recyclers pays for the services of a professional management association through dues charged to members.

Associations may provide many useful functions. For example, meetings sponsored by associations can lead to communication among participants that are frequently more effective than computer exchanges. Trade associations can also provide a list of certified labs, consolidate programs, and serve as a clearinghouse for technical information. A trade association could also disseminate information on, for example, relevant legislation or technical innovations, through a newsletter. It was suggested that the association consider publishing a technical magazine devoted to resource reuse. Current magazines focus on recycling specific materials through existing scrap markets (for example, paper, glass, metals). An association may regulate its members through a

code of ethics and help to maintain the relatively positive image waste exchanges have currently.

Several tasks must be accomplished before such an association can be established. The scope, purpose, and function of the association must be determined. It was suggested that the goal of such an association be to facilitate waste exchange, not waste exchanges. Next, it must be decided what groups will be included in the association. Should all the types of people represented at the conference--generators, brokers, recyclers, consultants, regulators--be included or should only those people who engage in waste exchange under a particular definition be included? The consensus seemed to be that initially the membership of the association should be broadly defined to include all groups and that the association develop a code of ethics. It was also suggested that the association include members from outside the United States as well.

The second day's session on the establishment of a national association began with the exchange of ideas not directly linked to the session topic. A recent technological development (ground penetrating radar) can be used to detect subsurface drums. One participant reaffirmed the need for

highly qualified middlemen to get generators and recyclers together. These middlemen should have access to the recycler's financial records and EPA records, as well as knowledge of the specific recycling process. Because of "cradle-to-grave" liability for hazardous waste, a company would be unwise to part with its waste without this kind of information.

The issue of environmental audits to identify potentially recyclable wastes for a company was also raised. Waste audits are particularly useful to small companies and could be performed under the auspices of the association. For example, in Leon County, Florida, a hazardous waste assessment revealed that many small quantity generators did not know they were generating hazardous waste. They were also unaware of the options available to them in addition to traditional management methods. The point was made that it is important to involve local governments as well as federal and state governments in the hazardous waste management process.

A resolution was made to form a national association "for waste exchange and resource reuse." The association's initial goal, as a follow-up forum to this conference, would be

to draft a position paper based on the discussion from the conference. The position paper would be sent to all participants for review and then redrafted.

Representatives from several waste exchanges met informally and agreed to exchange catalogs, investigate the standardization of waste categories, and work toward a universal coding scheme that would maintain user confidentiality while providing consistency in listing information.

The session ended with the agreement that Dr. Roy C. Herndon would organize a committee to prepare a position paper to define tasks that need to be accomplished. The position paper should identify the need for and functions of the association. After these are specified, other aspects of the association such as structure, by-laws, membership requirements, and code of ethics may be proposed.

APPENDIX A
CONFERENCE AGENDA

NATIONAL CONFERENCE ON WASTE EXCHANGE

P.O. Box 6487
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(904) 644-2007

Florida State Conference Center **West Pensacola and Copeland**

MARCH 8-9, 1983

A Conference to Encourage Resource Reuse
Through Waste Exchange and Recycling

AGENDA

Monday Evening, March 7

7:00 **Pre-Conference Hospitality Hour and Early Registration**
Salon A-B, Hilton Hotel
101 South Adams Street

Tuesday Morning, March 8

8:00 **REGISTRATION AND CONTINENTAL BREAKFAST**

Florida State Conference Center
West Pensacola and Copeland

9:00 **INTRODUCTION AND ANNOUNCEMENTS**

Conference Coordinator: Roy C. Herndon, Florida State University

9:15 **CONFERENCE OVERVIEW**

- o Review of Waste Exchange Activities
- o Objectives and Goals of the Conference
- o Program Format

John E. Moerlins: Waste Management Program, Florida State University

9:30 **SESSION I - Waste Materials Suitable for Exchange**

- o Examples of Recyclable Waste Streams
- o Potentially Valuable Waste Streams
- o Process Modifications to Enhance Transferability of Wastes

Moderator: Richard L. Floyd, Union Carbide Corporation

10:00 **BREAK**

EPA FLORIDA STATE UNIVERSITY 1857 THE FLORIDA CHAMBER

10:15 **SESSION II - Expectations of Industry and Commerce in Waste Exchange Activity**

- Services Provided by a Waste Exchange
- Maintaining Confidentiality
- Cost Effectiveness of Waste Exchange Operations
- Evaluating Liability

Moderator: Christopher Teaf, Southern Waste Information Exchange

Panel: Jack Hollingsworth, M.J. Hollingsworth and Company
John Miller, Standard Oil Company (Indiana)
Charles Littlejohn, Florida Chamber of Commerce

11:00 **SESSION III - Cooperation Among Exchanges: The Key to Effective Service to U.S. Industry**

- Feasibility and Mutual Benefits of Cooperation among Exchanges
- Barriers to Cooperation among Exchanges
- Mechanisms for Cooperative Exchange of Information
- Examples of Cooperative Activity among Exchanges

Moderator: Elizabeth Dorn, Piedmont Waste Exchange

11:45 **SESSION IV - RCRA Reauthorization and New Definitions Concerning Resource Reuse**

John H. Skinner
Office of Solid Waste
U.S. Environmental Protection Agency

12:15 **BUFFET LUNCHEON**

Florida State Conference Center
West Pensacola and Copeland

Topic: Session Summaries, Discussion and Follow-up Tasks

Moderator: John E. Moerlins, Florida State University

Panel: Elizabeth Dorn, Piedmont Waste Exchange
R.L. Floyd, Union Carbide Corporation
Christopher Teaf, Southern Waste Information Exchange

Tuesday Afternoon, March 8

1:30 **SESSION V – Incentives/Barriers to Successful Exchange**

- Conceptual
- Economic
- Legal
- Regulatory

Co-Moderators: *Linda Gaines, Argonne National Laboratory*
Trevor Pitts, Zero Waste Systems

2:30 **BREAK**

2:45 **SESSION VI – Preliminary Discussion Concerning Need for a National Association for Waste Exchange**

- Purpose
- Anticipated Structure and Functions
- Developmental Strategies
- Cooperative Activities, Regionalization

Co-Moderators: *Leslie Allen, Allworth Inc.*
Walker Banning, Northeast Industrial Waste Exchange

3:45 **BREAK**

4:00 **SESSION SUMMARIES, DISCUSSION AND FOLLOW-UP TASKS**

Moderator: Roy C. Herndon, Conference Coordinator

Panel: *Leslie Allen, Allworth Inc.*
Walker Banning, Northeast Industrial Waste Exchange
Linda Gaines, Argonne National Laboratory
Trevor Pitts, Zero Waste Systems

5:00 **ADJOURN**

Tuesday Evening, March 8

7:00 **DINNER PROGRAM**

The Florida Room
Hilton Hotel

- Critique of Day's Activities
- Setting the Stage for Tomorrow's Sessions

Edward A. Fernald, Roy C. Herndon; Florida State University

Wednesday Morning, March 9

8:00 **REGISTRATION AND CONTINENTAL BREAKFAST**
Florida State Conference Center
West Pensacola and Copeland

9:00 **PANEL SESSION I - Legal Considerations and Legislative Trends**

- Liability of a Generator Following Waste Transfer
- State Regulatory Positions Concerning Waste Exchange
- Status of Federal Legislation/Regulation Concerning Waste Exchange

Moderator: Rolf P. Hill, U.S. Environmental Protection Agency

Panel: Raoul Clarke, Florida Department of Environmental Regulation
William Preston; Hopping, Boyd, Green and Sams
Lori Spencer, Spencer Environmental Consultants

9:40 **PANEL SESSION II - Strategies to Encourage and Facilitate Waste Exchange**

Moderator: Marcel Veronneau, Environmental Waste Removal, Inc.

Panel: Bob Arundale, III, BCR Inc.
Robert O. Kincart, Resource Recovery of America
Donna Trask, New England Materials Exchange
Anthony Tripi, I.C.M. Chemical Corporation

10:20 **BREAK**

10:30 **PANEL SESSION III - Structure and Function of a National Association for Waste Exchange**

- Proposed Structure and Administration
- Long-term Goals and Activities
- Follow-up Strategies and Responsibilities

Moderator: Roy C. Herndon, Conference Coordinator

Panel: Walker Banning, Northeast Industrial Waste Exchange
Julia I. Barrow, Industrial Material Exchange
Thomas Herbert, T.A. Herbert and Associates
William Stough, Waste Systems Institute

11:30 **CONFERENCE SUMMARY AND CRITIQUE**

- Summary of Conference
- Strategies to Implement Ongoing Activities
- Future Meetings

12:00 **CONFERENCE ADJOURNMENT**

APPENDIX B
CONFERENCE PARTICIPANTS

CONFERENCE PARTICIPANTS
NATIONAL CONFERENCE ON WASTE EXCHANGE
March 8-9, 1983

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