Proceedings of

THE THIRD NATIONAL CONFERENCE ON WASTE EXCHANGE

Sponsored by

Center for Environmental Studies
Arizona State University

March 4-6, 1986

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PREFACE

A National Conference cannot be planned without the efforts of many people. Without the cooperation and guidance of the speakers, moderators, and a host of cooperating Exchange Services this conference would not have been possible. In addition, faculty, staff, and students from the Center for Environmental Studies at Arizona State University labored long and diligently to ensure that this conference became a reality.

The Director of the Center, Dr. Duncan T. Patten, encouraged the involvement of the Center and approved the funding outlays so facility reservations could be guaranteed. During the entire planning process and organization of the registration period, mailings, and agenda preparations the Center's Administrative Assistant, Pat Chase, along with the Center's Secretary, Lynn Druliner, coordinated and executed all phases. Word Processing and art assistance were provided by Sara Frischknecht and Cindy D. Zisner, also staff members of the Center. A special thanks to Cindy D. Zisner for also editing all the papers. Additional assistance from Loretta McKibben and David Grisa in filling registration folders and printing labels was also much appreciated. To list the jobs necessary to coordinate a conference of this size would take several pages. The miscellaneous duties alone such as answering phones, running local errands to the hotel, and many others are endless.

Arizona State University, the Center for Environmental Studies, and the Western Waste Exchange wish to express their sincere thanks and appreciation to the following Waste Exchanges and companies for their moral and financial assistance.

Industrial Material Exchange Service
Illinois EPA
Illinois State Chamber of Commerce

Piedmont Waste Exchange
University of North Carolina
Charlotte, North Carolina

Northeast Industrial Waste Exchange
Syracuse, New York

Southern Waste Information Exchange
Florida State University
Tallahassee, Florida

Great Lakes Regional Waste Exchange
Grand Rapids, Michigan

Phoenix Fire Department
Hazardous Incident Response Team
Phoenix, Arizona

Western Technologies, Inc.
Phoenix, Arizona

Chemical Waste Management
Phoenix, Arizona

Chemical Disposal Co.
Rillito, Arizona

Ensco
Maricopa, Arizona

Bureau of National Affairs
Washington, D.C.

Chem Sources, Inc.
Mission Hills, California

INTRODUCTION, Dr. Nicholas R. Hild, Center for Environmental Studies, Western Waste Exchange, Arizona State University, Tempe, Arizona

This is the third in a series of National Waste Exchange Conferences. We have all gathered with the fervent hope that what we have begun will grow into a formal consortium of exchanges, not only within this country but internationally. Dr. Roy Herndon points out in his paper that there have now been more waste exchanges that have gone out of business than currently exist. Yet, the reasons for the existence of waste exchanges have never been more apparent or necessary.

Bill Stough, Director of the Great Lakes Regional Waste Exchange Service, points out that "efforts undertaken during the year to reduce volume and toxicity of waste generated (for all RCRA Hazardous Waste Generators under Section 3002 Waste Minimization requirements) may, in part, be satisfied by documented use of Waste Exchanges." He has a letter from former EPA Office of Solid Waste Director, John H. Skinner, supporting this statement.

If more reasons are necessary for the continued existence of waste exchanges, consider that more than 130,000 small quantity generators fell under regulation in March 1986, with few options for disposing their wastes, that cannot be improved upon via use of waste exchanges. Indeed, as indicated by several paper presentations in these proceedings, even the EPA has begun to actively encourage and advertise exchange services, not to mention that many of the funds necessary for continued operation comes from various EPA grants. RCRA Hot Line, as Jim Ginley our featured speaker notes, has actively referenced inquiries to exchanges throughout the United States.

So where does all of this lead? For most of the participants, the news that waste exchanges serve a vital role in the search for alternatives in our "throw-away" society is not new. We do, however, need to do a better job of spreading the word to "the rest of the world." That is where this international gathering can have an impact. As a conference of like-minded individuals, we meet yearly to renew old friendships and review the past year's achievements, looking forward to next year's conference when we can do it all again. But, the time has come to become a formal association of professionals in order to move forward and take our place as part of the waste management alternatives our nations so desperately need.

We need to be addressing issues of federal, state, and local legislation that impede the opportunities for recycling. We need to be addressing issues of how the consortium of

exchanges can become actively involved with EPA, and even Congressional subcommittees, to ensure that adequate monies are available to continue the much needed services we provide. We need to jointly become a voice for change in the way the general public views wastes, by showing how much is not being thrown away where it can become a health or environmental problem years later. The volumes of wastes recycled via exchanges, after all, are impressive if only the numbers can be highlighted and publicly displayed.

Writing in the New York Times (December 8, 1985), Dr. George W. Tessel who is Program Director for Informal Science Education at the National Science Foundation recently said:

> ....Despite the fact that we live in an age of technology - when every new car has a small computer to control the ignition and every newspaper contains articles about toxic chemicals and nuclear safety - most people are essentially unequipped to read and understand these articles. And most people are fashionably proud of it....

It is important to realize that Dr. Tessel's comments are relevant to the highest office holders in our land, just as they are to common citizens who speak their minds by their votes at election time. If we are ever to impress the powers who control the purse strings with the gravity of our waste problems, then we must first educate the fashionably proud who have neither the knowledge nor inclination to learn about waste exchanges. As an association, we have the power to not only be heard but to be understood. As individuals, we fight an uphill struggle for our existence that deficit-cutting administrators have not even realized existed.

It is encouraging to see so much energy and vitality represented in these proceedings. It is our hope that it can be directed and channeled into every corner of bureaucratic awareness so that we become a more viable alternative than waste-disposal sites and much more respected. Let us hope that with our efforts here, next year's conference finds more exchanges in existence rather than fewer. But, most of all, let us hope that our message is presented clearly and appropriately to everyone that hears our unified plea: Waste exchanges are a viable necessity in the scheme of alternative technologies that help every nation's industries manage wastes.

SESSION I. IMPACT OF USEPA'S JANUARY 4, 1985 REDEFINITION OF SOLID WASTE

Moderated by Faith Gavin Kuhn, Executive Director, National Association of Solvent Recyclers, Hazardous Waste Service Association, Washington, D.C.

EPA'S DEFINITION OF SOLID WASTE: PROBLEMS AND POSSIBLE MODIFICATIONS, Barry Garelick, Versar, Inc., and Robert Kerr, Kerr & Associates, Inc., Springfield, Virginia

When is a waste not a waste?

The Environmental Protection Agency (EPA) attempted to answer the riddle last January when it issued the final version of a revised definition of "solid waste" under the Resource Conservation and Recovery Act (RCRA). In essence, the EPA regulation holds that for a material being recycled, one must know both what the material is and how it is being recycled before determining whether it is regulated under RCRA.

The exercise is not just one of semantics or meaningless federalese. Under RCRA, hazardous wastes are subsets of solid wastes, and the outcome of the "When is...?" riddle has enormous implications under the new federal solid and hazardous waste regulatory programs.

EPA's Approach

In attempting to answer the question, EPA sought to take a reasonable position between two unsatisfactory extremes: (1) that all secondary materials being recycled are solid wastes; and (2) that none are. The original definition (adopted in May 1980) took the prior position and has essentially proven unsatisfactory to both the agency and the regulated community. That definition contained an extremely ambiguous section stating that spent materials and by-products that "sometimes are discarded" are solid wastes. This approach could allow virtually any material to be called a solid waste, it is a virtual certainty that at some time someone has discarded almost any material.

To mitigate the effect of having almost all waste materials being called solid wastes, regardless of whether or not they were recycled, EPA in May 1980 chose to limit the regulations of such wastes. Only the hazardous wastes that were listed, along with hazardous sludges, were subject to the requirements of RCRA. (A listed hazardous waste is a waste stream that appears on the EPA list of such streams, cate-

gorized by the process and industry that generate it. The list appears in 40 CFR 261.31 and 261.32.)

In 1983, EPA decided that the 1980 approach -- the limited regulation of recycled waste -- had not adequately prevented the occurrence of "sham" recycling. EPA was also aware that the vagueness of the "sometimes discarded" definition had to be eliminated. What was needed was a system that could -- through a series of tests -- tell the difference between those materials that are wastes and those that are products and regulate the wastes accordingly.

The opposite approach -- not classifying recycled materials as wastes -- was not considered an acceptable solution by either EPA or the general public. The fact that a waste material is recycled does not ensure that the environment and public health are adquately protected. The most obvious example of this is the case in which 25 barrels of dioxin-contaminated waste oil were sprayed on roads in Times Beach, Missouri.

EPA proposed a revised definition on April 4, 1983, and adopted the final version on January 4, 1985. The result was an elaborate scheme to define which materials, when handled in certain ways, are wastes and which are commodities. The answer to the "When is...?" riddle raised other questions, however, such as when is recycling not recycling, and at what point during recycling does a waste cease to be a waste?

Defining a Waste

In its preamble to the January 4, 1985 final definition of solid waste, EPA provided a precis of the definition:

> The revised definition of solid wastes states that any material that is abandoned by being disposed of, burned, or incinerated -- or stored, treated, or accumulated before or in lieu of these activities -- is a solid waste. The remainder of the definition states which materials are wastes when recycled.

The central concept in the definition of solid waste is that of "discarding" or throwing something away. Determining when something is thrown away is the major challenge in understanding the definition. The definition expands the concept of "thrown away" to include storing or treating the material if the storing or treating is being done instead of or prior to discarding, and is done to materials that are recycled -- depending upon what the material is and how it is to be recycled.

Two other concepts should be kept in mind in understanding the definition and how it works. The first is that only hazardous wastes are treated as solid wastes for purposes of the definition. The second is that the qualification of a material as a solid waste does not automatically render the activity associated with it subject to regulation under RCRA.

Recycling Activities

Four types of recycling activities are addressed in the definition: (1) speculative accumulation; (2) placement on land; (3) burning for energy recovery; and (4) reclamation. These four categories of recycling activities are divided further according to the type of material involved: spent materials; sludges; by-products; commercial chemical products; and scrap metal. Again, the recycling activities identified in the definition relate to the classification of a waste as a "solid waste," not whether it is subject to the RCRA hazardous waste management standards.

Speculative Accumulation

Material does not have to be thrown away in order for it to be a solid waste under the new definition. Instead, the material may qualify as a solid waste if it is stored "in lieu of or before" disposal.

Depending on what the material is and how it is to be recycled, storage of the material prior to recycling (if EPA regards the recycling as tantamount to disposal) may be under RCRA jurisdiction. For example, certain materials, when burned as fuels for heat recovery, are deemed to be solid wastes and are subject to regulation under RCRA. Storage of the material prior to such burning would also be subject to regulation and RCRA storage permits would be required.

What about materials that would not be considered to be "thrown away" when recycled? How are these materials viewed when stored prior to the activity? To prevent mismanagement and "sham" operations, EPA fashioned the definition of solid waste to include materials that are stored "too long." Storage for too long a period of time is viewed by EPA as indicative of a possible "sham" operation, or as raising the potential for more spills or leaks. Storage for too long is termed "speculative accumulation." If less than 75% of the material is recycled or transferred to another facility within one year, the stored material is "accumulated speculatively." This condition does not apply to waste materials that are chemical products. In such instances, EPA views these materials the same as commodities.

Because economic and other conditions may prevent a company from recycling 75%, EPA has included a means to petition for a variance. Despite that variance provision, however, the accumulative speculation portion of the definition is viewed as a disincentive by companies that may recycle some of their waste but generate very small volumes of it.

Placement on the Land

With respect to placement on the land, the "When is...?" riddle might be better stated as, "When is a solid waste not a regulated waste?" The confusion arises because some wastes qualify as solid wastes under the definition but nonetheless escape regulation (for the time being) under RCRA.

Almost all waste materials that are hazardous (according to the RCRA definition of hazardous wastes) and that are "thrown away" by placement on the land are hazardous wastes. However, materials that are commercial chemical products, and for which land application is the normal intended use of the products, are not solid wastes when placed on the land. Pesticides are an example of such products and include pesticide rinse waters. Applied to the land as normally intended for beneficial use, they are considered to be used as end products, not recycled wastes. On the other hand, mixing a listed hazardous waste with used oil and spreading it on roads to suppress dust would trigger regulation as a solid waste.

In a separate category are waste materials mixed with other substances to be used as fertilizers or used as ingredients in the manufacture of cement. Both fertilizers and cement are applied to the land. Because the waste materials are incorporated in these products, by EPA's definition they are solid wastes. Although considered solid wastes, they are not necessarily <u>regulated</u> as hazardous wastes under RCRA. Simply stated, if the waste is incorporated in a product placed on the land, the waste-derived product is not regulated if the waste has undergone a chemical reaction (bonding) and is essentially inseparable from the product.

Commercial fertilizers containing recycled materials, even if they have not undergone chemical bonding, are also exempt from regulations. They will not always be exempt, however. After study, EPA may regulate fertilizers and other hazardous waste-derived products. EPA explains in the preamble that commercial fertilizers are "fertilizers produced for the general public's use and not for the exclusive use of the generator."

Burning for Energy Recovery

Wastes burned for energy recovery are solid wastes under the new EPA definition. The exceptions to this are fuels and those materials that are commercial chemical products for which burning is the intended used.

As with materials placed on the land, materials may be solid wastes when burned for energy recovery but are not yet regulated under RCRA. EPA has, however, recently published regulations that impose limits on the contaminants for the materials burned in boilers and other energy recovery devices (Nov. 29, 1985, Federal Register). Also, the January 1985 regulations contain definitions of "boiler" and "industrial furnace" with the intention of preventing operators from claiming that they are burning wastes in a boiler that in reality serves as an incinerator. (Devices that incinerate wastes require permits and are regulated.)

One critical aspect of the burning-as-energy portion of the definition concerns EPA's distinction between burning for material recovery and burning for energy recovery. Materials burned as part of a material-recovery process (such as smelting operations) would not be deemed to be burned as fuel, provided that burning is part of the normal recovery process.

However, what happens if an operator burns a material for purposes of recovering both material values and energy? In the original April 4, 1983 proposal, EPA said it would not consider the material to be burned as a fuel. However, in the preamble to the final definition EPA took the opposite view. The outcome is that materials burned to recover both materials and energy are considered to be burned as fuels.

Reclamation

If a waste is processed or regenerated so that a usable product can be recovered, it is said to be "reclaimed." Until the reclamation is complete and the usable product reclaimed, the waste material is essentially considered to be "thrown away," and it is regulated as a solid waste. Exceptions to this provision are granted for by-products and sludges that are hazardous by characteristic (i.e., ignitable, corrosive, reactive, or EP toxic; these wastes are sometimes referred to as "unlisted," because they do not appear on the lists mentioned earlier) and for commercial chemical products. These materials were exempted because EPA felt there was no feasible way to distinguish commodity-like and waste-like unlisted by-products and sludges from commercial products that are being reclaimed.

For the most part, the reclamation "riddle" is straightforward: a waste is not a waste once it has been reclaimed to recover a usable product. What happens though, when a waste is reclaimed but requires further processing to render it usable? Strictly speaking, it is still a waste unless EPA grants a variance. The variance allows for those situations in which "just a little" bit of processing is needed to complete recovery because the initially reclaimed material is more product-like than waste-like. The criteria EPA may consider include how much processing the material has undergone and how much more is needed, and the value of the material after it has been reclaimed.

Inherently Waste-Like Materials

Certain materials judged to be "inherently waste-like" are designated solid wastes regardless of how they are recycled. In particular, the definition designates a group of dioxin-containing materials as solid wastes.

EPA may include other materials if it is shown that the materials ordinarily are not recycled on a nationwide basis, and if they contain toxic constituents at levels not found in the counterpart raw materials or products. EPA may also base the decision on whether the materials pose a substantial hazard to human health and the environment when recycled.

Materials That Are Not Solid Wastes When Recycled

When wastes are recycled by being used directly, they are by and large not defined as solid wastes, provided that the material is not reclaimed prior to or during its use. There are basically three situations in which the direct reuse of the waste is excluded from the solid waste definition:

* The material is used as an ingredient in an industrial process to make a product.

* The material is used as an effective substitute for commercial products.

* The material is returned to the process from which it was generated to be used as a substitute for raw material feedstocks.

Merely using a waste as a substitute in a commercial product may not be enough to exclude the material from the solid waste definition. The effectiveness of the material as a substitute or as an ingredient in an industrial process will be examined. EPA will consider it a "sham" if the material

is ineffective or marginally effective for the claimed use (for example, the use of heavy metal sludges in concrete).

The third condition has resulted in some confusion and could be seen as a problem in some situations. An example would be emission control dust generated by a metal milling operation. If the emission control dust were sent to a smelter for metals recovery, the dust would be deemed a solid waste because it is not returned to the original production process. Although the material can be said to be used as an ingredient in an industrial process to make a product, it has been sent to a different production process and reclaimed; thus, it is a solid waste.

On the other hand, the third condition is the only case for which EPA may allow a variance from the definition for materials that have been reclaimed and then reused within the original primary process. For such a variance to be granted, EPA must decide whether the reclamation operation is an essential part of the primary production process.

The Next Riddle

The EPA definition of solid waste does not provide an easy answer to the riddle, "When is a waste not a waste?" That definition is a complicated network of provisions, conditions, and exceptions. EPA claims that the definition is complicated because the issue itself is complicated. Some in the regulated community claim that the definition is unnecessarily complicated.

There is an element of tension between the need to write a definition that prevents hazardous wastes from escaping the regulatory system and being mishandled, and the desirability of developing a definitional and regulatory framework which does not unnecessarily discourage recycling as a form of resource conservation and waste minimization.

Recycling is one way to reduce the use of raw or virgin materials. The production of those virgin materials in itself carries the potential environmental penalties -- such as those associated with mining operations or OCS oil development.

Nor are handling problems unique to hazardous wastes. The preamble to the revised definition states, "Unless the wastes are extremely valuable...there is no imperative incentive to avoid leaks and spills" (50 FT 617). There is obviously no reason to assume, to the extent this assertion is accurate, that it must be more true of hazardous wastes used as secondary commodities than of virgin materials.

The question as to the impact that the definition of solid waste has on recycling is a legitimate environmental question. While it is necessary that the rules for defining and regulating wastes be sufficient for protecting the environment, complexities and limitations that are not completely necessary could hamper the operations of a recycled materials market. That market already faces some attitudinal barriers. Many companies see wastes only as wastes, not potential secondary commodities. Even where the potential of a secondary commodity market has been recognized by the creation of a special marketing unit, operating units of companies may simply want to get rid of the materials they have finished with as quickly as possible. This can make the actual development of a secondary market extremely difficult.

Changes made from the proposed definition (48 FR 14472, April 4, 1983) to the final definition (50 FR 614, January 4, 1985) considerably restrict the classes of materials that could escape regulation. As explained in the preamble to the final rule:

> In determining the level of regulation to adopt for those facilities which would have been conditionally exempt, the Agency is guided by the principle that the paramount and overriding statutory objective of RCRA is protection of human health and the environment. The statutory policy of encouraging recycling is secondary and must give way if it is in conflict with the principal objective.

The question is whether there might be changes to the definition which would provide greater encouragement for recycling without increasing risk to human health or the environment. In some cases, even greater clarification of intent might alleviate some of the concerns of generators, reclaimers, or state regulatory officials.

With a regulation as complex as the definition of solid waste, the clarity of decision rules can be of major importance. Clarification of the relationship of "treatment" and "reclamation" with respect to regulatory requirements, for example, is an area that has caused a degree of confusion for some generators and state officials. Misinterpretations by state regulators can be particularly important if embodied in state regulations. At a recent state/EPA conference on waste reduction, incidents of this kind were discussed by state officials. The more conjectural the interpretations of states or generators as to meanings and requirements under the regulation, the greater the scope for unexpected and unintended results.

Beyond issues of clarification, there are also substantive questions. Under what circumstances, might it be preferable

to increase the range of recyclable materials, based on equivalence with nonwaste materials or unregulated wastes, which could be less stringently regulated?

Clarification of Relationship of "Treatment" and "Reclamation"

As noted above, the process of reclamation itself is unregulated. Thus the fact that a facility carries on reclamation does not subject it to a requirement to obtain a TSDF permit. What it means for a material to be "reclaimed" is defined in 40 CFR 261.1(c)(4):

> A material is "reclaimed" if it is processed to recover a usable product, or if it is regenerated. Examples are recovery of lead values from spent batteries and regeneration of spent solvents.

"Treatment" is defined (40 CFR 260.10):

> "Treatment" means any method, technique, or process including neutralization, designed to change the physical, chemical or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste nonhazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

From discussion with both generators and state officials, it appears that there is some concern as to the intended relationship between these two concepts. In particular, there appears to be concern that the intent of the definition is to leave "reclamation" unregulated only when "reclamation" can somehow be considered not to constitute "treatment." Since it seems reasonably apparent from the two definitions above that "reclamation" is simply a subset of "treatment," the concern of these individuals is that while "reclamation" as such may not be regulated, "treatment" is regulated, and that facilities involved in "reclamation" will be subject to TSDF permit requirements because they are carrying out "treatment." What results from such a reading of the regulations is some rather creative efforts to attempt to distinguish some elements which would differentiate "reclamation" from "treatment," in order to find some room for "reclamation" activities that would not be regulated as "treatment." As is apparent from the preceding definition, such an effort is likely to produce much frustration, and to discourage generators from undertaking recycling activities which they believe will subject them to TSDF permit requirements for "treatment."

An alternative reading, which leads to less apparently contradictory results, is that "reclamation" is intended to be entirely a subset of "treatment," but that "treatment" activities constituting "reclamation" are unregulated. This appears to be the intention of the discussion of "recyclable materials" in 40 CFR 261.6.

If the alternative reading is the correct one, the addition to the regulations of a paragraph which specifically spells out this relationship would be extremely helpful in eliminating frequent current misapprehensions among those states and generators attempting to apply the definition, and would eliminate an unintended disincentive to recycling.

If, however, there is intended to be a category of "reclamation" independent from "treatment," the distinction should be spelled out. In this case, consideration might be given to adopting a schema under which all "reclamation" is excluded from the requirement of permitting for treatment facilities, since this would help to remove what would otherwise constitute a major barrier to recycling.

Greater Use of Concept of "Equivalence" in Determining Which Recycled Materials Should Be Subject to Regulation

The final rule on the definition of "solid waste" establishes some conditions under which recyclable materials may be excluded or exempted from regulation. These rules are substantially different from, and more restrictive than, those proposed in 1985. It might be reasonable to exclude from the definition or exempt from regulation additional materials. Possible examples would be recycled materials regulated under the new definition that are equivalent either to (1) virgin materials or (2) other recycled materials that would be exempted or excluded for a similar use. Such materials would, of course, have to meet appropriate conditions, such as the existence of potential buyers or users, to demonstrate the recycling was genuine. A number of operational conditions are mentioned in the preamble (50 FR 638).

Various alternative ways in which consideration of "equivalence" might reduce barriers to recycling include:

* Recycled materials that are reclaimed only in the course of the industrial process in which they are being reused could be excluded from the definition regardless of whether they are returned to the original production process. Alternatively, they could at least be exempted from regulation. If the material is being reused in the course of an industrial process, it is not entirely clear why there should be a

distinction based on whether that process does or does not make use of the material in a manner that could be described as reclamation. If the material is used as a feedstock without any previous steps of reclamation, it is certainly arguable that it is a commodity-like material.

An exemption for material reclaimed in an industrial process would fall between the position in the proposal and the decision in the final rule. Reclamation of a material prior to use as feedstock in an industrial process would cause it to be regulated (as in the final rule). An exemption would apply to reclamation occurring as an integral part of the industrial process (as required in the proposal).

* In lieu of the above, materials that are recycled through reclamation could be exempted from regulation when reclaimed by the generator for use in any process at the plant site at which it was generated (even if not in the original production process).

* Materials reclaimed prior to return to the original process could be exempted. In the preamble, EPA explains that it was intent on eliminating the exemption for "operations where the reclamation step is less and less directly related to the principal production process." In particular, the Agency was concerned that "companies might seek to avoid regulation by reclaiming some small increment, and returning the increment to the original production process." This problem might be avoided by defining minimal levels of recycling through the original production process which would have to be met to be eligible for the exemption.

* Materials that are reclaimed under batch-tolling agreements, or similar leasing or processing agreements, could be exempted from regulation providing that a daily log of materials processed under such contractual agreements, at both the generator and the reclaimer, met sufficiently rigorous standards. Reclaimers with such contractual arrangements would be subject to inspection, whether or not they were TSD facilities. Time limitations could be the same as in the proposal (recyclable wastes sent to the reclaimer within 180 days; reclaimed materials back to the generator within 90 days).

* With respect to recyclable materials used in a manner which constitutes disposal by being placed on the land, commercially sold waste-derived fertilizers are exempted under the final rule. That same fertilizer if produced for the generator's own use would be regulated. It might be equivalent to one sold commercially even if, in a particular case, that fertilizer were not sold to the public. Similar consideration could be given to other substances used in conditioning soil, such as soil stabilizers.

EPA points out that the definition contains built-in incentives to use or reuse waste materials directly as substitute ingredients or feedstocks. However, there is some indication from recyclers and waste-exchange operators that there is precious little opportunity to use or reuse a waste material directly; some amount of processing must usually be undertaken to render the material suitable for its subsequent function. Although the preamble of the EPA regulation provides some guidance on what does and does not constitute reclamation, many other instances are not covered. Is skimming reclamation? Is settling? Is evaporation?

To the extent that, instead of clear, generic decision rules, case-by-case exemptions become an important vehicle for decision making, resolutions may come to depend less on logic than on political power. Given that the definition is purported to be true to the intent and thrust of RCRA itself, many of the inequities and biases perceived to be in the rule may in fact stem from the statute. For example, a storage tank containing virgin trichloroethane for use in manufacturing is not subject to the same requirements as a storage tank containing spent trichloroethane to a solvent-recovery facility.

The next riddle to be answered will most probably have to do with the extent to which the RCRA law itself, and EPA's interpretation of it, will allow a common-sense attitude to prevail in detecting sham operations. In the interim, there is likely to be a good deal of confusion and recycling opportunities foregone.

SESSION II. STATE SUPPORT FOR WASTE EXCHANGE AND RESOURCE REUSE

Moderated by William Stough, Director
Great Lakes Regional Waste Exchange
Grand Rapids, Michigan

STATE CAN REDUCE GENERATOR LIABILITY BY PROVIDING INDUSTRY WITH TECHNICAL ASSISTANCE, William Stough, Waste Systems Institute, Great Lakes Regional Waste Exchange, Grand Rapids, Michigan

Introduction

The demarcation line between solid waste and hazardous waste is rapidly decreasing. The Environmental Protection Agency's (EPA) recent Redefinition of Solid Waste and Congress' Reauthorization of the Resource Conservation and Recovery Act (RCRA), are a few of the major actions that have dramatically increased the pressure on business and industry to alter their waste management practices. This is especially true for the up to 1.5 million small- to medium-sized firms across the United States that have little previous experience with waste management regulations. Many of these new demands have left the overwhelming majority of solid and hazardous waste generators desperately seeking new options that are cost effective.

To help relieve the pressure, there is a growing recognition among many states that if new waste-management regulations are to be effective, technical assistance must be available to business and industry to facilitate compliance. An essential element in this movement is the knowledge that if compliance costs are to be lowered, business and industry must reduce the quantities or degree of hazardous wastes generated. In order to reduce the quantities or degree of hazard of wastes generated, the application of technology is required. New technology is constantly working to recover hazardous constituents to improve production processes, or substitute less hazardous raw materials. Some states have taken the lead in transferring information and technology to business and industry in order to speed up the conversion from old management practices to newer less costly, yet more efficient, technologies.

Background

The incentive for business and industry to comply with new regulations designed to protect public health, safety, and the environment is embedded in the evolution of RCRA's (P.L. 94-580), original legislative intent, better known as the

generator's "cradle-to-grave liability." In 1976, Congress enacted RCRA as an amendment to the federal Solid Waste Disposal Act. Before this, there was no federal regulation on the management and disposal of solid or hazardous waste. RCRA established a comprehensive "cradle-to-grave" system for the regulation of hazardous waste. Responsibility for managing the new system was given to the EPA through adoption of detailed regulations governing the generation, transportation, treatment, storage, and disposal of solid and hazardous waste.

One of the primary reasons waste disposal problems exist today is that in the past there was no straightforward chain of responsibility for hazardous waste management. Once hazardous waste was removed from the site of generation it was forgotten about. Under RCRA, however, the luxury of a hazardous waste generator washing his hands of responsibility once it leaves his facility is a thing of the past. Section 7003 of RCRA allows EPA to bring suit in Federal District Court to restrain any person contributing to the handling, storage, treatment, transportation, or disposal of solid or hazardous waste that threatens public health or the environment.

Even though RCRA and numerous pieces of state legislation were being developed to address the elimination of future contaminated disposal sites, there were no mechanisms available to fund cleanup for the mounting number of problem sites being identified nationwide. In 1980, Congress passed the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), which had as its centerpiece, the Hazardous Substance Response Fund, commonly referred to as "Superfund" (P.L. 969-510 of 1980, as amended).

The key link between Superfund and RCRA focuses on generator liability. Superfund establishes a system of cleanup remedies available to the federal government, states, and private citizens for release or threatened release of hazardous substances into the environment. EPA has been very successful in the federal courts by using the liability mechanism of Section 107 of CERCLA. Far-reaching decisions have been made concerning "mistakes of the past." To date, the federal courts have held that liability under CERCLA can be: (1) retroactive; (2) strict (without regard to fault); (3) joint and several; (4) regardless of proof of the cause of release; and (5) derivative, placement of liability on responsible shareholders, officers, directors, and successors-in-interest.

Decisions regarding liability have gone beyond traditional disposal practices such as leaking landfills. It now extends liability to any facility from which a release is occurring or is threatened. With certain exceptions relating to marine vessels and the cost effectiveness of the

selected cleanup remedy, there is no monetary limit on the extent of liability which may be imposed (Polito et al. 1985).

As the expiration date of RCRA neared, Congress began looking into the issues that would affect its re-authorization. The result of their investigation led to the passage of the only major piece of environmental legislation during the 98th Congress. Signed on November 8, 1984, the re-authorization of RCRA contained many new requirements aimed at controlling mismanagement, including a general phase out of landfilling for many hazardous wastes (Hazardous and Solid Waste Amendments, P.L. 98-616 of 1984). It required generators, transporters, and treatment, storage, and disposal facilities to not only ensure their own compliance with the rules but, in effect, monitor regulatory compliance by others over whom they have no legal or other authority to reduce their potential liabilities.

The burden of verifying that other parties are following the law fall on generators of hazardous wastes more than any other part in the RCRA/Superfund "cradle-to-grave" management system. The generator has the most to lose if a transporter or treatment, storage, or disposal facility intentionally or unintentionally fails to manage the waste properly and legally.

Under the cost-recovery provisions of Superfund (Section 107), numerous federal court decisions have affirmed EPA's right to collect all costs of removal or remedial action at a contaminated site from past and present owners and operators of the site, in addition to generators and transporters who contributed to the site (Stough 1984).

Other environmental regulations are compounding industry's need for technical assistance in the form of general information, onsite consulations, and long-termed applied research:

* By May 1986, owners of underground storage tanks were required to be registered, and owners must begin complying with a major federal regulatory effort to control leaking tanks;

* by May 1986, companies that handle hazardous substances must have begun complying with federal Right-to-Know regulations requiring labeling and training for employees;

* starting now and extending over the next several years, smaller businesses will have to begin complying with pretreatment regulations that will control the amount of waste material

that can be discharged into publicly owned sewer systems;

* air pollution control and surface water discharge laws are becoming more strict and are beginning to be applied more and more to "minor dischargers"; and

* industry must begin to certify that they have undertaken programs to minimize the volume and toxicity of waste generated.

The cumulative impact of these new requirements have started to exceed many firms' ability to comply in a timely manner. However, given the burden of liability placed on generators of hazardous waste, there is a compelling desire by many firms to obtain low-cost assistance to improve their waste-management practices.

Conclusions

Several states have responded to this "compliance crisis" by establishing various programs and/or providing monies to promote hazardous waste minimization. Currently, there are at least 24 states that offer informational programs that support some aspect of waste exchange or resource reuse (Versar, Inc. 1985). At least 15 of the following states offer technical assistance programs, or support waste-exchange activities (see * in Table 1). Table 1 provides an overview of the states that offer programs.

TABLE 1

WASTE MINIMIZATION INFORMATIONAL PROGRAMS

Alabama	*Maryland	*North Carolina
*California	Massachusetts	Ohio
*Florida	Michigan	*Pennsylvania
*Georgia	*Minnesota	*Tennessee
*Illinois	*Missouri	Texas
*Indiana	*Montana	Utah
Kansas	*New Jersey	Washington
Louisiana	*New York	*Wisconsin

While each program is unique in its attempt to assist industry, they all share the common objective to reduce the quantity of hazardous waste generated at a reasonable cost to industry. As reported in the National Research Council's report, "The number of industrial processes generating haz-

ardous waste is large, and technical approaches to reducing waste generation are many and varied." In some cases, sophisticated firms have made substantial reductions in quantities of hazardous waste generated. But for the large majority of firms that do not have the resources to implement sophisticated reduction programs, some states are providing assistance. As the differences between solid and hazardous waste continue to become smaller, technical assistance provided at the state level encourages business and industry to implement new management options that will reduce their operating costs. This, in turn, will reduce the state's financial liability for future cleanups through prevention.

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THE ROLE OF THE MINNESOTA TECHNICAL ASSISTANCE PROGRAM IN HELPING MINNESOTA BUSINESSES IMPROVE THEIR HAZARDOUS WASTE MANAGEMENT

THE ROLE OF THE MINNESOTA TECHNICAL ASSISTANCE PROGRAM IN HELPING MINNESOTA BUSINESSES IMPROVE THEIR HAZARDOUS WASTE MANAGEMENT, Donna Peterson, Technical Assistant, and Cindy McComas, Director, Minnesota Technical Assistance Program, Minneapolis, Minnesota

Direction for the establishment of Minnesota's Technical Assistance Program (MnTAP) came with amendments to the State's Waste Management Act in 1984. The assistance provided by such a program was outlined in the legislation to include the following:

1. Outreach programs designed to assist generators in evaluating their hazardous waste generation and management practices;

2. identify opportunities for waste reduction and improved hazardous waste management; and

3. a program to disseminate information about hazardous waste reduction and management methods.

In the amendment, this direction was given to the Minnesota Waste Management Board. The Board is the primary agency in Minnesota charged by the Legislature with responsibilities for planning for solid and hazardous waste management in the state. The Waste Management Act in Minnesota, as initially passed in 1980, listed the following specific goals relating to management of hazardous waste:

1. Reduce hazardous waste generated;

2. separate and recover materials and energy from hazardous waste;

3. reduce indiscriminate dependence on land disposal of waste; and

4. provide for orderly and deliberate development and financial security of waste facilities, including disposal facilities.

The Waste Management Board, created by this Act, was given the responsibility of pursuing these goals. The Act delineated a strong role for the Board in siting suitable areas in the state for processing or disposal facilities, with the hope that this would make development of facilities by private enterprise easier.

The Waste Management Board has attempted to set policies and develop programs consistent with the goals outlined in the Waste Management Act of 1980. Therefore, in establishing its policies for hazardous waste, the Waste Management Board has outlined a criteria of management preferences. Waste reduction is given top priority, followed by resource recovery and recycling, waste treatment, and disposal is given the lowest preference. Providing possibilities for hazardous waste generated in Minnesota to be managed in Minnesota is a long-termed goal of the Board.

Management options or possibilities are not an issue, however, if the waste is not even generated. That the highest priority is given to this goal is easy to understand. Policy statements of the Board individually address waste reduction and resource recovery. Policy statements regarding these items, recommend that the state encourage research and development of appropriate technologies. The Board's policy statements further state that while information options should be made available to individual companies, choices for waste reduction or resource recovery should be decisions made by the individual generators.

Information and possibilities to reduce or recycle waste can be readily accessible and, yet, not appropriated by industry if other factors at a state or federal level do not encourage this. In Minnesota, aside from costs associated with transportation and processing or disposal and unknown liability, there are two other costs associated with hazardous waste generation. Generators of hazardous waste pay fees based on volume and number of hazardous waste streams. These fees are collected to offset some of the costs of the regulatory program, which is carried out by the Minnesota Pollution Control Agency. Generators also pay taxes on volume of hazardous waste generated. Waste that is reused or recycled is exempt from the tax, while waste that is land disposed is taxed at a rate of 32 cents per gallon. Tax rate differences is one way the state encourages companies to review their management methods. Tax revenues are used to fund cleanups at hazardous waste sites in Minnesota.

As stated earlier, a primary task of the Waste Management Board is to help in siting hazardous waste facilities in Minnesota. By 1984, the Waste Management Board had compiled an inventory of 21 sites suitable for processing facilities. However, it had also set aside the task of identifying disposal sites both because of strong citizen opposition and the uncertainty as to the need for such a facility. Once siting was no longer an exhaustive task, the Board could devote more attention to efforts to reduce, recycle, or treat Minnesota's hazardous wastes. Likewise, Minnesota businesses were seeking help in cutting their hazardous waste costs. A company incentive to reduce costs associated with hazardous waste management makes the assistance that can be provided by a technical assistance program valuable.

Therefore, one of the recommendations to the Legislature from the Waste Management Board in 1984 was a program to provide technical assistance to hazardous waste generators in the state. While a directive for the program was an emphasis on waste reduction, keeping with the Board's priority, a realization existed that the highest goal was not always attainable. Helping industry improve their hazardous waste management and reducing their dependence on land disposal are worthwhile accomplishments. Along with providing approval for start of the Minnesota Technical Assistance Program in 1984, the Legislature also approved $150,000 for waste reduction grants and $350,000 for processing grants. Resource recovery or recycling projects along with treatment projects were eligible for processing grants. The funding from the Legislature for setting up the Technical Assistance Program was $110,000.

While the 1984 Legislature allocated a specific level of funding for the Technical Assistance Program, the 1985 Legislature appropriated a lump sum of money to the Waste Management Board. This allowed the Board to establish the

funding level for each of its programs for the next two years.

For our present year, which will end on June 30, 1986, the Board's allocation has been $180,000. It is now assured the Board's allocation for our program will be at a comparable level for the second year of the Legislative biennium. The total funds allocated for the waste reductions grant program and the processing grants program is $205,000.

Once the Legislature appropriated funds for the program, the question of where the program should be located had to be answered. Many legislators and members of the Waste Management Board felt strongly that it should not be identified with the Regulatory Agency in the state. The University of Minnesota seemed to offer many advantages for such a program and, after due consideration, the decision was made to locate the program at the University of Minnesota with a direct grant to the University for the program. The program is located within the Division of Environmental Health.

The Minnesota Technical Assistance Program currently has two professional positions and one clerical position. This has remained constant since the beginning of the program in late 1984. However, there is hope of adding a third technical person to the staff in the next fiscal year.

Helping Minnesota's industry achieve improvements in hazardous waste management in a broad sense is what our program seeks to accomplish. While promoting waste exchange or recycling are not spelled out as specific directions, opportunities occur to address these options.

We respond to the industry's needs in hazardous waste management by:

1. Responding to telephone inquiries.

2. Conducting onsite visits to evaluate compliance with hazardous waste regulations and offer suggestions for other options in hazardous waste management.

3. Providing information about a variety of items related to hazardous waste management, including lists of laboratories for testings; sources of equipment for waste recycling or treatment; and literature pertinent to a treatment or recovery process.

4. Conducting seminars for industry-specific groups or community or business groups on waste reduction options and regulatory updates.

5. Providing engineering interns to individual companies to address a waste-reduction problem at that company.

6. Offering research grant money to find solutions to hazardous waste management needs faced by small quantity generators.

A large part of our work is involved in responding to telephone inquiries. We have a toll-free line to make it as easy and economical as possible for a company anywhere in the state to contact us. The 40 telephone inquiries a month cover a broad range of questions. A request may be for information helpful in treating a given waste to equipment possibilities for recycling a solvent. Another company may be trying to determine which wastes they have that are hazardous. Inquiries include requests from companies for assistance in finding a user for material that is no longer useful or needed by them. While we have no official mechanism, we have drawn on previous contacts or knowledge of other industry groups to provide possible contacts. Referrals to waste exchanges in neighboring states are also made.

If waste exchange is used in a broader sense, many additional inquiries would be included. A number of generators are seeking out companies to process their waste, particularly for metals recovery. As time permits, we compile lists of companies that can be contacts for various kinds of reclamation -- from metals to paints to solvents.

If we review the requests we have had for assistance, at least as many requests have been for assistance with resource-recovery concerns as for assistance with waste-reduction concerns. Why this is so may be found by evaluating the size of Minnesota's generators. Minnesota is a state with a large number of very small generators (one to five drums per year). For a small business, improvements in waste management are likely to mean increased management by resource recovery in contrast to waste reduction. A small business lacks funds for equipment modifications or changes, and most likely lack qualified personnel and time to evaluate alternate processes. For these companies, providing information about resource recovery reflects the most realistic approach. Our assistance may include addressing possibilities for either offsite or onsite resource recovery.

Developing a formal waste exchange in Minnesota is not currently outlined as a goal or activity of our program. However, it is identified as a component to incorporate into the program in the near future. If a third technical person is added to the staff during the next fiscal year, one responsibility for that person will be to evaluate the benefit of adding an element of waste exchange to the Minnesota Technical Assistance Program. A question that must be

answered is how to set up a program that can best benefit Minnesota business. Enhancing waste exchange opportunities with existing waste exchanges in Illinois and Michigan by expanding distribution of their waste exchange newsletter is one method that has been proposed.

In conclusion, the overriding goal of our program is to help Minnesota's industry minimize dependence on land disposal for hazardous waste and to lessen costs and liabilities associated with hazardous waste management. To accomplish this we address a wide spectrum of options. Resource recovery and waste exchange are often the best choices.

THE NORTH CAROLINA POLLUTION PREVENTION PAYS PROGRAM: 1985 SUMMARY AND STATUS, Roger N. Schecter, Director, Raleigh, North Carolina

North Carolina is a national leader in implementing a Pollution Prevention Pays Program. With the support of business and environmental leaders, state government has adopted this waste-reduction philosophy as the major policy for environmental protection to reduce hazardous wastes and other forms of pollution. The simple principle is that reducing and preventing wastes pays off, both economically and environmentally. The goal of the program is to find and promote ways to reduce, recycle, and prevent wastes before they become pollutants. The prevention effort addresses water and air quality, toxic materials, and solid and hazardous wastes.

Many North Carolina firms have found a solution in the pollution-prevention-pays concept. These firms have used techniques such as volume reduction, production process modifications, recovery, and reuse to reduce their overall manufacturing costs. They are saving thousands of dollars each year in waste management, disposal, and raw material costs.

In 1983, the state established the Pollution Prevention Pays Program to help North Carolina industries and communities reduce waste generation. The program, in the Department of Natural Resources and Community Development, is the leading state agency for waste reduction efforts. Cooperating agencies include the Hazardous Waste Management Branch, Governor's Waste Management Board, and North Carolina Board of Science and Technology. The Pollution Prevention Pays Program draws together efforts to reduce pollution across the state through technical assistance, research and education, and financial assistance. Key elements of the program are described below. For additional information and assistance, please contact:

Pollution Prevention Pays Program
North Carolina Department of Natural Resources
and Community Development
P.O. Box 27687
Raleigh, North Carolina 27611-7687
Telephone (919) 733-7015

Technical Assistance

Information Clearinghouse

A growing information database in the pollution-prevention library provides quick access to literature sources, contacts, and case studies on waste-reduction techniques for specific industries or waste streams. Over 1,200 references on waste-reduction methods have been identified and organized by industrial category. Information is also made available through customized-computer searches of literature databases. This provides access to current national and international literature on pollution-prevention techniques specific to the problem area.

The Information Clearinghouse also has access to universities, trade associations, industries, research laboratories, and government agencies that can provide additional technical, economic, or regulatory information. This network includes contacts at state, federal, and international technical assistance and research organizations.

Reports on waste reduction published by program staff are available through the Clearinghouse. Reports include: Pollution Prevention Bibliography of literature organized by industrial category; Accomplishments of North Carolina Industries provides case summaries of the technical and economic aspects of pollution-reduction programs undertaken by North Carolina industries; Directory of North Carolina Resource Recovery Firms lists firms that purchase waste products for reuse; and A Handbook of Environmental Auditing details successful auditing programs used by North Carolina industries. A series entitled "Pollution Prevention Tips" provides technical and economic assessments of pollution-prevention methods for specific industries such as textiles, electroplating, and furniture manufacturing. Additionally, the program makes available handbooks developed in conjunction with workshops on pollution prevention for specific industries or waste streams. Examples include Managing and Recycling Solvents, Managing and Minimizing Hazardous Waste Metal Sludges, and Managing and Recycling Solvents in the Furniture Industry.

During 1985, the Pollution Prevention Pays Program staff responded to an average of 75 telephone calls and letter requests each month for general information and literature.

Staff also prepared detailed information packages to over 25 industries and communities. These information packages included copies of references, case studies, contacts, and computer literature searches covering textiles, food processing, metal finishing, microelectronics, laundry, furniture, and municipal waste-water treatment.

Onsite Technical Assistance

Comprehensive technical assistance is provided directly through a visit to a facility. During an onsite visit, detailed process and waste stream information is collected and plant personnel are consulted on current management practices. Information is analyzed and a series of waste-reduction options for each waste stream is identified. A short report outlining the management options is prepared for the facility which includes a preliminary assessment of reduction potential and economics. The report package includes all supporting documentation such as literature, contacts, case studies, and vendor information.

In 1985, the Program staff provided onsite technical assistance to five firms. Onsite visits addressed such waste streams as cooling oils, metal-contaminated waste water, oil waste water, high BOD wastes, acids/bases, metallic sludges, and solvents.

Outreach

Presentations on pollution prevention are given to trade associations, professional organizations, citizen groups, universities, and industrial workshops. Depending on the audience, these programs range from an overview of the state's Pollution Prevention Pays Program to in-depth discussions of specific technologies. The staff presentations provide information on the concept of pollution prevention, how it can be applied, and how to get assistance to carry it out. Additionally, a 10-minute slide/tape program, which provides an overview of the state's pollution-prevention-pays effort, is available to citizen groups, clubs, and business organizations.

As part of the outreach effort, the staff made presentations to almost 30 meetings in 1985. The staff also prepared numerous articles for newsletters and journals in North Carolina to further disseminate information on pollution prevention.

Research and Education

Research

The State of North Carolina is very active in pollution-prevention research and education. Research and education projects are funded through the North Carolina Board of Science and Technology with staff assistance from the Pollution Prevention Pays Program. Grants are made available to sponsoring universities and institutions for projects that address the application of pollution-prevention techniques to reduce the generation of hazardous wastes, discharge of water and air pollutants, and use of toxic chemicals. Research and education projects are supported that address the following objectives.

* Target waste streams and industries specific to North Carolina.
* Document economic and technical feasibility of waste-reduction techniques.
* Reduce the volumes of the state's major hazardous, toxic, and water/air waste streams.
* Develop innovative approaches to environmental management.

Research projects range from in-plant demonstration projects to applied research on new technologies. Some of the recent projects include application of pollution-prevention techniques to such industries as wood preserving, chemicals, electroplating, textiles, food processing, and microelectronics. Projects have also addressed North Carolina case studies, toxic water-quality effluents, environmental auditing, and pollution-prevention monographs.

Education

Educational programs have been developed or businesses, communities, and citizens. Workshops on pollution-prevention techniques or specific industries or waste streams have been presented throughout the state. These include onsite demonstrations and workshops on waste minimization for solvents, waste oil, hospital laboratories, food processing, and furniture manufacturing.

Two projects are aimed at increasing educational opportunities in pollution prevention at the college level. A pollution-prevention curriculum is being prepared that can be used in engineering and industrial technology programs. An engineering intern project is being developed to place engi-

neering students with industries to help develop a waste-reduction program for the individual firms.

Financial Assistance

Challenge Grants

To help businesses and communities develop and implement waste-reduction programs, financial assistance is available through Challenge Grants. Grants provide matching funds, up to $5,000 of a $10,000 project, for the cost of personnel, materials, or consultants needed to undertake a pollution-prevention project. Projects range from the characterization of waste streams in order to identify pollution-reduction techniques to in-plant pilot-scale studies of reduction technologies. During the first round in spring 1985, 16 projects were funded, representing over $190,000 in pollution-prevention and waste-reduction efforts. These projects address wastes from such areas as textiles, food processing, hospital laboratories, paper manufacturing, solid waste, waste oil, and drinking-water treatment. Waste streams and industries addressed by projects during 1986 include electroplating, waste solvent, laboratory waste, meatpacking, seafood processing, textiles, and municipal solid waste.

Referral

The program staff can identify sources of potential financial assistance and refer firms to the appropriate state or federal agency. Several agencies, such as the Department of Commerce and the Small Business Administration, can help firms secure financial assistance through industrial revenue bonds or loans. The North Carolina Technological Development Authority provides funds for development of new or improved products, processes, or services.

Special state tax treatment is also available to firms that purchase and install resource recovery, recycling, or waste-reduction equipment. This option allows firms to deduct the cost of equipment and facilities from their state taxes and excludes the equipment and facilities from property taxes. In order to qualify for this special tax treatment a firm must obtain certification from the Department of Human Resources.

Research Support

Through the Research and Education Grants, funding is available for the investigation, development, and application of waste-reduction techniques. Research topics generated by

trade associations and industries are considered for funding through the university system. Several current research projects are being conducted with the participation of a specific industry or trade group.

National Activity

In 1985, the North Carolina Program was responsible for organizing and staffing a national forum on waste reduction called "Workshops on Implementing State Waste Reduction Programs." The purpose of the roundtable forum is to provide the opportunity to exchange information and resources in waste reduction, minimization, and prevention. North Carolina hosted the first workshop in April 1985. The second workshop was held at EPA headquarters in Washington, D.C., in October 1985, and the next workshop was scheduled in Washington with the Congressional Office of Technology Assessment in April 1986.

Budget

The 1985 full session of the General Assembly authorized annual budgets of $190,000 for the program and $300,000 for research and education for fiscal year 1986 and fiscal year 1987. Research funds are appropriated to the North Carolina Board of Science and Technology with staffing provided by the Pollution Prevention Pays Program. Additional funding of $100,000 annually through 1987 is made through the U.S. Environmental Protection Agency to support research for small business waste reduction.

THE INDUSTRIAL MATERIALS RECYCLING PROGRAM, Terence P. Curran, P.E. Executive Director, New York State Environmental Facilities Corporation, Albany, New York

The Corporation

The New York State Environmental Facilities Corporation (EFC) is a public-benefit corporation constituted under the Public Authorities Law of the State of New York. EFC is not a regulatory agency. It does not implement or enforce environmental regulations for industrial and hazardous waste management. The Corporation has been an active participant in New York State's efforts to effectively manage hazardous waste since 1977.

Under the law, EFC may plan, design, construct, and operate solid waste, hazardous waste, resource recovery, and pollution-control facilities, and conduct programs regarding

remediation of inactive hazardous waste-disposal sites. EFC also finances water management and pollution-control facilities through the issuance of industrial revenue bonds.

History of New York State Support for EFC's Programs

In 1981, New York State amended the Public Authorities Law by the addition of Section 1285-g, which established the Industrial Materials Recycling Program. The Industrial Materials Recycling Act (IMRA), passed by the State, designated EFC as the State entity responsible for implementing the program responsibilities stipulated by law. This Law mandates a program to help industry reduce, reuse, recycle, and exchange industrial materials. The State annually appropriates budget funds to provide for the support of the program.

The Industrial Materials Recycling Program

Specifically, the law calls for EFC to assist companies that generate waste by establishing and maintaining a program in which EFC:

* Reviews and compiles research and development information on methods and technologies for reducing, recycling, and disposing of industrial materials;

* researches available markets for recycled materials and prepares a list of these materials;

* develops technical reference information on methods and economic means to reduce and recycle materials and provides technical assistance to industrial clients;

* establishes and maintains a waste exchange for industrial materials available for reuse, recycling, or recovery; and

* maintains data on existing and projected production of industrial materials.

EFC also conducts a marketing program that includes promotional publications and presentations of the IMRA program to trade and other organizations. A part-time technical field representative introduces the IMRA Program to individual potential clients.

The field representative performs a variety of services. In addition to initiating contacts with prospective clients,

which supplement contacts made by other staff members, he maintains contact with and visits individual companies to become familiar with their problems. Follow-up work for a client is performed by EFC staff.

In 1984, EFC continued its waste-exchange activities, pursuing more active service to industry. The value, volume, and number of EFC's completed exchanges increased. Savings through the waste-exchange program to both generators and users totalled $360,741. Over 13,100 tons of waste were exchanged for a significant savings over the cost of disposal.

When EFC receives information concerning the availability of a specific waste, staff members judge its recovery and reuse potential. Attempts are then made to find a potential user. The work involved in completing an exchange may include technical analysis, performing testing services, and identifying markets. EFC maintains files containing lists of recyclable materials, treatment facilities, transporters, and other essential services to assist clients.

Technical Assistance and Information Services

Technical services for industrial clients continue to be an integral part of EFC's IMRA Program. Technical-assistance projects range in scope from questions that may be answered over the telephone to extensive projects requiring one or more site visits. The number of projects in 1984-85 increased nearly 500% over the number of projects completed during the first year of EFC's IMRA Program, increasing from 54 cases in 1981 to 263 in 1984-85.

EFC's services continue to be promoted in many ways: by satisfied clients, through the quarterly newsletter, by the Corporation's part-time technical field representative, and via EFC's supplement to the Listings Catalog issued by the Northeast Industrial Waste Exchange (NIWE). EFC provides the NIWE with financial support, which last year totalled $65,000. This money is used by NIWE to fund printing costs associated with publishing over 9,000 quarterly Listings Catalogs that are distributed throughout the U.S. and Canada, but primarily to New York, New Jersey, New England, Pennsylvania, Ohio, and Maryland.

As the IMRA Program began its fifth year of operation, EFC staff continued to accumulate data about generators, users, recyclers, haulers, permitted facilities, available technical services, and ongoing research activities. Information dissemination is key to the success of the IMRA Program. Technology transfer is accomplished through the use of a quarterly IMRA newsletter, special project reports, and client-specified letters of advice. EFC has also prepared a

Haulers Directory which is updated annually. It contains information compiled from a survey of permitted haulers. The information may be accessed in three ways: (1) alphabetical listing of company name; (2) waste type; and (3) geographical region denoted by telephone area codes.

Special Projects

In addition to IMRA, EFC conducts special projects which this year have included the Long Island Regional Ashfill, a Hazardous Waste Management Audit Program for Small Quantity Generators, and a Feasibility Study for a Research and Development Center for Hazardous Wastes.

Long Island Regional Ashfill

On November 1, 1985, in accordance with the Laws of 1985, EFC submitted a list of three potential ashfill sites to the Long Island Regional Ashfill Board. EFC identified these sites as having the most potential to serve the residual-ash disposal needs of the many municipal resource recovery plants planned, under design, or operating on Long Island. The Ashfill Board held a series of public meetings on the proposed sites. The Corporation has submitted a final report to the Governor and the Legislature.

Waste Management Audit Program

In August 1985, EFC was awarded an EPA grant to assist small quantity generators (SQGs) in managing industrial wastes. The 20-month program is being developed with the assistance of the Manufacturers Association of Central New York, the Northeast Industrial Waste Exchange, and the Central New York Environmental Management Council. EFC selected the Central New York Syracuse region as a study region in the state, which would serve as a microcosm of small quantity generators. This representative industrial region serves as a manageable sample size from which data about types and quantities of waste as well as waste management practices will be collected, analyzed, and incorporated in the development of state waste management for SQGs. The data compiled is expected to highlight the needs of SQGs in the state for reducing, recycling, reusing, collecting, transporting, and treating wastes.

Hazardous Waste Research and Development Center

EFC was appropriated $150,000 in the 1985-86 state budget to perform a feasibility study for a research and development center for hazardous and industrial waste. It is anticipat-

ed that the center will conduct basic and applied research on hazardous waste in the areas of source reduction, treatment, resource recovery, recycling, and other forms of waste management as well as address governments and industrial policy issues, disseminate information, and train industrial personnel. EFC contracted with the Rockefeller Institute of Government Affairs to perform the study which was released in January 1986.

Industrial Financing Program

EFC was authorized by Chapter 1046 of the Laws of 1974 to make loans to private industry for air and waste water pollution-control facilities and for solid waste-management facilities, which include resource-recovery facilities. Chapter 639 of the Laws of 1978 extended this authority to include industrial hazardous waste-management facilities. Loans may apply to both existing and new facilities and do not prohibit the loan recipient from taking advantage of accelerated depreciation deductions, investment tax credits, and energy tax credits allowable under state and federal laws. Since 1976, $123.2 million in bonds have been issued under this program, enabling industry to meet its environmental responsibilities without incurring high financing costs.

Loans are financed from the proceeds of EFC's special obligation revenue bonds. The interest on these bonds is generally exempt from New York State and Federal income taxes, resulting in lower interest rates. The bonds are not obligations of EFC nor of the State of New York and are issued on an individual company basis. An important feature of the finance program is that several environmental projects at one or more of a company's plant sites in New York State can be financed through a single bond issue. To qualify, a company must demonstrate financial ability to meet the debt service.

Provided the facility to be financed meets the requirements of the Internal Revenue Service and DEC, there is no limit on the amount of the loan, which can be for a term of up to 40 years. The loan may be used to pay for the cost of land, appurtenant buildings, equipment, and engineering as well as for design, legal, financing, and other related costs. It should also be noted that unlike local IDA bonds, ownership of the facility financed remains with the developer.

Eligible Projects

Any industrial firm (corporation, partnership, public utility, association, sole proprietorship) is eligible to file

an application with EFC for the following types of pollution control projects:

* Sewage treatment works
* Sewage collection systems
* Solid waste disposal facilities
* Resource recovery facilities
* Air pollution control facilities
* Water management facilities
* Storm water collection systems

The increasing cost of compliance with hazardous waste, solid waste, and industrial waste regulations is a growing concern in New York State. In an effort to help industry keep such costs manageable, the Corporation has provided substantial industrial bond financing for waste-treatment and waste-reduction projects. Unfortunately, because of the high transactional costs associated with this financing mechanism, only larger companies have been able to take advantage of it. Consequently, smaller companies in the State are operating at a relative disadvantage.

At the present time, the Corporation does not have an appropriate mechanism to help such smaller companies for whom bond financing is prohibitively expensive. Without the Corporation's help, such companies may find it financially impracticable to reduce or treat the amount of hazardous waste, solid waste, or industrial waste requiring disposal, thereby incurring high disposal costs and possibly running afoul of environmental regulations. This may force a company out of business, or out of the State, resulting in a reduction in the State's tax base. A revolving-loan fund that would help the Corporation debt-finance waste reduction, recycling, and treatment projects for smaller companies would signficantly contribute to solving these problems for the State.

EFC has written a 1986 legislative proposal to establish in the Corporation a $10 million revolving-loan fund to be used to debt-finance: hazardous waste, solid waste, and industrial waste reduction, recycling, treatment, and disposal projects at smaller companies.

Summary

Since 1981, EFC's Industrial Materials Recycling Program, a significant part of the State's comprehensive hazardous

waste management program, has technically assisted generators of hazardous wastes to reduce, recycle, or reuse such materials as an economically and environmentally sound alternative to disposal. Specifically, EFC conducts a program that includes the following components:

* Review and compilation of research and development information on methods and technologies for reducing, recycling, and disposing of industrial materials.

* Development of technical reference information on methods and economic means to reduce and recycle materials, and

* provisions of technical assistance to industrial clients by recommending:

  - source reduction options

  - energy recovery options

  - treatment and disposal alternatives

  - conducting waste exchanges (EFC continues to assist industries exchange wastes. In 1984, the dollar value of the total savings to operators through EFC's active waste exchange program was $360,741.)

  - providing regulatory assistance

  - researching potential markets for wastes

  - evaluating technology

  - performing technical feasibility studies

  - conducting process analysis

  - assisting with consultant selection

Through these efforts, IMRA contributes to New York State's hazardous waste management program by helping private industry find beneficial uses for its wastes while reducing the need for disposal capacity and reducing the cost of users and generators.

WASTE SYSTEMS INSTITUTE OF MICHIGAN, INC., AND STATE ROLES IN WASTE MANAGEMENT ASSISTANCE, Jeffrey L. Dauphin, Executive Director, Waste Systems Institute of Michigan, Inc., Grand Rapids, Michigan

Overview of a Serious National Problem

Over the last 15 years, environmental regulation and state and federal regulators have sought primarily to control large generators of waste and pollution. In essence, our entire philosophical approach to environmental regulation (including laws, regulations, regulators, inspection, and compliance procedures, and even industry response), has developed an orientation toward big industry and big pollution sources.

As a society, we are now poised on the threshold of a totally new era of environmental control -- the regulation of thousands upon thousands of small- and intermediate-sized businesses. Businesses and business people that, heretofore, have never even perceived themselves to be an environmental threat and hardly know the meaning of EPA, RCRA, CERCLA, waste codes, and all the other "acronymic" jargon that we have all grown accustomed to over the years.

If we are to meet this new challenge, it will demand more than just simple alterations and modifications of standard operating procedures. It will require, in most cases, a whole new way of doing business -- new methods, new sensitivities, longer compliance times, and much, much more information assistance and training.

It is important that we meet this challenge correctly and not underestimate or unappreciate the task at hand. Small- and intermediate-sized businesses are the linchpin of the American economic system, and at the same time, are the most vulnerable to new and additional costs of doing business. We must also be sensitive to the lack of understanding of these businesses when it comes to environmental regulations, and the lack of resources -- both human and financial -- that these companies have to deal with for environmental control.

Within a matter of weeks, we'll be putting into effect, simultaneously, a series of diverse regulations covering hazardous waste, underground tanks, and right-to-know, that will collectively impact hundreds of thousands of small businesses. As a nation, we have done relatively little to prepare for the inevitable chaos, hardship, and ill-feeling that these actions will cause. We must do much more if these attempts to minimize environmental contamination and health hazards are to be more than just a bureaucratic sham.

Waste Systems Institute of Michigan, Inc.

Waste Systems Institute (WSI) is a nonprofit, nongovernmental information, assistance, and research center providing programs and services in waste management, toxics, and pollution control. WSI is not an advocacy organization but instead, operates from a philosophical approach of neutrality and a high standard of technical accuracy. WSI was organized in 1980 to fill a perceived need for a neutral and accurate source of information on environmental control issues, primarily in Michigan. That perceived need proved to be true and the organization has since expanded and diversified and offers a full range of information, assistance, and problem-solving services to industry, government, and environmental professionals in Michigan and throughout the Great Lake States.

WSI has a relatively small core staff of three environmental professionals and two administrative and clerical personnel, but often leverages its staff capabilities with the use of subcontractors and technical project advisory groups of specialists in various fields. The organization is funded primarily from four sources: revenues from fee-for-service programs; private foundation grants; state and federal grants and contracts; and corporate contributions. The annual budget averages from $250,000 to $300,000.

Foundation and corporate contributions are used primarily for working capital to develop new programs designed to be financially self-supporting within a few years. State and federal grants and contracts are generally used for specialized policy development studies or specific "one-time" type projects.

The following is a summary of some of WSI's major programs and services:

Michigan Waste Report

This is biweekly news of management, toxics, and pollution control issues in Michigan covering all environmental commissions, administrative activities of agencies, related laws and regulations, and important litigation. WSI initiated this service in 1981 and the publication has become highly acclaimed by industry, government, and interest groups as the leading source of waste management news and information in Michigan. Subscription price is $200 per year and 21 issues are published annually. There are approximately 450 subscribers and readership is estimated at nearly 3,000.

Special Annual Reports

In addition to 21 regular issues of Michigan Waste Report annually, WSI publishes 3 Annual Special Reports (approximately 28 pages each, purchased separately). The Special Reports cover Hazardous Waste (January); Agencies, Commissions, and Associations (May); and Solid Waste/Resource Recovery (September). Special Reports may be purchased separately or a package rate is available.

Legislation-in-Progress

This biweekly status report, new in 1986, covers all pertinent environmental legislation in Michigan. All bills and resolutions that are introduced, action status, committee referrals, and meetings are included. This publication can be purchased separately at a yearly rate.

Michigan Waste Report Digest

This publication will become available in 1986. It will be bimonthly summaries of the Michigan Waste Report articles for those who need to be informed but do not need the level of detail and timeliness of the regular Michigan Waste Report. There will be six issues per year at $85 per year; charter rates available in 1986, at $65.

Great Lakes EXCHANGE

Formerly Great Lakes Waste and Pollution Review Magazine, this bimonthly publication includes national and regional news of waste management, toxics, and pollution control; Technology Exchange, highlighting important technology developments and technical assistance programs; and published listings of the Great Lakes Regional Waste Exchange (see below). Distributed at no charge to 7,000 waste generators and managers. Display advertising and professional service listings are accepted.

Great Lakes Regional Waste Exchange

WSI initiated the Great Lakes Regional Waste Exchange in 1982 as one practical alternative service to business and industry in managing their solid and hazardous waste streams. The Waste Exchange allows users to list, at no charge, their "waste wanted" and "waste available" for possible exchange with other industries or processors in the Great Lakes States who might be in need of certain waste streams. WSI also provides computer searches and brokerage-

type services to generators attempting to find suitable disposition for their wastes.

Act 64 Legal Management System

An indexing and management system for Michigan's Hazardous Waste Management Act (PA 64 of 1979, as amended). This system contains a General Section Index, Section-by-Section Executive Summary, Keyword Index, and full text of the Act and Amendments, to date, indicating specific legislative additions and deletions by amendments. New in 1986, an indexing and easy-to-use formatting of newly effective Act 64 Rules will be added to the system. Both sections (Laws and Rules) and updating are purchased separately.

Small Quantity Hazardous Waste Management

In June 1984, WSI completed a report, "Investigations and Recommendations for a Management System for Small Quantities of Hazardous Waste from Michigan Business and Industry," under a contract with the Michigan Department of Natural Resources. The report, prepared with the assistance of and reviewed by business and industry participants, calls for an "assistance-first" approach to implementing small quantity hazardous waste regulations in Michigan. In 1985, WSI began implementation of the "assistance-first" program under a major grant from the U.S. EPA involving notification of 35,000 potential small quantity generators, preparation of informational and assistance guides and bulletins, and a series of training and assistance workshops for trade associations and generators. A notification brochure and Guidebook for Small Quantity Generators are available upon request.

Technical Information Clearinghouse

WSI maintains an extensive library of state, regional, and national information relating to waste management, toxics, and pollution control issues, plus the organization staff have a vast knowledge of resource people and materials available. Routine inquiries for general information and referrals are handled at no charge as a public service. More thorough investigative and research services are available on a fee-for-service basis negotiated case-by-case. A toll-free 800 number will be in service early in 1986 to further assist in responding to inquiries.

Waste Management Policy Development

In the past, WSI has organized and managed highly successful Thinktank Roundtables of 40-50 participants representing diverse interests, to brainstorm and develop a consensus on major environmental management policy issues. WSI also periodically conducts conferences on major policy questions. Additionally, WSI works under contract for state agencies, interest groups, or trade associations to facilitate practical and implementable policy and strategy development. WSI is currently under contract with the State Toxic Substance Control Commission to develop a set of recommendations for the Governor on Public Policy Approaches to Reduce Hazardous Waste Generation.

Professional Conferences and Technical Seminars

WSI conducts periodic professional conferences and technical seminars on various waste management, toxic, and pollution control issues, or will work with other agencies or organizations to plan, conduct, and cosponsor such conferences and seminars.

WASTE-HELP Program and Waste Vendors Job Market

A new program of WSI, initiated in 1985, is designed to provide a one-stop service for solid and hazardous waste generators and others to assist them in finding various waste management service vendors including transporters, consultants, laboratories, equipment suppliers, process modification engineers, attorneys, and others. A newsletter, Waste Vendors Job Market, will be circulated to hundreds of vendors and will contain the coded listings of "services needed" by generators. The program is free to generators, and vendors are required to pay a minimal referral fee for access to "services needed" listings.

Considerations for State Roles in Waste Management Assistance

Many states have begun to recognize, to some extent, the impending needs mentioned earlier. In response, we are seeing a variety of different developing programs to address the information, assistance, training, and research needs of primarily small- and intermediate-sized businesses. In this panel session several model state programs have been discussed, and an overview of this trend in program development.

Since Waste Systems Institute is not a state program or state-supported organization, I thought it might be appro-

priate if I attempted to briefly summarize some basic observations and "guidelines" that states and others might use when considering the development of assistance programs. These ideas are offered for further discussion and consideration by the conferees and are based on our involvement in providing information and assistance programs over the past five years.

The Importance of Neutrality

WSI believes that one of the most important aspects to the success of our programs has been the fact that we are a neutral entity in the realm of actors, and our basic mission is to provide objective, unbiased information. One of our early premises for Michigan Waste Report was that all major interest groups -- state and local government, industry, and environmental -- by in large, have legitimate and important points of view and concerns. One of the basic problems, however, is that these groups are many times only communicating to themselves through their own publications and conferences. Most attempts at cross-group communications were biased (or assumed to be biased) at the source and quickly discounted by the other groups.

The concept of neutrality may sound easy, but it is difficult to actually carry out consistently over long periods of time. Everyone has "hidden agendas," and rightfully so, but the assistance center must be impeccably neutral.

Pollution and Waste are Pollution and Waste

In our development of sophisticated and complex regulatory systems to deal with pollution control, we have trended toward developing more and more segmented administrative structures to deal with the highly technical nature of environmental control. We have air, surface water, groundwater, drinking water, hazardous waste, solid waste, resource recovery, toxics, and other departments and agencies dealing specifically with their little "niche" in the "big picture." The concept of "cross-media pollution" is a widely discussed issue these days, but what I'm suggesting here, is even more basic than that.

No matter how complex the subject matter, and no matter how many little technical sections and units we may need to deal with the problems, assistance centers and environmental regulation of small business needs give the appearance of coming from one central contact point. This central contact point must have a general technical understanding of all the "niches" and, as well, have a sensitivity toward the problems of small business. It is essential not to confuse and

frustrate the "client" with all of the details and shuffle them around from one section to another.

"Research Mania"

In our efforts to solve environmental management problems and provide assistance, it is easy to get "caught up" with "research mania." Several states, universities, and the federal government are proposing, developing, or already supporting hazardous waste or related research centers. I am not saying we do not need good basic and applied research, but we do need some overall control to avoid extensive overlapping and duplication. Good research is expensive, and we need to carefully evaluate the cost versus benefit of every research effort.

Everybody Wants a Waste Exchange

Similar to the problems of research mentioned above, there seems to be a developing trend to establish more and more state-based or substate waste exchanges. In part, this trend is appearing because the basic waste exchange concept is relatively simple and, in many cases, it may seem to be an easily implementable, low-cost response to the complex problems of waste management. Unfortunately, in some cases, starting a waste exchange is more a public relations venture than a serious attempt to resolve waste management problems.

Good waste exchanges must be well staffed and managers must be familiar with the business of waste management, limitations of waste exchange, and have a good working knowledge of technical and regulatory issues. The development of too many, uncoordinated waste exchanges could well diminish the effectiveness of the overall concept.

Isolation Syndrome

Another potential "pitfall" of various assistance programs is that, once established, there is often times an expectation (both internally and externally) that it is the "end all" solution. There is an expectation and a momentum to assume that all assistance programs must come from this "center."

One thing that WSI has learned is that there are hundreds of organization, agency, association, university, and private sector programs involved directly or indirectly in providing training, assistance, research, and information services. Many of these existing programs, if not currently focused, can be altered or modified to serve a needed purpose. It is important to have any centralized assistance effort work

extensively at coordinating with other existing programs and maximizing the effectiveness of limited financial and human resources.

Summary

The training and assistance needs of small- and intermediate-sized businesses necessary to cope with the "new wave" of environmental control are enormous. States and others involved must begin to recognize the enormity of these needs and come to the realization that traditional environmental control approaches are not going to be effective in dealing with these smaller businesses.

New and innovative approaches are necessary, and they will require extensive financial and human resource commitments that are not obvious at present. Several such innovative approaches have been outlined in this conference; all of which have merit and should be considered as alternative models, but much more remains to be done. As states and others begin to move toward development of these new programs, they must consider carefully the audience that they are intending to serve, and most avoid some of the obvious "pitfalls."

SESSION III. OFFSITE RECYCLING AND REUSE

Moderated by Margo Ferguson Sierkerka, Program Manager
Industrial Materials Exchange Service
Springfield, Illinois

RECOVERY OF POLYETHYLENE TEREPHTHLATE (PET) FROM FILM SCRAP,
James G. Burke, International Plastic Recycling, Inc.,
Dixon, Illinois

In 1982, approximately 14 million pounds of cyanide-tainted film chips were discovered at six scattered locations in the Chicago area, and in warehouse buildings near Amboy, Illinois. One death from cyanide poisoning triggered the investigation that uncovered the largest volume of cyanide-tainted material in the history of the country. The material was accumulated and stockpiled by a Chicago-based company, that was using cyanide to recover silver from the film. Richard Daly, Cook County States Attorney, later charged the officers of the company with murder and, subsequently, they were tried and convicted of the charge.

In August 1984, Decontamination Systems, Inc. (DSI), an affiliate company of International Plastic Recycling, Inc., was awarded a $3,800,000 contract by the Illinois Environmental Protection Agency to be the primary contractor, with Mid America Environmental Services, to complete the cleanup. This contract was awarded to DSI over 48 other companies, which included some of the largest hazardous waste contractors in the country. DSI engineers designed a sophisticated, highly technical treatment facility, and constructed it within 30 days. This high-volume facility essentially consisted of a tank farm, capable of storing 148,000 gallons of chemicals and liquids, together with two treatment vats each with a 50-ton load-treatment capacity.

Because a majority of the chips, 10,000,000 pounds, were at the downstate location, the facility was constructed at that site and the other 4,000,000 pounds were trucked from Chicago. There were several legal attempts to stop the cleanup because of the highly charged emotional and political situation. The entire cleanup would have been completed within 45 days without these delays.

The contaminated materials contained varying amounts of cyanide, up to 1,300 parts per million. Upon treatment, all materials met the Federal EPA established standard of less than 5 parts per million total cyanide with most of it down to zero. DSI safely and successfully completed the cleanup to the satisfaction of the Federal EPA and the Illinois EPA in October 1984. After the cleanup, due to a series of circumstances, DSI took ownership of the 14,000,000 pounds of

chips that had been trucked to an industrial park at Canton, Illinois, which is 35 miles southwest of Peoria.

Consequently, an affiliate company, International Plastic Recycling, Inc. (IPRI), was formed for the purpose of deciding whether or not to recycle the decontaminated film chips. IPRI expended much time and money on laboratory testing and international research to determine the viability of recycling scrap film. Subsequently, a chemical process was developed, a plant designed by the engineers, and the owners of IPRI made the decision to recycle scrap film. The process involves the removal of polyvinyldenechloride (PVDC), and cellulose acetate from the film, and recovering polyethylene terephthlate (PET) in a pure enough state to market. Testing, cost analysis, and market research revealed that in order to be a financially sound business proposition, IPRI would have to treat huge volumes and obtain scrap film from the silver-recovery companies for not much more than paying to truck the film from the generator's location.

Market research revealed that, for the most part, scrap film is being buried or incinerated at great expense to the environment and the silver-recovery companies. IPRI has found, with assistance and suggestions from Margo Ferguson Sierkerka, Program Manager, Industrial Material Exchange Service in Springfield, Illinois, that there was a great deal of interest by the scrap-film generators in having IPRI take their film.

In August 1985, construction of the plant was started in Canton, Illinois. The company was given a great deal of encouragement and assistance by city officials, Richard Carlson and Del Haschemeyer, Director and Deputy Director of the Illinois Environmental Protection Agency, respectively, and Governor Jim Thompson, who was determined to see something positive result from the negative cyanide chip episode. The plant is being constructed to treat 3,000,000 pounds of scrap film per month, with the option to increase production by one-third.

It is anticipated that construction will be completed in March of this year and recovery of PET from scrap film will commence in April. Once all of the start-up problems have been resolved, and the plant is in full production, IPRI management will conduct further research on recycling plastic packaging material and polyethylene chemical containers.

SOURCES AND USES OF VEGETABLE OIL BY-PRODUCTS IN THE UNITED STATES: AN OVERVIEW, Jonathan C. Arundale, Byproduct Chemical Reclamation, Inc., Aurora, Illinois

Introduction

Vegetable oil by-products are generated throughout the vegetable oil processing, transportation, and oleochemical industries. Because of the diversity of uses for vegetable oil, many of these by-products can be utilized as the raw stock for production of additional finished products. For the purpose of this paper we will also consider off-spec and contaminated oils as by-products. Due to the broad nature of this subject, only a general overview will be attempted.

The Refining Process

The most common method of refining vegetable oil is the continuous, centrifugal alkali process (Fig. 1). There are other methods in use such as steam refining, batch alkali, or batch-acid refining and mechanical refining. However, the by-products from all of these are much the same.

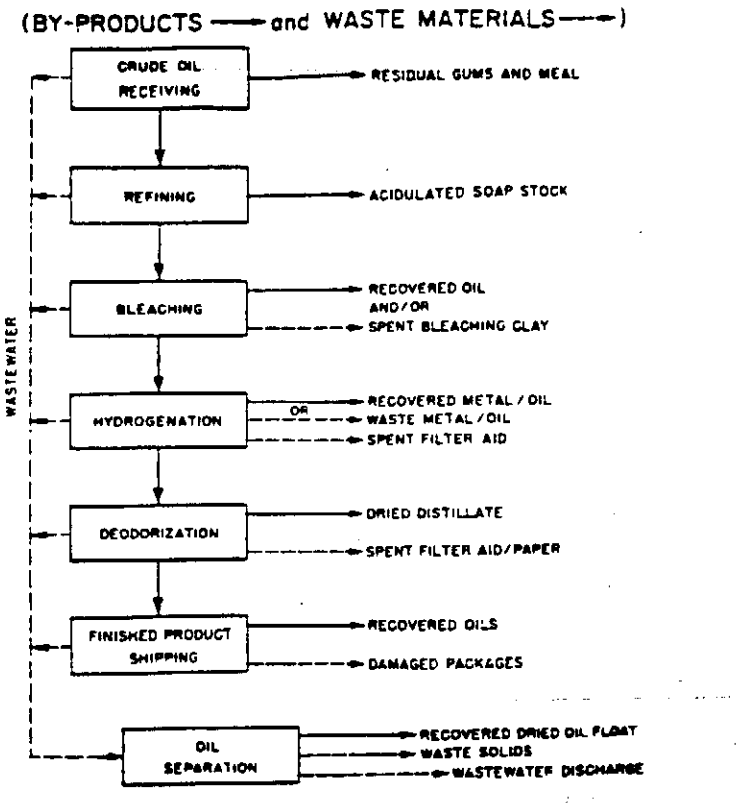

Figure 1. Typical vegetable oil processing plant.

In the refining process, crude oil is reacted with caustic soda to saponify the free fatty acids present, forming a mixture of soap stock and neutral oils. The soap stock is separated by use of a centrifuge and pumped to a holding tank, while the neutral oil continues through the system.

Soap stock is either acidulated onsite or sold to an outside acidulator. In the acidulation process, soap stock is treated with an inorganic acid, normally sulfuric, which produces water and acidulated fatty acids. These fatty acids, also known as acid oils, are used predominately as a high-energy animal feed supplement or sold to fatty acid producers.

Bleaching of the neutral oil is carried out with the use of bleaching clay to remove color bodies, traces of soap, and other impurities. The clay is removed from the oil with the use of filters. The spent clay can contain 20 to 30% oil and is subject to spontaneous combustion when exposed to air. There are two methods of recovering this oil: boiling with water and solvent extraction. Neither of these methods are greatly utilized because the disposal of wet clay is difficult and solvents are extremely hazardous. Therefore, most spent clay is deposited in a landfill and covered with dirt.

The bleached oil is then hydrogenated by the reaction of hydrogen in the presence of a metallic catalyst, usually nickel. This spent nickel catalyst will contain 30 to 35% oil and 10 to 14% nickel. There are some facilities in the U.S. that recover the nickel and oil, but it is a difficult due to environmental regulations so most is exported to less stringent countries for recovery. Since there is a growing worldwide concern for the environment, better methods of recovery need to be developed.

The final step is deodorizing so the oil will be palatable for human consumption. The deodorizing process removes odoriferous material by steam distillation. The odoriferous materials, mostly free fatty acids, are removed from the oil by injection of a stripping steam while the vessel in under vacuum. This distillate is then recovered through the use of a condensor. Depending on the type of oil refined, the distillate is sold for tocoperol content, fatty acid production, or animal feed.

A great deal of water is used in the refining process and in cleanup. Therefore, processors utilize large flotation or settling tanks where the entrained oil can be recovered by skimming. These skimmings are used predominately for animal feed.

Most of the by-product oils from the refining process are produced in such volume and consistency that the uses for

them are well established. Therefore, recycling is more a matter of reliability of the buyer and pricing.

The Oleochemical Industry

The oleochemical industry includes those businesses that produce or use as intermediates, fatty acids, surfactants, and other ester amines, natural alcohols, amides, and alkanoamides. This industry produces a wide variety of by-products (Fig. 2). These by-products are produced inadvertently by the inherent inefficiency of equipment, called mechanical loss, and through the inability to achieve 100% chemical reactions. In addition, most finished products require the reaction with specific components of the beginning oil stock. These by-products are generally referred to as still bottoms, pitches, residues, and recovered material. Some are of consistent quality and quantity, others are not. The by-product from the manufacture of comparable finished goods of several companies will vary considerably. Additionally, an item called a fatty pitch can come from many production processes and equipment. These by-products need to be analyzed regularly and their uses and markets constantly reviewed. Figure 3 illustrates best uses for most of the by-products.

FIGURE 2

CONSUMPTION OF FATTY ACIDS

Use	Millions of pounds	Percent
Surfactants	392[a]	33[a]
Soaps		
Chemicals	---	
Fatty nitrogen compounds	214	18
Resins and plastics	48	4
Rubber	119	10
Lubricant	60	5
Paint and varnish	119	10
Textiles	60	5
Food additives	12	1
Cosmetics	12	1
Other	154	13
Total consumption	1190	100

[a]Surfactants and soaps combined.

FIGURE 3

HIGHEST AND BEST USES FOR VEGETABLE OIL BY-PRODUCTS

1. Edible oil and personal-care products.
2. Soaps, detergents, and surfactants.
3. Chemicals - material suitable as is.
4. Industrial - material needs prior processing.
5. Animal feed supplement.
6. Secondary fuel markets.

Transportation and Storage

There are two aspects of the transportation and storage of oils that need to be addressed. First, when handling these products the equipment eventually needs to be washed. Second, over any period of time stored-oil products will have some settling of impurities, moisture, and heavier fatty acids. These tank bottoms and washouts can have many uses depending on the source oils. Nationwide there are considerable sources of usable materials.

The value of materials, transportation, and storage charges have a major impact on the total cost and final use. Similar by-products in different locations can have different "best uses" because of these costs.

Off-Spec and Contaminated Oils

Off-spec and contaminated oils are produced by equipment failures, employee errors, and improper storage and are generated in all of the aforementioned industries. These are often quality oils suitable for higher-value end products. For example, an edible oil needs only slight degradation or contamination to be inedible but may be suitable for sale to surfactant or fatty-acid producers.

Conclusion

Dealing in vegetable oil by-products is a diverse and interesting business because of the variety of producers and uses of the materials. Finding economically viable uses for by-products produced in large quantities, of consistent quality, with a high fat content is relatively easy. The producers that need the most help are those that have poor quality or low volume and sporadic or one-time by-products.

Since we are interested in the value of the oil, it is this oil portion of poor-quality by-products that must absorb all freight and handling charges. Freight charges on less than truckload quantities are also very expensive. Sporadic and one-time materials require substantial time and laboratory work to market. These producers receive little, if anything, for their by-products. Even so, it is more economical than landfilling or incineration.

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METALS RECOVERY, Gary W. Mann, Hevmet Recovery Ltd., Port Colborne, Ontario, Canada

Brief History

Hevmet was formed January 6, 1984, and received licensing approval from the Ontario Ministry of the Environment to handle hazardous wastes on February 8, 1985. From then to date we have assembled a plant to recover the metal values from hazardous industrial wastes using proprietary and patented (pending) processes. The plant has the capability of handling waste/dilute acids, bases, and sulfides in the processes, and these can be contaminated with heavy metals.

Personnel

Gary W. Mann, C.A., is the President and General Manager, Harry A. Wells, C.E.T., is the Operations Manager, and Richard J. Smythe, Ph.D., is the Technical Director and Holder of the patentable processes. All personnel have been involved in the hazardous waste management field.

Waste Handling

Sampling

When we become involved in a discussion with a waste generator, our first requirements are as follows:

(a) A 1 pound/1 gallon sample of waste in question;

(b) any analyses which have been done on the material;

(c) present methods of disposal of the material;

(d) quantities available, how stored, rate of generation, and how presently shipped; and

(e) a brief description of the manufacturing process generating the waste, if not proprietary.

By the requirements of the license, we must do our own analysis, and the charge for analysis is $75 per waste stream. Once we have analyzed the waste stream, the Technical Director prepares a "recipe" for the recovery of the different metal values contained in the waste stream. Based on the analysis and recipe, we weigh the economics of the recovery and recycling of the materials and set the disposal/processing fee accordingly.

Operational

Once the disposal/processing fee has been agreed upon with the generator, we will arrange for the transportation to have the material picked up. We are using an Ontario-licensed carrier, who presently has licenses to operate in New York, Michigan, Illinois, and Wisconsin; the latter two states were added at our request.

Presently, only materials in drum quantity are being handled, but the logistics of handling bulk loads in luggers, dumpsters, etc., is being looked at. On receipt of the material from a generator, a sample of each drum or container is taken, which is a requirement of the license. These samples are analyzed in our laboratory. If there are items in the shipments that are materially different from the original sample, i.e., PCB's, the entire shipment would be rejected and returned to the generator. The appropriate environmental offices would then be notified of the return and reasons for rejection given.

Facilities

Hevmet's plant encompasses 23,000 square feet, of which 9,000 square feet is processing area, and the balance is storage for raw feedstocks and recovered metallic salts. Within the 9,000 square feet, we have approximately $1,000,0000 of chemical processing and storage equipment.

Waste Streams

Examples of Rejected Waste Streams

(a) Sludge from a manufacturer of printed circuit boards - 29-30% solids, metals include copper 77 mg/l, fluoride 20 mg/l, and nickel 14 mg/l. This sludge was rejected because of low levels of copper and nickel in the waste stream that were not considered high enough. Obviously, if a customer dried their sludge further to reduce water content, it would increase metal concentrations and we may have been interested.

(b) Chromium sludge from a chrome plater - 42% solids, with chromium at 1.1 ppm (only significant metal). Again, this stream was rejected because of the low concentration of chromium. In this instance, the analysis was received from the customer and on this basis the material was rejected.

(c) Sludge filter cake from electroplating waste water pretreatment - 20% total solids, metals include calcium as CaO 28.6%, iron as FeO 19.7%, magnesium as MgO 3.95%, chromium 1.19%, and zinc 5.69%. We rejected this material because of high iron content. Iron salts are virtually worthless with respect to the other salts. We will maintain this customer's file and will consider taking the material at a later date.

Acceptable Waste Streams

We have set out below some of the waste streams that are presently being handled from Ontario and the U.S., and examples of streams under review and discussion with potential customers. Those recyclable products that we propose to make for resale to industry are indicated.

(a) Nitric acid contaminated with heavy metals from electroplating facilities. This is 70% nitric acid containing nickel and copper. Calcium nitrate and nickel and copper salts are produced from this waste stream.

(b) Electroplating wastes containing cyanides in percentages from 1 to 5 to 6%. The cyanides would be

recovered as sodium cyanide, both in granular and briquet form as the volume of materials accepted increases. The metal values in these wastes will be concentrated and, again, depending on market demand, be recycled as the chloride, sulfate, or nitrate.

(c) Mercury/zinc amalgam from battery manufacturers where zinc levels are 50% and mercury is present at 7%. We recover the mercury as elemental mercury and produce zinc chloride solutions. We are presently becoming a qualified supplier to a Canadian battery manufacturer of 62.5% zinc chloride, and making 50% zinc chloride solutions for our Canadian distributor. We are also investigating the market for zinc ammonium chloride as we have had two requests for the material.

(d) Industrial products containing mercury from which the mercury is recovered as elemental mercury and after treating fragmented glass, have identified a market for the crushed glass. The same customer has a filter press cake containing zinc and nickel from which we will recover the two salts, probably both as chlorides.

(e) Dust collector dust from battery manufacturers containing carbon 82% and manganese 10%. We are presently recycling the manganese as manganese chloride and looking for the proper market for the cleaned graphite stream.

(f) Waste streams currently being reviewed for recovery prospects. These generators are all U.S.-based and have been referred to us by Margo Ferguson Siekerka's department.

- Manganese waste stream containing 51% manganese.

- Copper cake sludge containing zinc, lead, copper, cobalt, nickel, and arsenic. This stream would probably become the most difficult separation we have worked on.

- Zinc hydroxide sludge containing 20% zinc.

- Nickel-plating purification media sludge containing 5.8% nickel and 45% carbon.

- "Spent" can maker's solder dross containing 3-4% tin, 25% lead, and 12% zinc as salts and oxides.

- Electroplating sludges containing nickel, chrome, and zinc as the major components.

Recycled Products

It is the Company's intention, in most cases, to recycle the metals as metallic salts at industrial-grade level. Because our plant is run on a "batch" basis, we can convert from chlorides-to-sulfates-to-nitrates fairly readily and thus satisfy a changing market demand.

Our philosophy has been to try and keep our "disposal/ processing" fee lower or the same as present landfill disposal methods, and when we resell a recycled metallic salt back to a generator we would sell that product at a price approximately 80% of the going market price.

Future

It is our present plan to being a facility in the U.S., probably in Illinois, by late 1987 or early 1988 at the latest, as freight costs are and will become the greatest price deterrent for generators to ship to us in Canada.

THE REUSE OF SPENT CATALYSTS: AN AMERICAN PERSPECTIVE,
L. S. Feldman, B.S., Catalyst Disposal Services, Calgary, Canada

Abstract

Catalysts have only been in existence for 75 years and have grown to be a multi-billion dollar business worldwide. Currently, an estimated 700 individual types of catalysts vie for a place in the market serving the petroleum, petrochemical, chemical, and food industries.

The development of these various catalysts has led to the ability to manufacture many new products, each contributing to a better lifestyle for all. Many of these man-made catalyts, primarily metal-based, present definite hazards when landfilled improperly. This is due mainly to the various contaminants adsorbed during the catalytic life.

Recycling for many of these waste products has for years been an unattractive alternative to landfilling. Depressed prices of commodities create an uneconomical environment for recycling. Tougher legislation is continually being created to govern the methods of landfilling hazardous industrial wastes. Spent catalysts are now being grouped into many of these hazardous waste classifications.

There are only a handful of companies in North America that are actively involved with spent-catalyst recycling. Even

fewer are directly involved with reclamation. Current catalyst-reclamation technology is only partially effective. The residues generated by these processes still contain high concentrations of base metals now altered by the reclamation process. In addition, the bulk of the original catalyst, usually alumina, is unmarketable due to heavy metal content and chemical contamination from the reclamation process.

New technology is being developed that will reclaim many of the spent catalysts currently difficult to recycle and will render all of the original constituents commercially marketable. This is sure to offer industry an economical alternative to an ever-growing problem.

Preface

The following information was prepared at the request of the Illinois EPA, for presentation at the Third National Conference on Waste Exchange in Phoenix, Arizona, March 4-6, 1986. Due to the growing emphasis on environmental conservation, the recycling of spent catalysts is demanding considerable attention. These industrial materials present potential hazards when landfilled.

For the purpose of this conference, only metal-based industrial catalysts are discussed. This presentation will provide a base of information as to the physical nature and applications of spent metal-based catalysts and some insight into the developing technology designed for their reclamation.

The Catalyst - An Introduction

A catalyst is "a substance which alters, by its presence, the speed at which a chemical reaction takes place, without itself appearing in the end products resulting from the chemical change."

Each and every year, the worldwide petroleum, petrochemical, chemical, gas processing, and food industries manufacture hundreds of thousands of tons of products through catalytic processes. These processes are used to manufacture many types of products such as artificial fertilizers, petroleum fuels and by-products, synthetic fibers and rubber, plastics, edible fats and oils, and artificial sweetners. In addition, catalysts are currently being used in pollution abatement devices applied to a variety of waste streams (Table 1).

TABLE 1

EMISSION CONTROL

Process	Application	Catalyst
Automotive exhaust	Reduce hydrocarbon, carbon monoxide, and nitrogen oxide emissions from automotive and truck engines.	Platinum, palladium, or platinum/rhodium on monolith or pellet supports.
Industrial	Control emissions from incinerators, ovens, wood stoves, and nitric acid plants.	Precious metals on supports.

During 1984, the petroleum and petrochemical industries accounted for the majority of worldwide catalyst sales. Current levels exceed $2.5 billion. A 5% steady growth rate is predicted to 1989.

Catalysts are used in virtually all processes producing commercial petroleum products, and in an estimated 90% of all processes producing commercial chemicals. Primarily, these catalysts are metal based. Depending upon the type of process application and product(s) produced, catalyst composition can vary significantly. They are usually constructed of an alumina substrate (sometimes silica, carbon, or zeolite) and are finely impregnated with a metal, metal oxide, or metal salt. They may appear independently or in combination with the following elements: nickel, cobalt, molybdenum, vanadium, zinc, copper, tungsten, iron, chrome, tin, silver, gold, platinum, palladium, rhodium, irridium, rhenium, and ruthenium.

These elements are used in the majority of commercially applied catalysts. A catalyst will usually contain one, two, three, or no active metals depending upon its specific function. Tables 1, 2, and 3 illustrate the variety of catalysts used in chemical and petroleum refining as well as emission control.

TABLE 2

CHEMICAL INDUSTRY

Process	Application	Catalyst
Polymerization	Produce high-density polyethylene polypropylene, linear low-density polyethylene, polyvinyl chloride, polystyrene, urethanes, and other rubbers and plastics.	Aluminum alkyls, titanium trichloride, organic peroxides, tertiary amines, and organotins.
Organic syntheses	Produce agricultural chemicals, organic intermediates, flavors and fragrances, pharmaceuticals, rubber additives, ethyl benzene, and many other products.	Noble metals, phosphoric acid, and anhydrous aluminum chloride.
Ammoxidation, oxidation, and oxychlorination	Produce ethylene oxide, nitric acid, sulfuric acid, acrylonitrile, vinyl chloride, phthalic anhydride, and maleic anhydride.	Silver, vanadia, copper chloride, and noble metal gauze.
Hydrogen, ammonia, and methanol syntheses	Steam reforming of natural gas to produce hydrogen, ammonia, and methanol production.	Activated carbon, zinc oxide, cobalt/molybdenum, nickel, promoted iron, nickel oxide, copper oxide, and zinc chromite.
Hydrogenation	Produce such edible and inedible oils as margerine, shortening, and fatty amines. Make nitro compounds, olefins, and aromatics.	Nickel and activated nickel.

TABLE 2. cont.

Process	Application	Catalyst
Dehydrogenation	Manufacture styrene from ethyl benezene.	Promoted iron.

TABLE 3

PETROLEUM REFINING

Process	Application	Catalyst
Catalytic cracking	Produce gasoline.	Aluminosilicate zeolite.
Alkylation	Produce high-octane blending components for gasoline.	Sulfuric acid or hydrofluoric acid.
Hydrotreating	Remove sulfur from various petroleum fractions. May also remove nitrogen and decompose unstable compounds.	Cobalt-molybdenum oxide and/or nickel-molybdenum oxide on alumina.
Hydrocracking	Crack petroleum streams for use as motor fuels, heating oils, cat-cracker feedstocks, or other applications.	Combination of platinum, palladium, cobalt, molybdenum, nickel, or tungsten on alumina or zeolite.
Catalytic reforming	Improve octane level in no-lead and low-lead gasolines.	Platinum or platinum/rhenium on alumina.
Sulfur removal (also chloride and fluoride scavenging)	Natural gas processing (elemental sulfur recovery).	Activated alumina.

Landfill Disposal - An Inexpensive Alternative

The magnitude of hazardous waste management problems in the U.S. has only become evident in the last six to eight years. In 1976, Congress passed the Resource Conservation and Recovery Act (RCRA). Under RCRA, the EPA has developed an intricate maze of regulations to control hazardous waste from "cradle-to-grave." These regulations include procedures for classifying certain wastes as "hazardous," a manifest system to ensure that wastes reach their proper destination, a complex permitting program, and specific standards for generators, transporters, and handling facilities. These strict regulations will ultimately force the closure of as many as 70% of all land-disposal facilities in the United States.

A recent survey by the American Petroleum Institute found that using EPA's current definition of hazardous waste, petroleum refineries generate approximately 850,000 tons of hazardous waste and 1,200,000 tons of nonhazardous waste annually. Most spent catalysts are currently categorized as nonhazardous but are expected to be reclassified as potentially hazardous before the end of 1986 (Table 4).

TABLE 4

PERSISTANT AND BIOACCUMULATIVE SUBSTANCES AND THEIR CONCENTRATIONS RESPONSIBLE FOR CLASSIFYING A WASTE AS BEING HAZARDOUS

Substance	Concentration (ppm)
Aldrin	0.14
Antimony and compounds	100.0
Arsenic and compounds	5.0
Barium and compounds (excluding Basite)	100.0
Beryllium and compounds	1.0
Cadmium and compounds	1.0
Chlordane	0.3
Chromium and Chromium (VI) compounds	5.0
Chromium and Chromium (III) compounds	25.0
Cobalt and compounds	80.0
Copper and compounds	15.0
DDT, DDE, DDD (TDE)	0.1
2,4-Dichlorphenonyacetic acid	10.0
Dieldrin	0.1
Dioxin (TCDD)	0.003
Endrin	0.02
Fluoride salts	180.0
Heptachlor	0.3
Kepone	0.5

TABLE 4. cont.

Substance	Concentration (ppm)
Lead and components (inorganic)	5.0
Lindane	0.4
Mercury and compounds	0.2
Mirex	0.5
Molybdenum and compounds	350.0
Nickel and compounds	20.0
Pentachlorophenol	1.0
Polybrominated biphenyls (PBBs)	5.0
Polychlorinated biphenyls (PCBs)	5.0
Polychlorinated terphenyls (PCTs)	1.0
Selenium and compounds	1.0
Silver and compounds	5.0
Thallium and compounds	5.0
Toxaphene	0.5
Trichloroethylene	0.5
2,4,5-Trichlorophenoxyacetic acid	1.0
Vanadium and compounds	24.0
Zinc and compounds	20.0

The reclassification of the nonhazardous wastes is expected to cost the petroleum industry an additional $100-300 million annually in secure landfill disposal. A portion of these additional costs will be attributed to the disposal of spent catalysts. From both an economical and corporate-image viewpoints, recycling spent catalysts present great benefits.

Recycling - An American Perspective

The United States is "home" to in excess of 1,000 individual refining and process facilities. A substantial portion of these industries utilize catalysts in varying quantities. It is estimated that all these "catalyst users" consume a total of 100,000+ tons of catalyst to produce their respective commercial products.

As a "rule-of-thumb," catalyst manufacturers generally assign a 25% "change-out" rate for the purposes of new catalyst sales. This means that approximately 25,000+ tons of waste catalyst are generated annually in the U.S.

Reclaimers are always ready to purchase spent catalysts comprised of noble metals (gold, silver, platinum, palladium, irridium, rhodium, rhenium, and ruthenium). However, spent base-metal catalysts do not always command similar interest.

As an example, when metal prices were experiencing "all-time highs" in the mid-1970s, reclaimers and brokers were actively purchasing these catalysts. Many of the hydrotreating catalysts containing molybdenum and cobalt or nickel were easily sold into the speciality alloys industries as inexpensive sources of these strategic elements. When prices of commodities declined, extraction proved too costly for these less-attractive materials. In addition, some spent catalysts contain high concentrations of sulfur. They present an environmental hazard to most pyrometallurgical reclaimers. To compound the problem, some catalysts are manufactured with small concentrations of phosphorus (in oxide form). The presence of this element in concentrations greater than 0.04% is detrimental to the speciality steels industries as it causes brittleness in metal products. Table 5 illustrates the most common types of base-metal catalysts and the various contaminants that may be present.

TABLE 5

COMMON TYPES OF BASE-METAL INDUSTRIAL CATALYSTS

Catalyst	Composition	Contaminants spent form
Hydrotreating	NiO @ 3-10%	S @ 0-20%
	MoO_3 @ 10-30%	C @ 0-20%
	Al_2O_3 @ balance	P @ 0-3%
		residual hydrocarbons
	CoO @ 3-5%	S @ 0-20%
	MoO_3 @ 10-30%	C @ 0-20%
	Al_2O_3 @ balance	P @ 0-3%
		residual hydrocarbons
	WO_3 @ 5-30%	S @ 0-20%
	NiO @ 5-20%	C @ 0-20%
	Al_2O_3 @ balance	P @ 0-3%
		residual hydrocarbons

TABLE 5. cont.

Catalyst	Composition	Contaminants spent form
Steam reforming	NiO @ 10-40% Al_2O_3 @ balance	S @ 0-10%
Shift conversion	CuO @ 20-50% ZnO @ 20-50% Al_2O_3 @ balance	H_2O @ 0-40%
	Fe_3O_4 @ 89% Cr_2O_3 @ 11%	H_2O @ 0-20%
Desulfurization	ZnO @ 60-100% Al_2O_3 @ balance	H_2O @ 0-20%
Sulfur recovery	Al_2O_3 @ 100%	S @ 0-20% C @ 0-15%
Edible oil synthesis (Hydrogenation)	Ni @ 25% SiO_2 @ balance	Oil @ 10-40% P @ 0-1%
	Ni @ 50% SiO_2 @ balance	Oil @ 10-40% P @ 0-1%
Inedible oil synthesis (Hydrogentation)	Ni @ 40-50% SiO_2 @ balance	Oil @ 10-40% P @ 0-3% S @ 0-3%

Many of today's reclaimers find that their existing technologies are not economically efficient. The high cost of transportation and depressed prices of metals dictate the need for more advanced technology.

Catalyst Reclamation - A New Resource Industry

In 1981, the United States Department of the Interior, Bureau of Mines, commissioned the INCO Research and Development Centre to perform an in-depth study of the potential resource of spent catalysts. The report, titled, "Assessment of Critical Metals in Waste Catalysts," was a testimony to their potential value. Subsequently, the Bureau of Mines, acting on the recommendations of this report, has been actively engaged in developing an effective and safe method for spent catalyst reclamation.

Apart from simple metallic value, reclaimed elements from spent catalysts containing nickel, vanadium, cobalt, tungsten, and molybdenum can be applied to the speciality alloys industries, i.e., aerospace, electronics, and pigments. Copper and zinc-bearing catalysts (not contaminated with heavy metals or toxic organic residuals) are attractive additives as soil and livestock nutrients. Catalysts containing iron and chrome have potentially attractive value when reclaimed through the use of phosphoric acid. (Iron phosphate can be applied to the fertilizer industry and chromium phosphate has significant value to the pigment industry.) Even the alumina residues from most of these reclaimed materials have value to the abrasive, steel, and chemical industries as raw material supplements. Through innovative technology, reclamation of these waste products has the potential to develop into a comprehensive resource industry offering high-value commercial products.

The Research Challenge

Fundamental problems exist when reclaiming spent catalysts:

(1) the process must be economical;

(2) the process should efficiently reclaim all catalyst elements, leaving no residues; and

(3) most processes are not universal in application.

Companies currently involved with catalyst reclamation are few in number. Only a "handful" operate in the world, primarily in the United States and Japan. There are no universal facilities operating in Canada. The majority of these companies employ a caustic-leaching method, which is only partially effective. As an example, when used to reclaim hydrotreating catalysts it leaves behind 10 to 40% of the molybdenum and 100% of all other elements. The bulk of the original catalyst, now a contaminated residue, still remains. This process is also weak when applied to other

materials containing such elements as tungsten, cobalt, nickel, and precious metals.

Catalyst Disposal Services (Canada) Limited, in conjunction with the Ontario Research Foundation, is developing a hydrometallurgical process to effectively reclaim most types of spent catalysts without the creation of a hazardous residue. Further research is currently being conducted with reference to the construction of a pilot-scale facility.

Summary

As time progresses there will be greater demands for strategic elements, primarily from the aerospace and speciality steels industries. Conventional mining costs are escalating and cheaper sources of these various elements will have to be developed. Coupled with the negative aspects of landfilling, spent catalysts reflect a major group targeted for serious reclamation research.

Acknowledgments

The writer gratefully acknowledges the personal input of his friend and colleague, Mr. F. J. Hennion, a research and sales engineer with the International Metals Reclamation Company (INMETCO), an wholly owned unit of INCO, U.S.

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CHEMICAL DESTRUCTION OF PCB'S IN OILS: AN EXAMPLE OF CONVERSION OF HAZARDOUS WASTES TO MARKETABLE PRODUCTS,

Claude E. Terry, Ph.D., Vice President, PPM, Inc., Atlanta, Georgia

Background

PPM, Inc., is a waste management firm specializing in polychlorinated biphenyls (PCB) handling, chemical destruction, and testing. PPM has facilities and offices in Kansas City; Philadelphia; Atlanta, Georgia; Toronto, Canada; and Regina, Saskatchewan. PPM's laboratories are located in Regina and Atlanta and are equipped with the most modern equipment available to measure PCB's and other hazardous contaminants in oil, air, and water.

PPM has developed a process for destroying PCB's in a variety of oils that formerly would have been hazardous wastes. This process lends itself to use either by a mobile decontamination rig or at our fixed facilities.

The mobile unit underwent its first commercial operation early in November 1981 in the United States in a cleanup observed by the EPA. Demonstrations were carried out during 1983, 1984, and 1985 for three Canadian provinces.

Chemical PCB destruction technologies are usually sodium-based processes that dechlorinate the PCB molecule. Although sodium processes are relatively new methods of dealing with PCB disposal, they are a known technology in

the chemical industry and used in a variety of other processes. In fact, a sodium process was used for some time in the oil industry to purify virgin transformer oil. The process was later replaced by less expensive sulfuric acid, solvent extraction, and hydrogenation processes. The first semicommercial sodium PCB destruction process was proposed by Goodyear. Goodyear did not commercialize the process but made the technology available to any firm interested in commercializing the technology. The initial "Goodyear Process" had serious economic and safety problems associated with it. The most serious problem was the use of a highly flammable solvent, tetrahydrofuran, to dissolve the metallic sodium. Independently, several firms (including PPM, Inc.) have developed their own proprietary processes.

An advantage of chemical treatment using the PPM process rather than incineration is that the process avoids conditions forming highly toxic chlorinated and nonchlorinated dibenzofurans and dibenzodioxins. These materials require oxygen and heat for their formation. However, the PPM process is done in an oxygen-free atmosphere and at ambient temperature. Moreover, the sodium reagent chemically destroys any chlorinated dioxins or furans present so that these compounds are avoided. The PPM process has no emissions or effluent other than salts and a high molecular weight polymer, allowing the process to be used as at any location safely, and allows reuse of the oil.

The PPM Process

The PPM process was independently developed to meet three important criteria:

1. It must be safe and simply operated in the field;

2. it must produce an acceptable product (i.e., transformer oil, etc.) and;

3. it must be economical.

For simplicity and safety, the PPM process operates at ambient temperature and does not use flammable solvents. The reducing agent used in the PPM process is a highly complex organo-sodium reagent. The reagent is air- and water-sensitive and, therefore, the process is blanketed with nitrogen. The process can tolerate small amounts of water, but every effort is made to minimize water levels. The reagent reacts immediately with PCB's and chlorinated hydrocarbons, forming sodium chloride and a polyphenylene polymer.

Transformer oil is a complex blend of organic materials. To determine the reusability of transformer oil, the reaction

of the organo-sodium reagent with various components must be examined. Chemically, the sodium reagent material is a potent reducing agent and produces reactions similar to the hydrogenation step used in transformer oil refineries.

The sodium reagent immediately reacts with inhibitors, acids, thiols, and chlorides forming appropriate sodium salts. These materials are then present in the oil as an insoluble sludge. This solid sludge is composed of a variety of reaction materials and products and includes: polyphenylene, unreacted reagent, sodium chloride, sodium hydroxide, NaOR (inhibitor) and NaO_2R (acids).

After complete destruction of all PCB's, the reagent has also converted inhibitors and acids into insoluble sludge. The polyaromatic nature of the oil is either unchanged or slightly increased due to the coupling nature of the reagent. The increase is insignificant but should improve the properties of the oil.

To reuse the oil as transformer oil, the above-described sludge is removed. After cleanup, sodium levels in the oil have been reduced to undetectable levels and the oil passes or exceeds transformer oil specifications.

Mobile Unit

PPM has incorporated the sodium process into a mobile decontamination unit. The unit is on a trailer towed to the site where the hazardous material is stored. By taking the unit to the site, problems associated with transportation, handling, and public and worker exposure of the contaminated oil are greatly reduced. The need for a permanent disposal site is also eliminated by cleaning the oil so that it can be reused.

Trailer

The unit has been constructed in a 40-foot trailer. All lines and equipment on the trailer are within a large spill pan. The pan holds approximately 1,200 gallons, which is more than the combined volume of all tanks on the unit.

The trailer is connected to the holding tank using 2-inch chemical transfer lines. The lines are fitted with male/female quick disconnects. During storage and transportation, all of these lines are plugged or capped to prevent spills. Drip pans are placed under all connections. Areas leading to sewers or open water are diked. Valves are opened slowly and all connections are checked for leaks.

Support Van

Chemicals, laboratory equipment, water filters, and miscellaneous equipment and tools are brought to the site in a 20-foot enclosed panel truck.

Chemical Decontamination

The PPM Chemical Process consists of three parts: Pretreatment, Decontamination, and Clarification. In the Pretreatment portion of the process, water is reduced to acceptable levels by draining the water off the bottom of the tank and using water filters. In the second step, Decontamination, PCB's are destroyed and PCB's in the oil are reduced to undetectable levels. After PCB destruction, the sludge and solids in the oil are removed using a variety of filters.

Waste Streams

Prior to treatment, the oil is inspected and any free water held at the bottom of the tank is drained and disposed of according to regulations. During operation, clothing, rags, and disposal equipment that come in contact with PCB-contaminated oil are placed in a container and disposed of as necessary for PCB-contaminated materials.

The process itself produces solids and small amounts of sludge and aqueous waste that are removed from the process and disposed of according to regulation. The process does not produce any emissions. There are no discharges into the environment. This makes the PPM process inherently safer than the disposal options of landfilling or incineration. The PPM process can be performed at any location without fear of discharges into the environment.

Process Safety

The PPM process is designed for worker and environmental safety. The process itself operates at room temperature and does not use flammable solvents. Equipment construction conforms to industrial safety codes, and equipment hazards are minimized. The equipment is blanketed with nitrogen to avoid reaction side-products and to eliminate fire hazards.

Employees are trained in process controls and operational safety. Each unit is operated by qualified personnel. In general, worker exposure to PCB oil is minimized and, under normal operation conditions, should never occur. This is because the PPM process is a closed-system process. Once the PPM mobile unit has been connected to the source of contaminated oil, all contaminated material is confined to the

PPM unit and the original container. At the end of the PPM process, the oil, the original container, and the PPM unit have all been decontaminated. Each unit contains spill cleanup equipment, and necessary work protection clothing including gloves, goggles, and full-body garments. Onsite fire extinguishers and sodium carbonate are located near the unit for fire protection. An oil absorbant is also available for minor spills and cleanup.

Sampling and Analysis

Prior to treatment, the storage site is inspected by PPM, Inc., personnel. The inspection team examines the oil-storage layout to look for potential problems and to evaluate the safety of the site. During this visit, the oil is sampled and carefully examined by PPM's laboratory to determine the amount of materials needed to clean the oil.

When the mobile unit arrives at the site, the oil is again analyzed for PCB. PPM uses an AID portable gas chromatograph for site work. As the oil is treated, it is continually monitored for PCB's by the onsite gas chromatograph. PCB levels are usually undetectable and at least less than 2 ppm are required. The PCB analytical technique is an approved EPA method.

SESSION IV. PERSPECTIVES ON WASTE EXCHANGE AND RESOURCE REUSE

Moderated by Mary McDaniel, Director, Piedmont Waste Exchange, Charlotte, North Carolina

STATE UTILIZATION OF WASTE EXCHANGES, Eugene Theios, Illinois Environmental Protection Agency, Springfield, Illinois

Recognizing that more than just an official recommendation that "material and fuel values in waste should be recovered" would be needed if meaningful quantities of waste were to be reused in industrial processes, the Illinois Environmental Protection Agency (IEPA) accepted responsibility for funding and establishing the Industrial Materials Exchange Service (IMES). I have had the good fortune of being this Agency's designated manager for planning and implementing this program.

Early on in our planning, we asked ourselves a number of questions relative to how we could ensure or maximize successful operation of the exchange. We concluded that:

1. The Agency would underwrite the costs of the first several years of operation so that there would be no cost to industry to use the service.

2. That an organization advocating industry should co-sponsor and share in the operation of the service. That organization turned out to be the Illinois State Chamber of Commerce and much of the success of the exchange is due to their overt support.

3. That, while the state regulatory agency sponsored the service, the person actually performing the duties of the service should espouse the philosophy of maximizing the exchange and reuse of waste separate from the regulatory mandate of the Agency. That philosophy is now part of Agency policy.

4. That a mechanism would be built into the program that would annually assess its effectiveness, and

5. that we would cooperate with all other waste exchanges in an effort to support the exchange concept.

The State of Illinois and industries in Illinois have benefitted from our service. They have an operating service that annually redirects increasing quantities of waste away from land disposal and back into the manufacturing process. The environmental benefits from reducing the total quantity of wastes that are land disposed is obvious. The disposal cost avoidance and reduced liability to industry are also obvious.

Another benefit to industry is that their listings of waste with the exchange helps satisfy the Federal requirement that they demonstrate a program in place to reduce the volume or toxicity of waste produced. This requirement is then certified on manifests of shipments of wastes. Industries that dispose of their waste onsite must also certify that they have a program in place to reduce the volume of quantity and toxicity of the hazardous waste they produce. The use of the service similarly helps satisfy this requirement.

Last year the Agency initiated a pilot study to attempt to identify waste streams that are potentially reusable that have been approved for landfill. With data from IMES on potentially recyclable items, Agency staff reviewed approximately 500 landfill authorizations and identified about 30 waste streams that were potentially recoverable. After IMES staff contacted firms that were seeking the components present in the waste streams and determined that they would welcome being contacted by the generator, they notified the generators of the opportunity to recycle their waste. IEPA is considering expansion of this effort based on this pilot study.

An unexpected benefit has resulted from the mutual support and operation of the exchange by the Agency (an industry regulator) and the State Chamber of Commerce (an advocate of the regulated community). These two groups have, historically, not always agreed on new regulations and their implementation. Dialogue between the two groups on other issues has been impacted positively through their successful joint partnership in the Industrial Materials Exchange Service.

Other states and their industries have also benefitted from our service. The usefulness of our program was immediately realized by our neighbors and their participation has increased each year. Presently, state and private sector agencies in Iowa, Kentucky, Minnesota, Oklahoma, Texas, and Wisconsin distribute the IMES directory to their industries in their area.

Future State Utilization of Waste Exchanges

Effective January 1, 1987, a hazardous waste stream may no longer be land disposed in Illinois unless the generator and

disposal-site owner obtain specific authorization for such disposal from the Illinois Environmental Protection Agency. The Agency may grant such specific authorization only after the generator has demonstrated that it is not technologically feasible or economically reasonable to recycle for reuse, incinerate or chemically, physically or biologically treat the waste so as to neutralize or render it nonhazardous. In considering such demonstrations, the fact that a waste stream, otherwise not treatable, has been listed on the exchange -- with no takers -- could, in part, result in the generator receiving an authorization for land disposal. Conversely, if the Agency knows that similar wastes from other companies are being reused by other industries, such authorization might not be forthcoming.

As the Federal lists of waste streams prohibited from land disposal become effective, innovative treatment methods and uses for such wastes will be needed. Waste exchanges should play an increasing role in finding productive uses for them.

Small quantity generators are a case in point. Expanded mechanisms for combining small quantity lots of similar wastes from a number of generators into quantity loads that are economically practicable to transport for recovery or for direct use in a process can be brought about by adjustments and expansion of the current services of the various exchanges. Increased cooperation, sharing of listings between exchanges, and increases in the universe of areas and industries to which waste exchange services are available can increasingly address specific needs of small quantity generators.

The Federal program on leaking underground storage tanks will provide new areas of activities for waste exchanges. The recovery and reuse of recovered portions of chemical products that have leaked from underground tanks through the mechanism of waste exchange listings seems to be a natural extension. The fact that the recovered portions are chemical products, not wastes, should make finding an industrial user easier.

States may benefit by the expansion of exchange services into a more active role with generator industries and potential reusers. Technical assistance in the form of visits to sites to assess ways of reducing quantities of waste generated and to suggest waste segregation methods could increase recovery and reuse rates.

Several years ago, the State of Illinois made a commitment to hazardous waste treatment, recovery, and the use of alternative technologies rather than landfill. We believe that waste exchanges can effectively redirect significant portions of certain wastes back into industrial use and pro-

duction. We have found waste exchange to be an integral part of our hazardous waste management program.

An opportunity for increased cooperation between operating exchanges exists. We need to help find uses for waste, to share listings, to expand into regional exchanges so that we might serve a larger universe of users, and to increase the probabilities of matching available wastes with potential users through modem access to a national database that provides instant access to all available markets.

CRIMINAL AND CIVIL LIABILITY FOR HAZARDOUS WASTE VIOLATORS,
Gary A. Meyer, Parker, Milliken, Clark, O'Hara & Samuelian, Los Angeles, California

In the Courts - Trend Toward Expanding Liability

As demonstrated by the cases discussed below, there is a growing trend in the courts to expand criminal and civil liability for hazardous waste violators. Prosecutors and judges alike throughout the country are taking bold new steps to punish those who run afoul of the ever-expanding hazardous waste laws.

In Illinois, a judge found three corporate executives guilty of murder for the cyanide-poisoning death of one of their employees. Similarly, the Los Angeles District Attorney has recently announced plans to criminally prosecute company heads whose unsafe working conditions lead to a worker's death or injury. Focusing downward on the corporate ladder, the U.S. Supreme Court recently held that employees can be subject to criminal liabilities if they knew or should have known about their employer's hazardous waste violations.

Liability is expanding in the civil law area as well. A New Jersey State Court ruled that a hazardous waste generator is responsible for the injury and damages his waste caused, even though the waste was handled and disposed of legally. Likewise, a Federal Appellate Court held that landowners are "strictly liable" for hazardous waste cleanup costs even if they were not the party who created the problem. One note of consolation to this ominous trend of expanding liability is the U.S. Supreme Court's recent ruling that a hazardous waste disposal facility operator may escape cleanup cost liability by filing for bankruptcy. Further details about these case decisions are provided below.

Corporate Executives Guilty of Murder for Cyanide Death of Worker

In a precedent-setting decision, a Cook County Illinois Court sent shockwaves throughout this country's corporate boardrooms by finding three corporate officials guilty of murder for the cyanide poisoning of one of their industrial workers. Each was sentenced to 25 years in prison and fined $10,000.00. The three corporate officials of Film Recovery Systems, Inc., a suburban Chicago plant that reclaims silver from old film, were also found guilty of 14 counts of reckless conduct. The Court's ruling marks the first time corporate officials have been charged with and found guilty of murder due to dangerous conditions in a corporation's plant.

The murder conviction stemmed from the death of one of Film Recovery System's employees, a non-English speaking Polish immigrant who died after inhaling poisonous fumes from the plant's silver recovery process. In reaching his verdict, Cook County Circuit Judge Ronald Banks found the workplace to be "totally unsafe." Employees' prior complaints about cyanide exposure apparently went unheeded, and safety equipment and precautions, including the labeling of chemical drums, were found to be insufficient. The Court ruled that the executives knew that due to the company's poor safety conditions there existed a strong possibility that employee injury or death would occur.

Although this murder verdict will probably be appealed and perhaps overturned by an appellate court, this landmark decision will undoubtedly stir much debate and controversy about whether and to what extent corporate executives should be held personally responsible for criminal acts historically attributed only to their companies.

District Attorney Seeking Manslaughter Prosecutions For On-The-Job Accident Deaths

Sounding like shades of the above-reported Cook County murder case, Los Angeles County's District Attorney is asking local law enforcement officials to help his office prosecute negligent employers on possible charges of involuntary manslaughter or second-degree murder for industry-connected deaths. In a letter, Los Angeles District Attorney Ira Reiner recently sent to 47 Los Angeles County police chiefs, he pointed out that many of the more than 100 industrial deaths reported each year in Los Angeles County "are caused by unsafe working conditions." In an attempt to create a more effective "prosecution program," Reiner has established a special occupational safety and health team to be run by Special Assistant District Attorney Jan E. Chatten-Brown.

Chatten-Brown will be conducting training programs to instruct law enforcement personnel techniques to be used in the investigation and eventual prosecution of industrial accident cases. According to Chatten-Brown, depending on the facts and circumstances surrounding any given case, the District Attorney's office will consider filing either an involuntary manslaughter action under Penal or Labor Code statutes, or a more onerous action for second-degree murder. In addition, the District Attorney's office has recently hired additional staff to increase the number of criminal prosecutions for injuries due to toxic material exposure.

Criminal Liability Extended to Employees Under RCRA

Criminal liability for hazardous waste violations is expanding not only in the direction of corporate executives (see the two cases discussed above), but also in the direction of company employees. In February 1985, the U.S. Supreme Court "let stand" an appellate court ruling that corporate employees who knew or should have known that hazardous waste was being illegally disposed can be found criminally responsible under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Sections 6901-6987 (1982).

In the case of U.S. v. Johnson & Towers, Inc., 741 F.2d 662 (3rd Cir. 1984), a motor repair company owned by Johnson & Towers and two of its employees, a foreman and a service manager, were named as defendants. Federal agents allegedly saw workers pumping hazardous waste from a tank into a trench that flowed into a creek. Although the indictment did not allege details of the employees' specific activities, it did allege that they "managed, supervised and directed a substantial portion of Johnson & Towers' operations...including those related to the treatment, storage and disposal of hazardous wastes...."

Under RCRA, an individual "owning or operating" a hazardous waste treatment facility is required under Section 6925 to obtain a permit for disposal. The company did not have such a permit, nor had it applied for one. The court held that RCRA does not limit the criminal provision to just owners or operators. Rather, it extended liability to employees as well, but only if they knew or should have known that there had not been compliance with the permit requirements under Section 6925. In this case, the court ruled that the two employee defendants could be criminally prosecuted because they knew or should have known of the RCRA violations. The court also held that in proving a defendant's "knowledge" of a RCRA criminal provision, such knowledge "may be inferred by the jury as to those individuals who hold the requisite responsible positions with the corporate defendant," 741 F.2d at 670.

Absolute Liability For Hazardous Waste Generators

Last year a New Jersey State Court set new precedent in the area of hazardous waste liability by ruling that hazardous waste generators, under New Jersey law, can be held "absolutely liable" for personal injury and property damage, irrespective of the care they took in disposing of their waste. In the case of Kenney v. Scientific, Inc., (NJ Super. Ct., Middlesex County), the judge, characterizing hazardous waste disposal as an "abnormally dangerous activity," held:

> A company [i.e., a hazardous waste generator] which creates the Frankenstein monster of abnormally dangerous waste should not be expected to be relieved of accountability for the depredations of its creature merely because the company entrusts the monster's care to another, even an independent contractor.

The consequence of this landmark ruling is that no matter what precautions a hazardous waste generator takes to dispose of its hazardous waste, it can nevertheless be found liable for any resultant personal and property damage.

The Kenney lawsuit was filed in July 1984, on behalf of 95 plaintiffs, residents who lived near one of two landfills in Edison Township, New Jersey. The plaintiffs brought their action against more than 600 waste generators, 20 waste haulers, the owner/operator of one of the landfills, and the State of New Jersey.

The court dismissed the suit against the State of New Jersey, ruling that the New Jersey State tort law insulates the State from this action. As to the hazardous waste haulers named as defendants, the court held that they were not subject to absolute liability, except during the time the material was under their control. The court added, however, that a hauler may be found negligent if it chooses a disposal site that is deemed to be unsafe.

As noted above, waste generators did not fare as well in the court's ruling. However, despite ruling that generators were "absolutely liable," the court also held that before a plaintiff can recover damages from a generator he still must prove the element of causation, namely, show proof that a generator's waste proximately caused the plaintiff's alleged injuries or damages. In many instances, a plaintiff may have difficulty proving which generator's waste was the proximate cause of his damage.

Strict Liability For Landowners

In the recent case of New York v. Shore Realty (No. 84-7925 April 4, 1985), the U.S. Court of Appeals, Second Circuit, held that under the Federal statute known as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. Sections 9601-9657, "strict liability" can be imposed upon a landowner for the removal and cleanup of hazardous waste from his property. The court found that based on Section 9607 of CERCLA, a landowner must reimburse the State for its costs connected with the waste removal, even if the landowner was not responsible for generating the waste or depositing it on his property.

The property owner in Shore Realty, a land development company, purchased waterfront acreage upon which it planned to construct a condominium complex. The company knew that the site had been illegally used as a hazardous waste storage facility and, before the sale was finalized, had conducted a survey to ascertain the extent of any danger. The survey determined that the property was a proverbial "timebomb" which would cost upwards of $1 million to remedy.

The State of New York brought suit under CERCLA to compel a cleanup of the property and to have the land development company reimburse the State for its "response costs," e.g., those costs incurred in assessing the conditions of the site and supervising the removal of the hazardous waste. Interpreting CERCLA, the Appellate Court held that Section 9607(a)(1) imposes absolute liability on the owner of a facility from which there is a release or threat of release of hazardous waste, regardless of causation. Consequently, the landowner was responsible for the repayment of cleanup costs to the State and Federal governments, both of which acted in this instance on a cost-sharing basis pursuant to authorization under CERCLA.

Bankruptcy Filing Shields Waste Firm From Cleanup Liability

Although liability is expanding against generators and landowners of hazardous waste, the U.S. Supreme Court recently ruled that the Bankruptcy Code may, under certain circumstances, exonerate a hazardous waste disposal facility from liability if the company files for bankruptcy. In the case of Ohio v. Kovacs, 83 L.Ed 2d 649 (1985), the high court permitted a business to use the bankruptcy laws to avoid its existing obligations resulting from a state-ordered toxic waste cleanup.

In Kovacs, the State of Ohio filed suit against Chem-Dyne Corporation, an industrial waste company and its chief officer and only shareholder, William Kovacs, for state hazardous waste violations. As a consequence of this action,

Kovacs signed a stipulation with the State agreeing to stop storing hazardous waste materials on his property and remove specified waste from his property. Kovacs subsequently refused to comply, resulting in the State appointing a receiver to take control of Kovacs' property in order to supply the State with assets for its cleanup costs. However, before the receiver could carry out his objective Kovacs filed personal bankruptcy.

Ohio tried to set asides Kovacs' claim that his obligations should be cancelled. The State's argument was that Kovacs' obligation was not a "debt" or a "liability on a claim" under the Bankruptcy Code. The Supreme Court, in support of the lower court interpretation, did not agree. The Court explained that for bankruptcy purposes, Kovacs' debt is a liability on a claim. As a result, Kovacs' obligation to pay the State, like his other financial responsibilities, could be set aside under the Bankruptcy Code.

Although the cleanup order was reduced to a monetary obligation which the Bankruptcy Code defined as a claim, Justice O'Connor pointed out in her concurring opinion that states still have remedies to collect against the assets of companies and individuals who violate hazardous waste laws. Depending on the construction of a state's laws, a state can give statutory priority to cleanup orders over other bankruptcy claims which them must be honored by the bankruptcy courts. Therefore, a state still can protect its interest in environmental law enforcement by giving cleanup judgments the same level of recognition as statutory liens or secured claims.

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SESSION V. TECHNOLOGIES FOR WASTE REDUCTION

Moderated by Dr. Robert Laughlin, Manager,
Canadian Waste Materials Exchange, Mississauga, Canada

USE OF SYNERGISTIC EFFECTS MODELING FOR IN-PLANT WASTE REDUCTION AND ENERGY CONSERVATION, William E. Tabor and David G. Dempsey, P.E., Enwright Associates, Inc., Greenville, South Carolina

As some of you may recall, Enwright Associates was represented at the Waste Exchange Conference in Tallahassee, Florida, last year. At that time we were gathering data for inclusion in a computer program that simulates and models the interactions which may occur between waste streams. The first phase of this program, developed under a Department of Energy (DOE) contract, has been completed. The information supplied by the participants in last year's conference was very helpful in its development. Because of the special help we received from you, we are very pleased to be able to share with you some of the results.

The computer program, as it currently exists, has a qualitative level and a quantitative level which analyze the interactions between two different industrial effluents. Its genesis, however, was an effort to reduce the treatment needs of a plant having multiple intra-plant waste streams. For this reason, it is particularly appropriate that this presentation be made during this session.

Enwright's interest in the interaction of waste streams was stirred in the mid-1970s. At that time, the Environmental Protection Agency (EPA) proposed Effluent Guidelines for the electric utility industry. These guidelines required the separate treatment of individual streams within a power plant prior to discharge. Enwright was working on NPDES permitting and conceptual design for several of these plants. One of our clients had a total of 11 separate waste streams containing such contaminants as metals, oil, and suspended solids. In order to comply with the requirements, the power company would have had to operate 11 separate treatment facilities. In an effort to help the client avoid the high cost of multiple treatment systems, Enwright conducted studies to determine the effects of combining two or more of these waste streams. There were, of course, predictable effects such as neutralization by mixing high and low pH streams. There were also several unforeseen favorable effects such as metals precipitation and coagulation of oil and grease. Enwright scientists could only speculate on the mechanisms that caused these unpredicted favorable effects and no work was conducted at that time to quantify them. As a result of the information supplied by Enwright,

the EPA allowed a variance, in Region IV, to allow the beneficial mixing of waste streams prior to final treatment and discharge. Only 3 discharges of the original 11 discharges are now regulated by an NPDES Permit, and the plant has met all of its limits since that time without the use of commercial chemical treatment other than final pH adjustment. Since the time of our study, additional work on the synergistic effects phenomenon of "co-precipitation" has been conducted by the Electric Power Research Institute.

Another case of beneficial mixing of waste streams was encountered soon after the power plant study. Enwright found that waste from the acetylene manufacturing industry could be used as an effective pH adjustment chemical for other industries. After observing several such cases of beneficial mixing of wastes, Enwright sensed a need for additional technology in the area of waste stream interactions. Our initial investigation revealed several cases where beneficial mixing of waste streams was being used. In Milwaukee, Wisconsin, pickle liquor from steel mills was being supplied to municipalities for pH adjustment. In Pasadena, Texas, paper wastes, low in ammonia, were mixed with refinery and chemical plant waste resulting in improved treatment at less cost. In Turner Falls, Massachusetts, it was found that waste fiber and microstrainer sludge from the Strathmore Paper Company increased efficiency of the municipal treatment system. Finally, as a common example, a Uniroyal Corporation plant in Connecticut was supplying spent sulfuric acid to two other local industrial facilities for neutralization.

Although some interactions, such as pH, are well-defined and documented, Enwright could find little information discussing quantification of many other potentially beneficial interactions. We then set out to develop the technology to identify, document, and quantify other potentially interactive waste stream combinations that had not already been studied. This technology would address three possible interactions.

1. Synergism - Interactions resulting in a decrease in required treatment and generally resulting in energy conservation.

2. Antagonism - Interactions resulting in an increase in required treatment and generally resulting in energy consumption.

3. Hazard - Interactions resulting in a dangerous condition.

In late 1984, Enwright received a cost-reimbursable contract from the Department of Energy for the study of synergistic waste stream interactions and the resulting reduction of

energy consumption when such interactions occur during waste water treatment in the chemical industry. The synergistic waste treatment research was begun in three areas: (1) determination of waste water characteristics for selected industries; (2) waste water treatment technologies employed and their associated energy requirements; and (3) potential pollutant interactions that could influence energy consumption or cost. Twelve Standard Industrial Codes (SICs) listed in Table 1 were selected for initial examination of their waste stream characteristics.

TABLE 1

INITIAL LIST OF INDUSTRIES SELECTED FOR STUDY

SIC number	Type
2812	Alkalies and chlorine
2816	Inorganic pigments
2819	Industrial inorganic chemicals not elsewhere listed
2821	Plastic materials, synthetic resins, nonvulcanizable elastomers
2823	Cellulosic man-made fibers
2824	Synthetic organic fibers except cellulosic
2843	Surface active agents, finishing agents, sulfonated oils and assistants
2851	Paints, varnishes, lacquers, enamels, and allied products
2861	Gum and wood chemicals
2865	Cyclic crudes, cyclic intermediates, dyes, and organic pigments
2869	Industrial organic chemicals not elsewhere listed
2891	Adhesives and sealants

The primary sources of data for this part of the study were EPA Development Documents for Effluent Guidelines. Information on typical untreated waste stream pollutant concentrations, typical treated waste stream pollutant concentrations, and suggested discharge limitations was gathered for the program's database. Of the original SICs studied, sufficient data were found for all but four. The industries not appearing in the database are SICs 2823, 2843, 2851, and 2891.

Information on waste treatment technologies was gathered from several sources and covered the range from standard processes, such as biological treatment, to advanced methods such as ozonation and distillation. Sources for energy information included several DOE and EPA publications. The information presented in some of the EPA publications was oriented toward domestic waste water, therefore, much of the data had to be modified to apply to industrial treatment applications.

The most interesting research was that of identifying and documenting the potential interactions of waste stream pollutants. Through literature search, our own experience, and contacts with many organizations such as waste exchanges, an initial list of 34 potential synergistic interactions was compiled. Several more interactions, both synergistic and antagonistic, have since been added, yielding a total of 85 as of this writing.

In our research we found several applications of synergistic effects in the treatment of industrial waste. Some of these interactions actually result in the production of useful products. One Allied Corporation plant combined two waste streams containing hydrofluoric acid and lime-filled calcium fluoride solids to produce synthetic fluorspar, a saleable product. The use of this synergistic effect reduced their waste treatment lime requirement by 1,000 tons per year and resulted in a payback of about $1 million per year. As another example, the Du Pont Corporation mixes sulfuric acid waste stream from KEVLAR fiber production with a stream containing calcium carbonate to form calcium sulfate. The calcium sulfate is used to produce plaster board (Beltz 1986).

After finding several examples of synergism and antagonism, we developed mathematical algorithms that the computer could use to simulate interactions, treatment processes, and energy requirements. The simplest "interaction" is economy of scale. This premise states that the cost per gallon is inversely proportional to the flow. The alogrithm, therefore, is the sum of the flows. Although not technically a stream interaction, this effect is synergistic from an energy standpoint.

Only slightly more complex is the effect of dilution. Simply stated, the concentration of each pollutant in the mixed stream is equal to the weighted average of that pollutant in the two separate streams. The dilution effect may be synergistic because a pollutant that exists in one stream at a concentration exceeding the effluent limit may exist in the mixed stream at a concentration less than the discharge limit. Although EPA does not recognize dilution as a treatment method, it may be a beneficial by-product of synergistic treatment. By the same token, the dilution effect may be antagonistic if the pollutant still requires removal.

Some treatment processes lose efficiency as the initial concentration level of the pollutant decreases.

We have modeled the pH parameter. Not only is pH considered a pollutant, but it has an effect on other pollutants. It has an effect on the solubility of metals, the activity of chlorine, the effectiveness of coagulants, and many other aspects of waste water treatment. Since pH is a logarithmic function, the pH of the mixture cannot be calculated using the weighted average. In addition, the amount of pH adjustment chemical has to be calculated and added to the treatment cost. Enwright developed an algorithm to perform these calculations.

Continuing our development of several other algorithms, we included one for carbon adsorption. To be developed are the even more complex models for such things as metals removal. The solubility of metal ions is dependent on several variables with pH having the greatest effect. The initial metal concentration and the presence of other metal ions also affect the solubility. We plan to continue the development of this and other more complex algorithms.

During the time Enwright has spent on this project, we have identified many other areas in which this type of information could be useful. One of the most exciting was that of in-plant waste stream analysis. This model can identify those streams that should or should not be mixed, and can also be used to identify the most efficient order of mixing for those that are compatible. A recent example of the need for such technology occurred when one of our clients found a high total cyanide concentration in his waste stream while the free cyanide level was zero. The combined cyanide was found to be a ferrocyanide complex. Upon examining his individual contributing streams, it was found that boiler blow-down waste water was being introduced into the stream prior to the cyanide destruct system. The high iron content of the blow-down water was apparently complexing with cyanide to form sodium ferrocyanide which is not removed by the chlorination process. As a result of this study a recommendation was made to change the order of mixing the in-plant streams. For cases of this type, the qualitative portion of the computer model can help predict and interpret interactive effects.

Another possible use of this technology would be to determine synergisms, antagonisms, and hazards that may occur in a possible exchange of waste. With the use of the quantitative model the cost benefit of exchanges may be predicted. A great number of other possibilities will appear as the development of this technology progresses. We would like to enlist your support in furthering this work. Any information you may have on waste stream interactions would be very useful in our effort to build a usable model. We also

request that you indicate your support for this type of research directly to the Department of Energy in Washington, D.C.

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SESSION VI. BROKERAGE OF INDUSTRIAL MATERIALS

Moderated by Raymond H. Rozen, Vice President, Chem Sources, Inc., Mission Hills, California

SELLING OFF-SPECIFICATION AND EXPIRED SHELF-LIFE CHEMICALS,

Philippe LaRoche, Canadian Inventory Exchange, Quebec, Canada

Shelf-Life

The shelf-life of a chemical is a somewhat arbitrary term to describe the length of time during which a product is considered to be at its maximum activity and potency. Most manufacturers determine a shelf-life for their products based on a fairly reasonable estimation of how long they can guarantee their quality and efficiency.

This approach is very fair, since companies could obviously not guarantee a product forever, but we know by experience that most chemicals have a much longer life than their established shelf-life and are perfectly suitable for resale, most often when they were stored in the recommended conditions. When a specific chemical becomes obsolete or has passed its shelf-life and is no longer useful for its owner, some manufacturers will accept the material back, sometimes with a handling charge, but most companies refuse to do so. This is where waste exchanges come in. After a proper study of the out-dated chemicals, and with a good knowledge of the market, waste exchanges and brokers should be able to resell a good part of those products.

Some companies might consider it too big a risk to buy out-of-date materials, but of more than 1600 such transfers over the last nine years, only two products had to be taken back because they were not satisfactory. The risk has been greatly minimized by a proper physical inspection, sampling of all products, and a chemical analysis whenever required. Approximately 20 to 30% of out-of-date surpluses are not suitable for resale or may represent a risk for the buyer. In those cases, disposal of the material is the only alternative suggested to the owner.

A proper selection of industries to which out-of-date chemicals will be offered can also enhance the chances of reselling a surplus. Food or pharmaceutical companies will generally not be interested in such materials because of their strict buying policies, but a wide range of industries with less severe policies might find the products perfectly adequate.

Some typical examples of out-of-date exchanges are:

- Citric Acid used in liquors transferred to graphic ink manufacturers;
- Ascorbic Acid for vitamins used in feed-grade products;
- Corn Syrup used in vitamins sold as cement additives;
- Mink Oil for hand lotions transferred to shoe polish manufacturers.

OFF-SPECIFICATION CHEMICALS

Of the three kinds of off-spec chemicals, the ones that have suffered a slight change in color, odor, or texture due to age are the easiest ones to resell, as long as their chemical properties have not been affected. Companies with a less critical application or where the final product does not require consistency in color, odor, or texture are the most likely buyers. Chemicals that have undergone a change in consistency, such as caked powders, crystallized liquids, lumped flakes or granules, can be processed by a third party, or sold "as is" to an end user equipped to handle those products.

The most difficult products to resell are obviously in-process or damaged batches with chemical or physical properties differing from the originally expected results. The only possibility in such cases is to submit the product to a network of chemical consultants (and waste exchanges) to evaluate the resale potential of the product and suggest either its modification or disposal. When dealing with off-spec chemicals, it is extremely important to make sure that the end users are professional and reliable people who know how to treat these kinds of products with minimal risks and are aware of all regulations involved. Submitting out-dated or off-spec materials to waste exchanges could therefore substantially reduce disposal costs and simultaneously represent a good step towards recovery and reuse of recyclable materials.

In spite of their importance, off-spec and out-of-date chemicals represent only about 20% of the transfers of the Canadian Inventory Exchange. Seventy percent of all the chemicals handled are virgin chemicals still in their original containers and falling in the following categories:

- Excess inventory

- Changes in formulations resulting in surplus raw materials
- Discontinued line of finished products resulting in surplus raw materials
- Balance stocks from mergers
- Balance stocks from closings
- Balance stocks from bankruptcies

Approximately 10% of the exchanges are by-products, chemical streams, or waste materials, but the requests for handling these kinds of surpluses are increasingly frequent and will certainly become a major focus in the very near future.

The Canadian Inventory Exchange service is fully computerized and is interested in joining forces with a centralized databank, backed by a nationwide network of waste exchanges, brokers, and agents. This could significantly increase the efficiency of the services offered and make the whole concept of waste exchanges much more appealing to the industries. The main advantage of this database would be to rapidly advise thousands of potential buyers of a new listing, without having to wait for the next printed catalog. Many companies and organizations share the same objective and no effort should be spared to implement that network, opening doors to a mutually profitable cooperation between American and Canadian exchanges.

REUSING URETHANE RAW MATERIALS, Richard E. Kuljian, AM & Associates, Huntington Beach, California

Background

Of the thousands of chemicals known to man, I would like to discuss a small fraction of them known as urethane raw materials. As we know, polyurethanes play a key role in our everyday lives. We see elasmeric polyurethanes used as bumpers by the automobile trade to reduce vehicle weight and increase fuel mileage. We see rigid urethane foams used for insulation and marine flotation. We also come in contact with flexible polyurethane foams every day when we sit in our car or on our sofas and chairs.

The domestic urethane market is estimated at well over a billion pounds annually, and these liquid raw materials are handled by over a thousand firms. Naturally, with this volume of product produced you can imagine the volume of product that is not converted to a finished article by the orig-

inal consumer. This nonusable volume may range from being contaminated to merely having exceeded its shelf-life. AM & Associates' role in urethanes is to seek out and purchase these surplus products, and to reprocess and convert them into new low-cost systems for reuse in the same fields.

Chemicals Sought After

AM & Associates is in the market for the following types of chemicals:

1. Polypropylene Glycols of any molecular weight (Polyester, Polyether and Copolymer Polyols)
2. Any form of TDI and MDI isocyanates
3. Amine- and tin-based catalysts (Alkanolamines and Alkylamines)
4. Silicone-based surfactants
5. Miscellaneous additives such as flame retardants, plasticizers, and pigments

Potential Generators

The generators of these nonusable urethanes include the following:

1. The original chemical manufacturer
2. Compounders and formulators who supply end users
3. The end users themselves

AM & Associates can identify and are already working with most of the generators in categories 1 and 2. However, the end user represents the segment of industry that is by far the largest (over 1,000 end users) but is also the segment that could utilize our services the most. Many of these end users are firms with less than 20 employees. Consequently, the waste disposal fee pinches their wallet more so than for larger companies. This leads to Environmental Protection Agency (EPA) violations such as the "90 DAY RULE."

Low Cost Applications

Since the supply and quality of urethanes varies greatly from month to month, AM & Associates must blend these chemicals for use in extremely noncritical applications. These

applications include simulated wood parts such as picture frames and signs, insulation for spas and jacuzzis, and rebonded carpet underlay.

Industry Savings

We believe that our company offers a true win-win situation to the entire urethane environmental arena. We help our suppliers by having them avoid hefty disposal costs, we offer our customers a low-cost product compared to more expensive commercial ones, and we help keep our environment cleaner by reusing products that would otherwise be landfilled.

In 1985 alone we reprocessed over five million pounds of urethanes at a savings to the industry of an estimated $1,000,000. If you know of any urethane company who has a problem with their products we would more than welcome the referral.

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SESSION VII. Recycling Associations: A Roundtable Discussion

Moderated by Lewis Cutler, Manager,
Northeast Industrial Waste Exchange, Syracuse, New York

REMARKS, Michael Haskes, National Metals Company, Phoenix, Arizona

The National Association of Recycling Industries (NARI), was founded in 1913 and through the years has been internationally recognized as an innovator in seeking opportunities to increase recycling of economically important raw materials. The Association has approximately 1,000 member companies in the United State, Canada, and many foreign countries. They include the processors, merchant-brokers, importer-exporters, and industrial consumers of recycled metals, paper, textiles and rubber. Metallurgical interests -- aluminum, copper, lead and zinc, stainless steel, and iron and steel -- comprise about 75% of the organization's membership.

NARI is unique among industry trade organizations, as it represents both the processors of recycled materials and the industrial consumers who utilize these same materials in the manufacture of semi-finished and finished products. It has seven major commodity divisions representing the principal sectors of recycling activity. NARI has four regional divisions: Eastern, Midwestern, Southern and Western. The Association also has seven "regional centers," comprising 11 major urban marketing areas in the United States. The purpose of these regional centers is to generate more localized contact among recyclers and, at the same time, provide NARI members with low-cost meetings that offer marketing, operational, and regulatory services on a more direct basis. NARI has scheduled 23 regional center events in the first half of 1986, and many others are planned for the coming months.

The Association's services cover a wide range of industry interests in the areas of economics, operations, and technology. It sponsors educational programs on marketing, management, plant operations, technical affairs, and legislative matters.

The industry we represent is, of course, of vital national importance. In 1985, for example, almost 1.5 million tons of copper scrap were consumed by domestic smelters and refiners, making up 45% of the nation's copper raw materials. Over 2 million tons of scrap aluminum were utilized, about 30% of these raw materials and over 600 thousand tons of scrap lead were consumed, close to half of the total raw

materials supply. About 175 thousand tons of scrap zinc, making up 20% of the raw materials share; 600 thousand tons of stainless steel scrap, about 47% of the total raw materials used; and 37 million tons of iron and steel scrap were consumed, amounting to close to 30% of all of the ferrous raw materials utilized by American industry. These millions of tons of scrap metals were converted into useful metallic products and materials. Each year, NARI members also help recover some 12 million tons of waste paper, and close to 2 billion pounds of waste textiles and rubber, all of which are also recycled into new products and materials.

These numbers are certainly dramatic, especially in light of the relatively poor market conditions for all industrial commodities in 1985. Although scrap consumption was generally lower compared to 1984 levels, modest increases in their shares of the respective raw materials markets were posted for scrap aluminum, zinc, and stainless steel.

That's only part of the story. In addition to meeting domestic needs, NARI members ship vast tonnages of recyclables overseas to America's trading partners. These exports help bolster the nation's balance of payments position, and expand international business opportunities. A strong U.S. dollar notwithstanding, last year was extraordinary, as record amounts of nonferrous and ferrous scrap were shipped to countries in Asia, Europe, and Latin America.

Here at home, all of this recycling activity fosters effective solid waste management, it enhances the environmental welfare of states and communities, and it cuts energy cost outlays. The use of recycled materials in the manufacturing process saves significant quantities of energy units.

Most important, the cycle of materials recovery and reuse helps reduce mounting solid waste disposal costs and related economic burdens. It is the most effective manner in which to keep certain metals -- deemed "hazardous" by OSHA or the EPA -- <u>out</u> of the solid waste stream altogether. NARI's diversified structure, bringing together all segments of recycling, provides it with unified strength in seeking greater opportunities for the recovery and reuse of waste materials.

This representation has enabled the Association to secure landmark economic objectives in behalf of recycling. These include a first-of-its-kind tax incentive on recycling equipment. For almost four years (1978 to 1981) this brought "bottom line" economic assistance to everyone involved with recycled materials. There are also the reduced railroad freight rates and a guaranteed maximum rate cap on recycled nonferrous metals, waste paper, rubber, and textiles. The recycling industry alone has the benefit of such a rate cap. It is one that the railroads cannot

exceed, as it is linked to a specific revenue-to-cost ratio of 152.5%.

NARI efforts have also resulted in the maintenance of "free trade" policies in both the import and export of scrap commodities, assuring their universal availability in the marketplace undistorted by government intervention. Further, NARI affords the recycling industry effective representation to counter unrealistic hazardous waste, right-to-know, and other regulations that detrimentally impact waste materials recovery. This enables the industry to suggest positive proposals that recognize the important economic and environmental role of recycling.

Our Association sponsors a wide range of programs to maximize the recovery of recyclable materials and expand markets for recycled materials of all kinds. A comprehensive scrap metals research program is now being conducted with the Bureau of Mines. NARI is actively involved at all levels of government to expand existing markets and create new ones for recycling. Much of this activity is conducted through its State and Local Program and Field Services Operation.

NARI also brings the recycling industry's concerns, potentials, and objectives to world attention through programs of public and community relations to create a climate of greater understanding and economic opportunity for the industry. This, in turn, generates greater awareness of recycling's economic and environmental importance.

In terms of resource recovery and solid waste management at the state and local levels, we believe that a comprehensive, well-balanced approach is needed between government agencies and the private recycling industry. Recyclers have the operations, technological, and marketing expertise to assure the long-term success of such recovery programs. Waste management policies, established on a cooperative basis, preclude the useless, unconscious expenditure of public funds for the construction and operation of already-existing recycling facilities or the implementation of waste recovery efforts already performed by the taxpaying private sector.

To this end, NARI is urging the following:

One -- Policies to create new markets and expand existing ones for recyclables. We believe that government agencies can help generate markets for recyclables through the establishment of procurement guidelines requiring the inclusion of maximum content of recycled materials in all products and supplies that they purchase.

Two -- Economic incentives such as tax credits, that help promote investment in recycling equipment and facilities. State income and corporate tax assistance for industries

that utilize recycled materials encourages continuing, increased use of these materials. Recycling operations, which are manufacturing activities, should also be recognized as such by state authorities. This removes from recyclers the burden of having to pay sales taxes on the equipment they purchase, and allows them to expand their operations.

Tax exemptions for the industry are an important factor too. For instance, NARI has successfully supported an exemption for recycled metals from feedstock product and the waste disposal end taxes. This precludes recyclables from being subject to tax burdens which would undermine the recovery and reuse of scrap metallics.

That, gives you a general idea about NARI's organization structure, and some broad-based thoughts about its programs and its goals. The Association's Headquarters Office is in New York City and its Field Services Office is in Washington, D.C. These locations give NARI immediate access to emerging industrial, communication, governmental, and legislative events.

THE INVESTMENT RECOVERY ASSOCIATION, Manila G. (Bud) Shaver, Chairman, Chemical Commodity Committee, Investment Recovery Association (also, Manager, Resource Recovery Department, 3M Company), St. Paul, Minnesota

The Investment Recovery Association is a nonprofit association incorporated under the laws of Michigan. Membership is limited to companies having an Investment Recovery Program for the disposition of surplus assets.

The purpose of the Association is to:

FOSTER the study, development, and implementation of improved techniques for the disposition of surplus assets.

FACILITATE the interchange of Investment Recovery ideas among its members.

IMPROVE the Investment Recovery skills of its members.

ASSIST in the development of Investment Recovery Educational Courses.

PROMOTE Investment Recovery as a profession.

The first appearance of an organization such as the Investment Recovery Association was noted in the Salvage and Reclamation Bulletin on the National Association of Waste Material Dealers, Inc., dated April 15, 1929. Those companies, according to the Bulletin, were faced with disposal problems similar to those we struggle with today.

The actual forerunner of the Association was an informal conference that had its beginning in 1956 when representatives of several industrial firms met to discuss mutual problems in disposing of excess materials. Beginning in 1958, two meetings of the "Industrial Salvage Conference" were held annually. This organization continued to grow slowly and by the 25th meeting in April 1969 35 companies were represented.

During this period, a question had been raised a number of times concerning a formal organization of an Investment Recovery Conference. Finally in April 1981, a motion was passed to form the "Investment Recovery Association" with 50 firms as charter members.

Today the Association, which has its executive offices in Cleveland, Ohio, has approximately 170 member companies representing firms from the Fortune 500 list to smaller firms. Member companies represent a cross-section of American industry to include those who provide products and services from the chemical, petroleum, railroad, utility, forest, electronic, aerospace, food products, pharmaceutical, etc., industries. Association membership includes firms with long-standing investment recovery departments and those just initiating such activities.

The Association has five commodity committees: Dismantlements, Surplus Equipment, Recovery of Inventories, Scrap Metals, and Chemical Commodities of which I am the current Chairman.

The Association hosts two conferences per year primarily directed at "How To Do" topics for the membership. These topics range from subjects such as: how to start an investment recovery activity; how to locate markets; how to establish prices; how to negotiate; and, most importantly, how to sell investment recovery to management.

Those of us involved in the commercial recycling business have an identity problem. An example of this syndrome is the various synonyms used to describe our activities such as investment recovery, salvage, surplus, asset redeployment, materials reclamation, resource recovery, or, as some refer to my department, "Sanford and Son."

Regardless of what it is called, often management and our other department peers may not know what a recovery manager

does. Like Rodney Dangerfield, we often "Don't get no respect!"

The Investment Recovery Association has begun to address this problem with a definition of investment recovery as "a program to identify and reuse or dispose of surplus assets generated by an enterprise in the pursuance of its primary business."

There are a couple of terms in this definition that are very important. The first and foremost is the word PROGRAM which implies that there must be a systematic approach to recycling at the generating location. The sale of scrap materials is not an investment recovery program unless it has been determined that is the best recovery option.

The second significant word is ASSET, which can be defined as "anything that has value to someone." Generally while the asset may have no value to the generating location, it does have value to someone else. The problem is the time it takes to identify that someone else. Normally the generating location wants the unneeded asset out of sight as soon as possible and does not have the patience to wait until a recovery opportunity is identified; hence, they scrap the asset. Since a dollar recovery opportunity has not yet been identified, the generating location's management accepts the cost of disposal as a normal part of doing business instead of viewing it as a "lost" business opportunity.

We in the recovery business must recognize this dichotomy of attitudes toward surplus assets and do our best to serve both the needs of the generating location and our management. We may have to handle the asset twice, first to get it out of the way of the generating location so as not to impede their operation, and again when a maximum recovery opportunity has been identified.

The third term is DISPOSE which means, to we recovery managers, "find someone else who can use the surplus asset." Disposal options, listed in order of most profitable to least profitable, are: reuse within the company; return to the original vendor; sell on the open market; trade-in when buying something; recondition or rebuild; donation; and lastly scrap, dismantle, or destroy.

Simply put, commercial recycling is effectively identifying surplus assets and finding a viable reuse or disposal opportunity that maximizes the return on asset utilization. In short, we are primarily identifiers or finders. If we can't identify a use within the company, then we must find a market. This is when the recovery manager interfaces with those who operate and manage waste exchanges.

Effective recycling programs require personnel who are aggressive and entrepreneural in spirit. They must be snoopers getting into the factory work areas and warehouses to identify surplus assets, particularly those assets which have been set aside in case "they might be needed someday." They also must possess salesmanship ability to convince others to utilize a surplus used asset instead of buying a new one and to convince management that recycling increases the return on assets adding to the company's bottom line. Recovery managers must view surplus assets as opportunities.

Although the Environmental Protection Agency (EPA) has recently encouraged recycling of materials by tightening restrictions on the use of landfills, "Recovery" has been the forgotten "R" in Resource Conservation and Recovery Act (RCRA) in what has been for years a disposal-oriented society. As a result, recovery has been suddenly thrust to the forefront as an environmentally sound and cost-effective way to handle a variety of wastes and by-products. Today with the increased and expanded enforcement of RCRA regulations, demand has increased among generators for more recycling options such as those offered by Waste Exchanges.

Today American industry is competing with foreign firms, many who are not required to comply with the same regulations American companies must. The Congressional Budget Office has estimated that American private industry spent a maximum of $5.8 billion for the disposal and treatment of hazardous wastes during 1983 and this cost is expected to double by 1990. These additional costs add to the manufacturing cost resulting in increased consumer prices.

If American industry is to remain competitive, we in the recycling business must seek every opportunity for recovery of surplus assets while remaining cognizant of the liabilities. The rewards will be great for those who find such opportunities.

SMALL GENERATOR COOPERATIVE EFFECTS ECONOMICAL RECYCLING,
M.E. Malotke, TENCON Associates, Cincinnati, Ohio

Abstract

This paper presents the method used to evaluate wastes generated by a large group of Cincinnati automobile dealerships for whom recycling of spent solvents was not economical on an individual basis. The analysis of the waste material and the group strategy for pick-up and handling are described, as well as the processing and reusage, and the cost to members.

Association Approach

The recycling companies in southern Ohio are located near Dayton, over 50 miles from northern Cincinnati. Because of the distance, the recyclers were reluctant to set up a milk-run pick-up system for businesses such as auto dealerships, which averaged one to two drums per month of hazardous waste. Through the Cincinnati Chamber of Commerce, Solid Waste Subcommittee, TENCON Associates was asked to put together a program to assist small companies in meeting the new "small generator" regulations, and at the same time promote recycling of valuable resources.

TENCON, in conjunction with the Greater Cincinnati Auto Dealership Association, approached the dealers and suggested the formation of a uniform laboratory/labeling/handling system that would reduce the cost per gallon recycled and allow expeditious handling of these small quantities of waste solvents throughout the Cincinnati area.

Analysis/Waste Profile

The initial approach was an environmental audit of seven random dealerships in the area to determine common wastes and collect samples for analysis. The wastes and waste oils were analyzed for the dealerships, and the results were profiled to determine what variations might occur in the waste streams. The results were surprisingly uniform, reflecting the common procedures used for automobile maintenance.

At the end of the evaluation, it was discovered that dealers have three to four recyclable waste streams. These were:

1. Lacquer thinner with paint sludge
2. Degreasing solvent (mineral spirits) with high lead content in the sludge
3. Spent carburetor cleaner (methylene chloride)
4. Waste gasoline
5. Waste oil

A given dealership generation averaged:

One to two drums of thinner/body shop/month

One drum degreaser/two months/dealership

Five gallons carburetor cleaner/six months/ dealership

One drum gasoline/six months/dealership

250 gallons of waste oil/dealership/month

The waste oil was set up on a separate pick-up system using a waste-oil dealer from the Dayton area, Clark Oil Company. Since the quantity was sufficient in any given month to allow them to plan a weekly routing in quadrants of the city, no "small quantity" handling fees were necessary.

Hazardous Waste Handling

The remaining drummed material, identified as hazardous due to lead content, was entered on a computer record dealer-by-dealer. The initial lab work allowed these materials to be identified as Hazardous Flammable Liquid N.O.S. This minimized the labeling and manifesting variations.

Each dealer was given directions for labeling, dating, and storage. His initial amount of waste was entered into the computer file for his dealership. The computer system generates a list of dealerships along a given route which have not had a pick-up for more than four weeks. A phone call sheet is established, and a clerk phones the "route" approximately one week ahead of the recycler's trip on that route.

The truck is usually two-thirds full with large pick-ups, and the recycler is glad to make three to four additional stops per trip to fill the truck. Approximately once per month they devote one day to dealerships that are not on main routes, and who by that time have accumulated two or three drums each. This scheduling has eliminated any pick-up or handling charge on the dealership's part. Fees for the computer and clerical time are approximately $35 annually.

Recycling Processes

Lacquer Thinner

The lacquer thinner is stripped/distilled and the sludge consolidated at the recycler. The thinner is evaluated for quality and is then sold for several applications.

- auto-body undercoating shops for use in thinning and application gun cleaning
- small steel fabricators for use in priming (some color allowable)

Lacquer thinner that does not meet minimum specifications is separated and blended in fuel once the sludge is removed.

Degreaser

The degreasing solvent, basically mineral spirits, is filtered when feasible and reblended with new material to be sold as a lower-grade mineral spirit. Several of the dealerships purchase this lower-grade mineral spirits for reuse in degreasing. By blending at a 50/50 ratio, the material is kept "active" enough to perform well while reducing costs. The degreaser lead sludge, removed either by filtration or distillation, is added to the paint sludge for solidification and disposal. Solvent that is too "dirty" is blended into the asphalt fuels program.

Carburetor Cleaner

Carburetor cleaner, the other common solvent waste from auto dealerships, is kept in open buckets for the entire usage period, so that little solvent remains. This low percentage of solvent, and the small quantity generated per dealership (5 gallons/6 months) indicates that the best alternative for this material is disposal. Although disposal costs are higher, handling costs are eliminated since the recycler picks up the material with the solvent drums. They consolidate the material and remanifest it to a chlorinated waste-disposal service as full drums.

Gasoline

The spent gasoline, usually contaminated with water or sugar, is blended into the fuels program. In most cases, gasoline that is sent from a dealership is of such poor quality that reuse in any vehicle would be suspect, especially when the full fuel value can be recovered in an asphalt fuels program.

Program Costs

The program, on average, costs a dealership $350/year. Larger dealerships average $550/year. This includes a minimal $35 annual fee to cover the computer scheduling. Degreaser, on a trade-out basis, costs $5 per drum over the nonbulk raw material cost, and lacquer thinner, with 8-10 inches of paint sludge, averages $60 per drum. Contaminated gasoline averages $35 per drum.

This cost is offset by the money received from the waste oil, which runs $150 to $250/year. This means that net dealer cost is $100 to $200/year. In addition, the dealerships have met all federal and state regulations with regard to Environmental Protection Agency (EPA) ID number, have

maximized the recycling of their waste materials, and have minimized any economic impact on themselves.

An evaluation of the cost to handle these waste materials without the Association indicates a potential increase of $600/dealer/year. In addition, the use of the computer for scheduling allows a yearly printout of the wastes handled, which can go directly on the generator's annual reports.

Conclusion

At this time, the Chamber of Commerce, TENCON Associates, and the Cincinnati Auto Dealers Association feel that the return from the "pooled" effort is well worth it. It is estimated that some 88,000 gallons of solvent/sludge material and some 265,000 gallons of waste oil will be recycled annually through this effort. The challenge now is to broaden the scheduling/laboratory assistance to other groups.

AN INTRODUCTION TO THE NATIONAL RECYCLING COALITION AND THE NEW HAMPSHIRE RESOURCE RECOVERY ASSOCIATION, Gary J. Olson, Executive Director, New Hampshire Resource Recovery Association and Finance-Vice President, National Recycling Coalition, Concord, New Hampshire

What I would like to accomplish is to introduce you to the New Hampshire Resource Recovery Association (NHRRA) and the National Recycling Coalition, briefly review each group's goals and activities, and invite you to become members. My focus is really to discuss how people are working together to develop recycling as a major and dependable waste-disposal option.

The National Recycling Coalition has been in existence since 1978. It seeks to bring together divergent groups from both public and private recycling sectors to work together in society's waste stream. Its members have worked in the legislative-governmental areas such as getting the Environmental Protection Agency (EPA) to develop recycled paper procurement guidelines. In the field of education the National Regulatory Commission (NRC) organizes and sponsors the Annual National Recycling Congress. This year it will be in Seattle, Washington, September 24th through 26th. This event brings the leaders in recycling together with those folks just entering the field, providing a tremendous opportunity for networking and exchanging information.

Recently there has been a movement within NRC to develop regional subsets of the national organization. Examples of these efforts can be seen in New England and the Midwest.

This effort is seen as a way recyclers in a particular region can work together to focus on common issues. For example, in New England, we are addressing two key issues - recycling markets and recyclable material procurement legislation. We are seeking to strengthen existing markets and develop new, nontraditional markets. Also, with the tremendous buying power of state, county, and local governments, we are seeking to develop legislation that each of our six New England states can adopt, that will give preferential consideration to products made from recycled material - thereby stimulating the demand for these materials.

I think the major successes of NRC to date has been to bring recyclers together to share their wealth of information on successes and failures. It is obvious to me in the four years I have been in the field of waste management, that the pace of recycling interest and activities in this country is accelerating at a rapid rate.

Issues of market development, marketability of secondary materials, and development of legislative incentives for recycled materials procurement are critical issues in need of extensive work if recycling is to broaden and expand in this country. It is the goal of the NRC Board of Directors to develop the organization beyond the present loosely knit coalition, into a tightly woven fabric having a full-time paid staff, providing crucial membership services that will support local, state, regional, and federal recycling development.

I want to stop here in my discussion of NRC and move onto discussing the activities of a state-wide recycling organization, but first I want to encourage you to pick up information on the National Recycling Congress as well as a NRC membership form.

The New Hampshire Resource Recovery Association, organized in 1981, is an association of people who represent municipalities, businesses, and concerned citizens united behind the idea that waste can and should be managed as a resource. Our three major activities are education, marketing, and technical assistance. We organize the Annual New England Resource Recovery Conference and Exposition, this year it will be June 10th through 12th in Boxborough, Massachusetts. Also, we have one-day seminars focusing on specific waste issues, and finally we write and disseminate a modest, quarterly newsletter, "Recycling News." In the area of technical assistance, the Association staff provides assistance to municipalities on how to design and implement recycling programs or how to improve existing program.

Our third focus is marketing. We have designed and managed a cooperative marketing program for recyclables. This is an innovative program having received national recognition for

its efforts in 1984. The Association's staff acts as brokers for member recycling programs that choose to participate. In fiscal year 1984/85 we marketed 1,440 tons of waste paper and waste glass, generating a revenue of $28,400 for the participating communities. We are also expanding into plastics and scrap metal, and are working with the Northeast Industrial Waste Exchange for marketing industrial waste.

We have a number of interesting projects, two of which I would like to mention. The first one is called the "Cans for Computer Curriculum Guide." NHRRA is producing a curriculum guide for state-wide distribution to public and private schools explaining in detail how a New Hampshire grammar school successfully developed a student-run business that collects and sells aluminum beverage cans, generating revenue for the school. This revenue, in turn, is being used to purchase computer hardware and software for the school. The success of the program has been tremendous, with over 95% of the students in the 300-pupil elementary school participating. Gross revenues received were $13,000 for can sales over two-and-one-half school years and now the school can boast the highest computer per student ratio in New Hampshire.

The second project is near and dear to Lewis Cutler and myself. That is the development of a New Hampshire Chapter of the Northeast Industrial Waste Exchange. NHRRA sees that the next logical step in our Association's growth is in working with the private sector providing the same services that we have in the public sector - education, marketing, and technical assistance. The status of this program is as follows. We have received support and are working with the New Hampshire Office of Waste Management, The Business and Industry Association of New Hampshire, and New Hampshire Congressman, Judd Gregg. We have submitted a proposal to the EPA for two-year start-up funding, and we have solicited and received a proposal from the Northeast Industrial Waste Exchange on how the two organizations can possibly work together to increase industrial waste recycling in New Hampshire.

To quickly overview, NHRRA will actively work with New Hampshire industries, getting them involved in waste minimization, reduction, and recycling strategies. One approach will be obtaining waste listings for the Northeast Waste Exchange Catalogue and on-line computer database.

If we are successful in developing a New Hampshire Chapter of the Northeast Industrial Waste Exchange, I hope that we will provide the framework from which other state recycling associations throughout the country can broaden their range of waste recycling. The basic types of services needed by the public and private sectors are the same - education,

marketing, and technical assistance - even though the types of waste materials vary.

I also hope that our efforts in the Northeast will serve as a catalyst in having the newly forming National Association of Waste Exchanges and the National Recycling Coalition look at ways of working together - our similarities are more numerous than our differences.

KEYNOTE SPEAKERS

NORTH AMERICAN WASTE EXCHANGES: A HISTORY OF CHANGE AND EVOLUTION, Walker Banning, Roy C. Herndon, and Eugene B. Jones, Southern Waste Information Exchange, Tallahassee, Florida

Industrial waste management practices in North America have undergone significant changes during the last decade. Due to economic and regulatory changes many companies that produce hazardous as well as nonhazardous wastes are beginning to explore the benefits of waste reduction, recycling, and resource recovery. Although land disposal remains the option most commonly utilized, industrial waste managers are increasingly considering source reduction, onsite recycling, and offsite recycling opportunities.

Since the early 1970's, a network of nonprofit industrial waste information exchanges has developed throughout North America to assist in the identification of offsite recycling opportunities. These information exchanges function as centralized clearinghouses for collecting and disseminating information about wastes available from generators and wastes sought by potential users. Although it is not necessary here to describe in detail the operation of waste exchanges (see Proceedings of the First and Second National Conferences on Waste Exchange for such details), it will be helpful to review some of the historical changes and trends that have taken place during the last 10 years in order to provide a clearer understanding of the role of these industrial waste management programs in North America.

To begin with, the development of the waste exchange concept has taken a different course in Canada than it has in the United States. In Canada, a single national exchange was established to serve the entire country. Provincial exchanges linked to the national exchange are now operational in Ontario, Alberta, and Manitoba. This network is expected to result in increased effectiveness, especially in the provinces outside of Ontario.

In the United States, waste exchanges have been established and have grown through a number of independent initiatives. Only recently have these individual programs considered the utility of increased coordination and cooperation. Even though the course of development has been different in Canada and the United States, it is likely that the configuration of these exchange programs will become quite similar: a network of cooperating and mutually supporting programs.

Nonprofit Exchanges

A review of the literature on North American exchanges indicates that there have been approximately 34 nonprofit programs established since 1975 - just 10 short years ago. Of these 34 exchanges, 15 currently publish and distribute a catalog of waste materials, and 1 exchange (Ontario) utilizes the catalog of the Canadian Waste Materials Exchange. Thus, more exchanges (18) have ceased operation than are currently in operation (16).

Table 1 lists the nonprofit exchanges that have ceased operation. Ten (over 50%) of the programs were sponsored by a trade association (such as a chamber of commerce or an industrial or manufacturers association). In the majority of cases, the areas once served by the defunct exchanges are still being served by another nonprofit exchange. In some cases the entire operation of the exchange has been absorbed directly by an existing exchange (such as in the case of Virginia, Houston, Pennsylvania, Maryland and the AARRII program). Although there are many reasons why each of these programs have ceased operation, it can be generally concluded that the sponsoring organization simply could not longer justify the cost of subsidizing the operation of the exchange. That is, trade associations and for-profit corporations prefer the programs they sponsor to be self sufficient. When this does not occur (and it never does), they simply cease operating the program or have it absorbed by a larger, multi-state exchange.

TABLE 1

NONPROFIT EXCHANGES NO LONGER IN OPERATION

Exchange/location	Type of sponsor	Area now served by
Washington	trade[1]	
Oregon	trade	
Colorado	trade	
Indiana	nonprofit corp.	
Virginia	trade	SWIX[2]
Iowa	university	IMES[3]
Houston, TX	trade	IMES
Minnesota	trade	IMES
Louisville, KY	trade	IMES
Oklahoma	for-profit corp.	IMES

TABLE 1. cont.

Exchange/location	Type of sponsor	Area now served by
Columbus, OH	trade	NIWE[4]
Pennsylvania	trade	NIWE
Maryland	trade	NIWE
AARRII, NY	nonprofit corp.	NIWE
WASTE, CT	for-profit corp.	NIWE
New England, ME	for-profit corp.	NIWE
RCRA, NH	for-profit corp.	NIWE
Amer. Mat. Exchan. Network, MI	for-profit corp.	GLRWE[5]

[1]Chamber of Commerce, Industrial Association, or similar nonprofit sponsor.

[2]SWIX = Southern Waste Information Exchange.

[3]IMES = Industrial Material Exchange Service.

[4]NIWE = Northeast Industrial Waste Exchange.

[5]GLRWE = Great Lakes Regional Waste Exchange.

Nonprofit exchanges that are in operation are displayed in Table 2. (Contacts are presented in Table 3. Table 2 does not include the Ontario Waste Exchange since it does not publish a separate catalog). In sharp contrast to the defunct programs, only three (20%) of the existing programs are sponsored by trade organizations, and nearly half by national and/or state (provincial) governments (both regulatory and nonregulatory). Only four (25%) of the existing exchanges are not supported, at least in part, by government funds. All of these exchanges are subsidized, i.e., the difference between direct income from the operation of the exchange (listing, subscription, and advertising fees) and the costs of operation are provided by other sources. There are a wide variety of funding sources: private foundation, U.S. EPA, universities, state regulatory and nonregulatory agencies, trade associations, and private corporations.

TABLE 2

EXISTING NON-PROFIT WASTE EXCHANGES
CATALOG CONTENT AND CIRCULATION

	Funding	Current Listings: Available	Current Listings: Wanted	Current Listings: Total	Services Available Listings	Display Ads	Issues Per Year	Circulation	Average Annual Budget
Alberta	Provincial	248	85	333	39		4	750	42,000
California	State	89	20	109			4	2,000	[3]
Canada	Nat./Prov.	411	133	544	37		6	3,700	38,500
Great Lakes	Foundation Grant	73	17	90		Yes	6	7,000	50,000
Ind.Mat.Exch.	State	133	46	179			6	8,500	50,000
Intermountain	For-Profit Corp.						4	1,100	50,000
Manitoba	Provincial	56	48	104			4	500	14,000
Midwest	States/Fed.	48	17	65		Yes	4	8,000	80,000
Montana	State	6	8	14			6	167	5,800
New Jersey	Trade	43	22	65			3	3,200[1]	[3]
Northeast	Loc/States	87	35	122		Yes	4	8,500	88,000
Piedmont	Univ/States Trade	106	22	128	12	Yes	6	2,500	80,000
Southern	Univ/Corp Trade	41	16	57	48	Yes	3	10,000	[3]
Tennessee	Trade	18	6	24	4		4	2,500	[3]
Western[2]	U.S. EPA Grant						4	685	[4]
TOTALS		1,359	475	1,834	140	5		59,102	543,800[5]

NOTES:

1. Once a year sent to 7,000 companies as promotional effort.
2. First catalog to be published February 1986.
3. Exchange not separately budgeted.
4. Budget to be determined.
5. Includes $45,500 for Ontario Waste Exchange.

TABLE 3

NONPROFIT WASTE EXCHANGES IN NORTH AMERICA CURRENTLY PUBLISHING INFORMATION

Dr. Charlie Wood
Alberta Waste Materials Exchange
4th Floor Terrace Plaza
4445 Calgary Trail South
Edmonton, Alberta
CANADA T6H 5R7
(403) 436-6303

Mr. Robert McCormick
California Waste Exchange
Department of Health Services
Toxic Substances Control Division
714 P. Street
Sacramento, California 95814
(916) 324-1818

Dr. Robert Laughlin
Canadian Waste Materials Exchange
Ontario Research Foundation
Sheridan Park Research Community
Mississauga, Ontario
CANADA L5K 1B3

Mr. William Stough
Great Lakes Regional Waste Exchange
470 Market Street, S.W.
Suite 100A
Grand Rapids, Michigan 49503

Ms. Margo Ferguson Siekerka
Industrial Materials Exchange Service
2200 Churchill Road, IEPA/DLPC-24
Springfield, Illinois 62706
(217) 782-0450

Mr. Clyde H. Wiseman
Midwest Industrial Waste Exchange
Ten Broadway
St. Louis, Missouri 63102
(314) 231-5555

Mr. Buck Boles
Montana Industrial Waste Exchange
Montana Chamber of Commerce
P.O. Box 1730
Helena, Montana 59624
(406) 442-2405

Mr. Lewis Cutler
Northeast Industrial Waste Exchange
90 Presidential Plaza
Suite 122
Syracuse, New York 13202
(315) 422-6372

Mr. Brian Forrestal*
Ontario Waste Exchange
Ontario Research Foundation
Sheridan Park Research Community
Mississauga, Ontario
CANADA L5K 1B3
(416) 822-4111

Ms. Mary McDaniel
Piedmont Waste Exchange
Urban Institute
UNCC Station
Charlotte, NC 28223
(704) 597-2307

Dr. Roy Herndon
Southern Waste Information Exchange
P. O. Box 6487
Tallahassee, Florida 32313
(904) 644-5516

TABLE 3. CONT.

Mr. William Payne
Industrial Waste Information Exchange
New Jersey Chamber of Commerce
5 Commerce Street
Newark, New Jersey 07102
(201) 623-7070

Ms. Sharon Bell
Tennessee Waste Exchange
Tennessee Manufacturing Association
501 Union Building
Suite 601
Nashville, Tennessee 37219
(613) 256-5141

Mr. Joseph Parkinson
Intermountain Waste Exchange
C/O W. S. Hatch Company
P.O. Box 1825
Salt Lake City, Utah 84110
(801) 295-5511

Dr. Nicholas Hild
Western Waste Exchange
Center for Environmental Studies
Arizona State University
Tempe, Arizona 85287
(602) 965-2975/3996

Mr. Rod McCormick
Manitoba Waste Exchange
C/O Biomass Energy Institute, Inc.
1329 Niakwa Road
Winnipeg, Manitoba
CANADA R2J 3T4
(204) 257-3891

*Does not publish separate catalog; uses catalog of the Canadian Waste Materials Exchange.

For an exchange sponsored by a chamber of commerce or manufacturers association (Tennessee, New Jersey, Midwest and Montana), it is just as likely for expenses to be underwritten entirely by the sponsoring organization as it is for these expenses to be government funded. For example, the Midwest exchange is funded by the states of Arkansas, Kansas, Missouri, and the Tennessee Valley Authority. The Montana Exchange is funded by a grant from the State of Montana. The other two exchanges (Tennessee and New Jersey) are supported entirely by their sponsoring organizations.

Like the Midwest Industrial Waste Exchange, several other exchanges receive funding from more than one source. The Northeast Exchange is funded primarily by the New York State Environmental Facilities Corporation (a nonregulatory agency) and receives additional funding from the Ohio Environmental Protection Agency (a regulatory agency) and from the Central New York Regional Planning Board (a local governmental planning agency). The Southern Waste Information Exchange is funded by support from Florida State University, the Florida Chamber of Commerce, and private waste management companies. The Piedmont Waste Exchange has the greatest number and diversity of funding sources (i.e., 10

organizations, including the North Carolina and South Carolina state governments). The Canadian exchange receives funding from provincial governments as well as the national government.

The remaining exchanges each receive funding from a single source: California (state regulatory agency), Industrial Materials Exchange Service (IMES, state regulatory agency), Great Lakes (foundation), and Western (U.S. EPA). IMES is unique among the exchanges in that it has agreements with several state and private sector agencies for them to distribute the IMES catalog throughout their area of jurisdiction. In addition to Illinois, the states involved in these agreements include Iowa, Kentucky, Minnesota, Oklahoma, Texas, and Wisconsin.

Although the above discussion may appear to present a haphazard and chaotic organizational/funding pattern, the result is a surprisingly thorough coverage of the major manufacturing areas of North America. In addition, the discussion shows that an obvious trend among U.S. exchanges has been the development of programs to serve multi-state areas. Such a trend reflects, in part, the relatively high fixed-costs (primarily staff costs) of operating an exchange and the relatively low marginal costs of distributing a catalog throughout a multi-state area. Programs that limit their service area to a single state are missing significant opportunities for their clients by failing to expose material listings to potential recycling opportunities that may be available in nearby states. One exception to this rule is California which seems to be almost self sufficient due primarily to its relatively large geographic size and industrial diversity.

While most exchanges have expanded their coverage to a regional level, they typically do not receive direct financial support from all the states within their region. The 12 waste exchange programs in the United States provide direct services to 37 states. However, only 10 states (Arkansas, California, Kansas, Illinois, Missouri, Montana, New York, North Carolina, Ohio, and South Carolina) provide financial support for the program that serves their state. Thus, these 10 states subsidize the provision of waste exchange services in the other 16 states. In addition, as mentioned above, six states indirectly support IMES through distribution of the IMES catalog.

The development of two new waste exchange programs demonstrates the continuing interest in helping industry locate offsite recycling opportunities. With start-up funding from U.S. EPA, the Western Waste Exchange is being organized to serve Arizona. Other funding arrangements will be investigated to continue the program beyond 1986. The State of

Indiana is in the process of selecting a contractor to operate a state-wide exchange.

For-Profit Exchanges

Like nonprofit exchanges, for-profit exchanges assist firms by acting as marketing agents or brokers for their industrial wastes and surplus assets. However, these companies are in business to make money rather than only provide a public service. Income is primarily from commissions charged for completed material transfers and from fees charged for services performed (consulting, material testing, etc.).

Table 4 summarizes some of the distinguishing characteristics of the companies that have been identified in the literature as for-profit exchanges. Most of these companies operate as a middleman between generator and potential user; that is, they act as a conduit for information exchange and provide related service necessary for a successful transfer of material. However, they do not take physical nor, usually, legal possession of the material. To assist in their marketing activities, a few of the companies publish and distribute catalogs of available and, sometimes, wanted materials. Only two of these companies function as what the literature has called "material exchanges"; that is, they take physical and legal possession of material before attempting to market it. Thus, for-profit brokers may be distinguished on the basis of (1) whether or not they publish a catalog; (2) whether they accept or do not accept material; and (3) whether they handle waste as well as surplus materials.

Table 4 greatly underestimates the total number of for-profit brokers engaged in the business of helping companies market surplus assets. Although the authors are unaware of any published list or directory of such brokers, their number may be estimated at between 35 and 70 (this estimate does not include brokers of nonchemical assets, such a paper, glass, metals, textiles, plastics, etc.). Most of these brokers will handle only surplus, by-product, and off-spec chemicals, although some specialize in specific industrial wastes, such as acids, pickling liquor, spent electroplating solutions, and so on. In size, these companies range from one-person operations to corporations with branch offices, technical and marketing staffs, and warehousing facilities.

Given the lack of information on the status and activities of these brokers, there is a need to investigate their role in industrial waste management. Such a study should include the compilation of a directory of brokers, listing the kinds of material handled and any other related services offered

By using telephone communication, exchanges can overcome the problems associated with the time delay in publishing and distributing a catalog. Since publication frequencies vary from six to three times per year, new listings may not be published for two to four months after they are received by an exchange. Another way to expedite exchanges is through the use of a computer database of material listings that can be accessed in an online mode by anyone with a microcomputer and a modem. Such a database could be updated immediately whenever a new listing is received by an exchange. The database could be searched by a client for specific materials (wanted or available), and a copy of the database could be printed to create, in effect, a new catalog whenever one is desired. During 1985, the Northeast Industrial Waste Exchange inaugurated such a service in Syracuse, New York. The National Waste Exchange Data Base contains listings from the Northeast Exchange, the Southern Waste Information Exchange, and the Industrial Material Exchange Service. New listings are to be added shortly from the Great Lakes Regional Waste Exchange, the Piedmont Waste Exchange, and the Canadian Waste Exchange. The Data Base can be used free of charge by anyone who obtains a password from the Northeast Exchange.

Before a unified database could be constructed, each of the participating exchanges had to agree to adopt a uniform coding system for their listings. They have also developed and are using a standardized material listing form. Using this standard form also greatly simplifies the listing process for clients who wish to list with more than one exchange. These exchanges have also agreed to reprint listings from each others' catalogs. Shared listings significantly expand the audience to which the reprinted listing is exposed. Finally, a number of the exchanges have agreed to include in their catalogs the address and phone number of the exchange that originated the reprinted listing. This allows an interested client to directly contact the originating exchange, thereby expediting the process of inquiring about a listing.

All of these cooperative management strategies allow the exchanges to more effectively serve the marketing needs of their clients. However, exchanges still need to do more to reach potential clients and to offer these clients a higher level of service. For example, the exchanges typically do little to publicize their existence and the services they offer. This is due, in part, to the desire not to oversell or overstate their role in a firm's overall waste management strategy. It is also partly due to a lack of appreciation of this important aspect of their exchange operations.

Exchanges need to develop closer ties to firms that recycle and recover both hazardous and nonhazardous industrial waste. The specific requirements of these firms must be

understood and greater efforts must be made to identify available waste streams that meet these requirements. The reluctance of some companies to deal with waste brokers must be acknowledged and suitable arrangements developed so that manufacturers, brokers, and exchanges can work together more effectively.

Manufacturers, especially larger companies, have two distinct types of waste management needs. On the one hand, they must plan for the long-term management of waste streams that are produced with a fairly consistent composition, quantity, and frequency. Use of the waste exchange catalog as one marketing strategy is appropriate for these predictable waste streams. On the other hand, companies frequently find themselves in possession of a waste stream that is not consistently generated. These wastes are a particular problem and must be marketed quickly to avoid disruption of the normal production process. Because of the time delays inherent in catalog production and distribution, other marketing strategies must be used.

The online National Waste Exchange Data Base could become a tool for the expeditious marketing of these types of waste streams. When updated daily, the use of this Data Base can eliminate nearly all time delays. Both waste generators and waste users must commit themselves to querying the Data Base on a frequent basis. Using the Data Base to identify potential buyers and sellers can, over time, become a routine marketing activity for generators, recyclers, brokers (surplus and waste), and exchanges. Intensive marketing of the Data Base will be important in making more widespread its use.

Small quantity generators present a unique problem for exchanges because small quantities of materials are typically least attractive to recyclers. The high costs of testing, transportation, and processing, are contributing factors to the difficulty of recycling these small quantities of waste. Although there are no simple solutions to this problem, discovering mechanisms for meeting the needs of small quantity generators remains a long-term challenge for exchanges.

Legislation directly encouraging the recycling of hazardous waste, and thus indirectly supporting the concept of waste exchange, is not widespread. However, California, for example, requires generators to justify why a recyclable waste stream is being disposed of rather than recycled. In Maryland, hazardous waste cannot be landfilled unless it has been rejected by a treatment unit or recycler. In Illinois, effective January 1, 1987, hazardous waste cannot be disposed of in a landfill unless the generator has demonstrated that within the bounds of technological and economic feasibility, the waste cannot be recycled for reuse, nor inciner-

ated or chemically, physically, or biologically treated so as to neutralize and render it nonhazardous. To help generators begin complying with this new Illinois law, the Industrial Material Exchange Service has recently reviewed 1,439 items currently being landfilled within Illinois to examine the feasibility of recycling these materials. Nearly 24% of these items were identified as being potentially recyclable. Each generator of a potentially recyclable waste stream was provided with a list of companies who might be interested in recycling a particular waste. It remained the generator's responsibility to contact the recycler. In a follow-up survey conducted by IMES, over 60% contacted the recycler(s). Over 50% of the respondents indicated that they had their material recycled, were still negotiating with the recycler, or would use the information in the future. Significantly, 92% of the respondents requested that information about recycling opportunities continue to be provided to them in the future. This figure indicates an overwhelming desire by generators for the kind of information waste exchanges are designed to provide.

At the federal level, the Resource Conservation and Recovery Act (RCRA) Amendments of 1984 contain many new requirements that affect companies who produce, transport, recycle, and dispose of hazardous waste. For the first time, the federal government will regulate thousands of smaller firms that generate between 100 and 1,000 kg of hazardous waste in a calendar month. Prior to passage of the amendments, only firms producing more than 1,000 kg/month were regulated. These newly regulated small businesses (such as dry cleaners, auto repair shops, printers, and some wholesale and retail stores) will be prohibited from accumulating waste onsite for more than 180 days unless the waste must be transported more than 200 miles to a disposal or treatment facility or to a recycler. In that case, waste can be stored up to 270 days, provided no more than 6,000 kg are stored during that time.

The RCRA amendments also require these generators to complete a copy of the U.S. EPA Uniform Hazardous Waste Manifest when shipping their wastes offsite, and stipulate that generators may offer their wastes only to transporters and facilities with an EPA identification number. Item 16 of the manifest (Generator's Certification) must be signed and dated whenever wastes are shipped offsite. When small generators (100-1,000 kg/month) sign Item 16, they certify that they have accurately described their material on the manifest and that it is properly packaged and labeled for shipment. In addition, generators producing more than 1,000 kg/month are certifying that they have developed a program to manage their waste in a way that reduces its volume and toxicity to the extent economically practical, and that they are using a management method which minimizes the threat to human health and the environment. However, generators will

not have to use the manifest if their waste is being reclaimed under a contractural arrangement where either the recycler or the generator retains ownership of the material throughout its generation, transportation, and reclamation.

EPA has determined that generators who send their waste off-site to be recycled are practicing a form of waste minimization that may satisfy the waste minimization certification requirements. EPA has stated that when participation in a waste exchange program affects a generator's efforts to reduce the volume and toxicity of hazardous waste, such participation may be used to satisfy the waste minimization and certification requirements. This practice may result in reduced toxicity in the sense Congress intended in the 1984 amendments to RCRA. Therefore, those generators who participate in waste exchanges can justifiably sign the certification when participating in a waste exchange program.

Thus, waste exchanges play an important role in helping generators comply with the waste minimization requirement of the 1984 RCRA amendments. Waste exchanges can also aid large and small quantity generators by identifying waste management options that minimize both disposal costs and the threat to human health and the environment. Generators who produce between 100 and 1,000 kg/month will also most likely experience an increase in their waste management costs due to the RCRA amendments. Waste exchanges can help these smaller quantity generators mitigate these higher costs by finding alternative waste management options, such as recycling and resource recovery, that not only meet legislative requirements but are also cost effective.

Several exchanges are developing new programs or expanding existing ones to help companies understand and meet their new responsibilities under RCRA. For example, the Northeast Exchange, in conjunction with the New York State Environmental Facilities Corporation, is developing a program to assist small quantity generators in managing their industrial wastes by source reduction, reuse, and recycling. The Great Lakes Exchange has conducted a series of workshops for small quantity generators. The Piedmont Exchange has surveyed small quantity generators and has conducted numerous educational activities including preparing and disseminating literature, sponsoring industry-specific workshops, and making presentations at industrial meetings, workshops, and conferences. The Southern Exchange is working will all the states in U.S. EPA Region IV to notify small quantity generators of the new RCRA requirements.

Conclusions

Industrial waste management strategies are changing to meet new regulatory and economic challenges and in response to

these changes, waste exchange programs are changing to meet the new needs of their clients. Several recent trends among waste exchange programs have been identified: (1) there has been a gradual movement toward regional programs with over half the existing programs serving a multi-state area; (2) sponsorship of exchanges by trade associations and for-profit companies has decreased significantly in recent years; (3) exchanges are becoming more "active" in seeking recycling opportunities and in matching buyers and sellers; and (4) exchanges are cooperating with each other, sharing ideas, and coordinating their activities more closely now than in the past. One result of this cooperation has been the development of the National Waste Exchange Data Base to provide manufacturers and recyclers with a new marketing tool to meet both short-term (spot market) and long-term recycling needs.

Securing consistent, long-term funding is a problem that most exchanges have not been able to alleviate. Although this situation does not make exchanges significantly different from most nonprofit service programs, it does require them to spend a disproportionate amount of time on fund-raising activities, and it distracts from their primary function of finding buyers and sellers of industrial wastes. To succeed with their primary function, exchanges need to develop strong relationships with legitimate recyclers and match their needs with potential sources of supply. This can be accomplished only if exchanges make the effort to understand and respond to the special needs of both major corporations and small quantity generators. The waste exchange will remain a cost-effective component of a company's overall waste management strategy. Using an exchange's catalog is an inexpensive method of contacting a large number of companies to determine potential interest in a waste or surplus material. "Active" exchanges and the National Waste Exchange Data Base provide other sources of assistance that should not be overlooked by companies seeking off-site recycling and resource recovery as an alternative to traditional disposal options.

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"I HEARD ABOUT THESE NEW REGULATIONS...CAN I ASK A FEW QUESTIONS?", James F. Ginley, GEO/Resource Consultants, Inc., Washington, D.C.

Introduction

For a certain group of people in our nation's capital, rarely a day goes by that these words aren't heard. Tucked away in a corner of EPA (Environmental Protection Agency) headquarters in Washington, D.C., this group is the focus of hundreds of telephone calls and hundreds of questions each and every day. "What do I do with this stuff?"; "Is my waste a hazardous waste?"; "I don't understand this regulation...could you help me?"; "How do I get an I.D. number?"; "Where do I send my forms?"; "Where can I get a copy of the Federal Register?" The phones start ringing shortly after 8:30 AM and if it weren't for the forgiving hour of 4:30 PM, they would probably never stop. "This is the RCRA/Superfund Hotline, may I help you?"

Initiated in 1980, by EPA's Office of Solid Waste, the RCRA/Superfund Hotline was part of the Agency's plan to help the regulated community understand and comply with regulations promulgated under the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). At present and in its early days, the Hotline was and is a focal point for the regulated hazardous waste community, serving generators, transporters, and owners and operators of hazardous waste treatment, storage, and disposal facilities. Other regular callers include a wide variety of consultants, lawyers, private citizens, and state and federal agencies, all of whom are engaged in or concerned with some aspect of the management of hazardous wastes.

As such, the Hotline is very important to waste exchanges. As a source of information, as a means of interpreting and clarifying regulations, and as a "barometer" on the questions, problems, complaints, and misunderstandings of the hazardous waste community, the Hotline is second to none.

This paper consists of four parts: (1) a brief explanation of the Hotline and how it functions; (2) a review of the regulations that have been either promulgated or proposed in the past year that directly affect waste exchanges; (3) a discussion of the various questions, problems, and management dilemmas as heard on the Hotline; and (4) a discussion of possible solutions to these problems, including the development of educational programs and the vital role of waste exchanges.

The Hotline: What, Where, Who, How, and Why

The Hotline is primarily an information service. Approximately 75 to 80% of the calls received by the toll-free Hotline pertain to the management of RCRA hazardous wastes and the regulations found in Title 40 of the Code of Federal Regulations, Parts 260 through 268, 270, 271, and 124. An additional 10 to 15% are in regard to the Superfund statute (CERCLA) and its regulations, including the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The remaining calls are usually requests for publications and referrals. Located at EPA headquarters in Washington, D.C., the Hotline averages nearly 8,000 calls per month. Calls include those from each of the states and territories, and occasionally from Canada and other foreign countries.

The nuts and bolts of the Hotline, however, are its people. The Hotline is operated by Geo/Resource Consultants, Inc., a private consulting firm under contract to EPA's Office of Solid Waste and Emergency Response. A close working relationship between Hotline staff, EPA staff, and counsel results in a very effective team effort. Callers benefit from the combined expertise and effort by receiving answers, advice, and information that is both accurate and up-to-date.

The workhorses on the Hotline are its 10 information specialists, whose backgrounds in the natural and physical sciences, engineering, and environmental management are as diverse as the range of questions they tackle each day. Each information specialist receives comprehensive training from the Hotline management staff prior to answering a single phone call. Through a series of internal briefings on current issues, attendance at public meetings, participation in Agency work groups, and an ever-growing library of guidance documents and memoranda, the Hotline specialists continuously expand the pool of information that is available to callers.

The New Regulations

Not since its birth in 1980 has RCRA seen such activity and growth as in 1985. Prompted largely by the Hazardous and Solid Waste Amendments of 1984 (HSWA), EPA's hazardous waste regulations increased greatly in both magnitude and complexity in the past year. If one includes the promulgation of the Agency's redefinition of solid waste and the proposed listing of used oil as a hazardous waste the results are bewildering.

Following is a synopsis of a few of the new regulations and some of the new requirements they impose on the regulated community:

* The Redefinition of Solid Waste: Brought significant changes to the reclassification and management of solid wastes, especially spent materials that are recyclable. Also created new standards for the management of specific recyclable hazardous wastes, including spent lead-acid batteries and wastes that are reclaimed to recover precious metals (50 FR 614, January 4, 1985).

* Small Quantity Generators: As of August 5, 1985, generators of hazardous wastes in quantities greater than 100 kg and less than 1,000 kg in a calendar month are required to use the Uniform Hazardous Waste Manifest when disposing of their wastes (50 FR 28702). On August 1, 1985, new regulations for this category of generators were proposed, including notification, use of the manifest, onsite accumulation, treatment, storage, or disposal at RCRA hazardous waste facilities and recordkeeping (50 FR 31278).

* Waste Minimization: HSWA requires that generators of hazardous waste account for their efforts to reduce the amount and toxicity of the hazardous waste they generate. A certification statement is now included in Item 16 of the manifest and a special narrative account must be included in the generator's biennial report, per 40 CFR 262.41(a)(6) and (7).

* Used Oil: On November 29, 1985, the Agency published three related rules: (1) final standards for burning and blending of hazardous waste fuel and used-oil fuel; (2) proposed management standards for recycling used oil; and, most significantly, (3) the proposed listing of used oil as a hazardous waste (F030) (50 FR 49164).

Among the consequences of the flurry of new regulations is a greatly increased regulated community, many of whom have no working knowledge of the EPA's myriad of hazardous waste regulations. Many of these newly inducted members of the regulated community have never even had to worry about RCRA

and EPA and all that other "regulatory stuff"; now they do. Some people have adapted well to the changes, others have not.

These new regulations are of great significance to waste exchanges. Many current waste exchange participants must, unlike before, comply with an array of regulations and requirements, which may be costly. Others, however, may for the first time need to consider recycling and waste exchanges as viable options for the management of their hazardous wastes. It is certainly a challenging situation and one that must be addressed promptly. But before solutions can be proposed and considered the problems must be discussed. What better way than to take a quick "barometer reading" from the Hotline.

What the Hotline Hears

Each and every day the Hotline shares the problems of the regulated community. Some of our callers are "on top of things," and only need a different perspective or a little bit of a nudge to help them answer their question. Some are feeling overregulated and overwhelmed by the Agency's regulations and are simply seeking some sort of relief. Others try every trick in the book, every machination of the written and spoken language, just to beat the system. Most people are genuinely interested in complying with the regulations, but they just don't know what to do. In some cases, lack of experience, education, and even time are the causes of uncertainty. For others, misunderstanding and fear are to blame. No matter the reason or cause, the fact remains that a lot of questions, doubts, and dilemmas do exist and they must be addressed.

The Hotline does its best to address these questions and to supply appropriate answers. Many questions are answered directly, whereas others require research or consultation with Agency staff members. Although a number of calls are routine, the wide spectrum of questions makes it difficult to identify "typical" Hotline questions. However, the following examples may help illustrate some of the problems people have discussed with the Hotline, especially regarding the new regulations.

* A generator of 35 gallons of hazardous waste (approximately 280 lbs) must manifest this waste offsite for the first time. The waste, however, is a mixture of several types of waste, all of which are regulated, but none of which can be recycled economically on their own. What options exist other than costly incineration or treatment?

* A generator of a newly defined spent material has traditionally recycled his wastes. The generator's recycling facility is now required to obtain a permit to store the wastes prior to recycling. If the recycler raises his fees to cover the costs of permitting he may lose a lot of customers. What can the recycler do to prevent this? What can the generators do?

* A facility generates two wastes. The first waste is produced in large quantities and is managed according to Part 262 standards. The second waste is generated in a small quantity, but because the facility is a full generator the waste must also be managed as a large quantity. The generator cannot accumulate enough of the small quantity waste in 90 days to make a full shipment. How can the generator avoid the burden of paying full transporter fees for less than a full load?

* In the past, used-oil recyclers paid generators 50 cents or more for a gallon of their used oil. The proposed listing of used oil as a hazardous waste has brought drastic changes. Now the recyclers are charging service stations and neighborhood collection centers to cover "compliance costs." Many foresee the end of their businesses; others see mismanagement and illegal dumping. How can this be prevented? What will EPA do to encourage and ensure compliance?

Perceptions, Solutions, and Suggestions

Little more than an hour or two on the Hotline is enough to make one realize that the regulated community needs help. Information is available from a variety of sources, but not all sources are reliable and not all information is easily understood. Even though the Hotline is one of the most reliable sources, it is limited primarily to explaining things over the phone. No matter how effective a given conversation may be, only so much can be learned and retained in this manner.

Additional efforts must be made to develop and disseminate information that is clearly written, easily understood, and easily obtained. This educational effort need not come from one source or one agency, but rather, it should come from the combined efforts of everyone involved in the management of hazardous wastes. Following are a few examples of the ways in which the EPA, waste exchanges, and the regulated community as a whole can contribute to this important effort.

Two examples of EPA's efforts are the Small Business Ombudsman and a brochure published by the Office of Solid Waste

entitled, "Does Your Business Produce Hazardous Wastes?" (EPA 1985).

As the title indicates, the Small Business Ombudsman addresses the needs and concerns of small businesses. Among the services the Ombudsman provides is a nationwide toll-free information service, featuring access to an extensive network of liaisons to each office of the EPA. The Ombudsman also receives complaints and protests from the small business community and attempts to ensure that these small businesses are not being inequitably effected by any of EPA's rules and regulations. The Ombudsman participates in rule development work groups and attends various meetings at the Agency to make sure that the small businessman is represented. In cooperation with both the Agency and trade associations, the Ombudsman develops a variety of educational materials, including videocassettes, pamphlets, and brochures. Recently, the Ombudsman participated in a number of workshops, seminars, and conferences sponsored by chamber of commerces and trade associations (Lord 1986).

The Office of Solid Waste has also joined the educational effort. In conjunction with the release of new requirements for small quantity generators, the EPA has published a brochure ("Does Your Business Produce Hazardous Wastes?") to help the newly regulated community understand what they need to do to comply with the new rules. In addition, industry specific inserts have been written to accompany the brochures. EPA conducted a survey of small businesses that were known to generate small quantities of hazardous waste, and after consultation with a number of trade associations and their members, developed 18 inserts. The inserts identify wastes that are typically generated in each of the 18 categories and provide help in completing the Department of Transportation (DOT) shipping descriptions on the manifest. EPA printed 750,000 brochures and has distributed brochures and inserts to the members of over 500 trade associations. Requests are still coming in (Rutherford 1986).

Despite these efforts, there is still need for more information. Many businesses are not members of trade associations and the media and other industry publications have been slow to spread the news. Many people still do not know where to go for information, where to take their wastes, or who to call for help. Perhaps a better effort is needed from within the regulated community itself; perhaps waste exchanges could take the lead.

Waste exchanges could and do provide the newly regulated generator with that much needed management option. Maybe the exchanges could also assist groups of small generators in "pooling" their wastes in combined listings, thus enabling generators with uneconomically sized loads to team together and successfully market their recyclable wastes.

Waste exchanges can also provide generators an opportunity to comply with the new waste minimization requirements, as evidenced in recent letters from John Skinner, former director of EPA's Office of Solid Waste, to the Great Lakes Regional Waste Exchange and the National Association of Solvent Recyclers (Skinner 1985). Finally, waste exchanges could initiate their own educational programs. Coordination with chamber of commerces, trade associations, and regulating agencies could prove helpful in spreading the work and increasing the entire community's understanding of recycling and waste management.

Concluding Remarks

If the EPA's hazardous waste regulations are ever going to be adequately and effectively understood, it will be accomplished through an improved flow of information to and within the regulated community. Most importantly, this flow of information must be more than a one-way street. The EPA and state agencies must strive to provide clear, concise, and understandable guidance for their very complicated regulations. Private industry, both big and small, must seek this guidance and initiate their own internal educational programs, which will in turn increase understanding and facilitate more voluntary cooperative compliance. Attendance and participation in training courses, seminars, workshops, and conferences can only add to the learning process and provide a much needed exchange of ideas, expertise, and experience. Finally, on one should forego the opportunity to participate in the rulemaking process. Submit comments, attend public hearings and meetings, and let your voices be heard!!

And when you get stuck, your boss wants an answer, and you don't know how in the world you're every going to figure out those confusing and frustrating regulations, call the **Hotline** at **1-800-424-9346.** We're always there to help.

Helpful Phone Numbers

RCRA/Superfund Hotline	(800) 424-9346 or (202) 382-3000
Small Business Ombudsman	(800) 368-5888 or (703) 557-1938
National Response Center (NRC)	(800) 424-8802
Pesticide Hotline (Texas Tech Univ)	(800) 858-7378
TSCA Hotline	(800) 424-9065
Chemical Emergency Preparedness Program	(800) 535-0202

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1) 50 FR 614, January 4, 1985.
2) 50 FR 28702, July 15, 1985
3) 50 FR 31278, August 1, 1985.
4) 50 FR 49164, November 29, 1985.

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Skinner, John. March 1, 1985 letter to William Stough, Director, Great Lakes Regional Waste Exchange, and August 5, 1985 letter to Faith Gavin Kuhn, Executive Director, National Association of Solvent Recyclers. U.S. EPA, Office of Solid Waste.

APPENDIX A.

CONFERENCE AGENDA

Third National Conference on Waste Exchange
March 4, 5 and 6, 1986
Phoenix, Arizona

Hosted by

Western Waste Exchange
and the
Center for Environmental Studies
Arizona State University
Tempe, Arizona

TUESDAY, March 4, 1986

10:30-12:30 **REGISTRATION**

12:30- 1:00 **CONFERENCE OVERVIEW**
Dr. Nicholas Hild, Conference Chairman
Overview of National Conference on Waste Exchange of 1986

Objectives and Goals of the Conference

1:00- 2:45 **SESSION I:** Impact of USEPA's January 4, 1985 Redefinition of Solid Waste

Moderator: Faith Gavin Kuhn, Executive Director
National Association of Solvent Recyclers
Hazardous Waste Service Association
Washington, D.C.

Panel: Matthew Straus
U.S. Environmental Protection Agency
Washington, D.C.

Barry Garelick, Senior Scientist
Versar, Inc.
Springfield, Virginia

Robert Kerr
Springfield, Virginia

3:00- 4:45 **SESSION II:** State Support for Waste Exchange and Resource Reuse

Moderator: William Stough, Director
Great Lakes Regional Waste Exchange
Grand Rapids, Michigan

Panel: Donna Peterson, Technical Assistant
Minnesota Technical Assistance Program
Minneapolis, Minnesota

SESSION II: State Support for Waste Exchange and Resource Reuse

Panel: Jim Glenn
Pennsylvania Dept. of Environmental Resources
Bureau of Waste Management
Harrisburg, Pennsylvania
"Re-Cycling & Resource Recovery Programs in Pennsylvania"

Terence P. Curran, Executive Director
New York State Environmental Facilities Corp.
Albany, New York

5:00-7:00 **HOSPITALITY HOUR** (Vendor Displays)

WEDNESDAY, March 5, 1986

7:30- 8:00 **REGISTRATION**

8:00- 8:30 **KEYNOTE SPEAKER**
Walker Banning
Southern Waste Information Exchange
Tallahassee, Florida
"Activities of North American Waste Exchanges During 1985"

9:15-12:00 **SESSION III:** Offsite Recycling and Reuse

Moderator: Margo Ferguson Siekerka, Program Manager
Industrial Material Exchange Service
Springfield, Illinois

Panel: James G. Burke
International Plastic Recycling, Inc.
Dixon, Illinois
"Recovery of Polyethylene Terephthlate from Film Scrap"

Jon Arundale
Byproduct Chemical Reclamation, Inc.
Aurora, Illinois
"Fatty Acids, Amines, Oils, and Soaps"

Gary Mann
Hevmet Recovery, Ltd.
Port Colburne, Canada
"Metals Recovery"

L.S. Feldman
Catalyst Disposal Services
Calgary, Canada
"Recycling of Spent Industrial Catalysts and Residues"

SESSION III: Offsite Recycling and Reuse

Panel: Claude Terry
PPM, Inc.
Tucker, Georgia
"Recycling of PCB Contaminated Oils"

Stephen B. Smith
Envirite Corp.
Thomaston, Connecticut
"Purification of Cyanides for Recycling and Reuse"

12:30- 1:45 **LUNCHEON MEETING**
Speaker: Jim Ginley
GEO Resource Consultants, Inc.
"RCRA" Hotline
Washington, D.C.

2:00- 3:30 **SESSION IV:** Perspectives on Waste Exchange and Resource Reuse

Moderator: Mary McDaniel, Director
Piedmont Waste Exchange
Charlotte, North Carolina

Panel: Joseph Mathewson
Industrial Waste Engineering
Long Beach, California
"Recycling and Disposal: A Transporter's Point of View"

Gene Theios
Illinois Environmental Protection Agency
Springfield, Illinois
"State Utilization of Waste Exchanges"

Gary Meyer, Esq.
Parker, Milliken, Clark, O'Hara & Samuelian
Los Angeles, California

3:45- 5:30 **SESSION V:** Technologies for Waste Reduction

Moderator: Dr. Robert Laughlin, Manager
Canadian Waste Materials Exchange
Mississauga, Canada

Panel: David G. Dempsey
Enwright Associates, Inc.
Greenville, South Carolina

SESSION V: Technologies for Waste Reduction

Panel: Robert O. Kincart
Resource Recovery of America, Inc.
Mulberry, Florida
"In-house Waste Reduction Case Studies"

Dr. David Brener
De Voe Holbein (Canada), Inc.
Montreal, Canada
"Vitro Kele ™ Process for Metal Recovery"

6:30-10:00 **Dinner** Optional Event-See Registration Form
Desert Steak Fry

THURSDAY, MARCH 6, 1986

8:00-10:00 **SESSION VI:** Brokerage of Industrial Materials

Moderator: Raymond H. Rozen, Vice President
Chem Sources, Inc.
Mission Hills, California

Panel: Philippe LaRoche
Canadian Inventory Exchange
Quebec, Canada
"Selling Off-Specification and Expired Shelf Life Chemicals"

Dr. Paul Palmer
ON-SCREEN Directories, Inc.
Sebastapol, California
"Role of Computer Technology in Hazardous Waste Recycling"

Ben Fisler
Southwest Solvents
Phoenix, Arizona
"Recycling Chlorinated Solvents"

Rick Kuljian
AM & Associates
Huntington Beach, California
"Recycling Polyurethene Chemicals"

10:15-12:00 **SESSION VII:** Recycling Associations: A Roundtable Discussion

Moderator: Lewis Cutler, Manager
Northeast Industrial Waste Exchange
Syracuse, New York

Panel: Michael Haskes
National Metals Co.
Phoenix, Arizona

M. G. Shaver
Investment Recovery Association
3-M Center
St. Paul, Minnesota

Ms. Mary E. Malotke
Tencon Associates
Cincinnati, Ohio

Gary J. Olson
National Recycling Coalition and
New Hampshire Resource Recovery Association
Concord, New Hampshire

APPENDIX B.

CONFERENCE PARTICIPANTS

THIRD NATIONAL CONFERENCE ON WASTE EXCHANGE

PARTICIPANT LIST

March 4, 5 and 6, 1986
Phoenix, Arizona

Phillip D. Alberts
Allied Precious Metals
P.O. Box 26726
Tucson, AZ 85726-6726
(602) 574-1818

Mike Aldous
Advanced Printed Circuit Tech. II
3201 S. Hardy Drive
Tempe, AZ 85282
(602) 829-1172

Gary B. Alessi
City of Phoenix-Personnel Safety
620 W. Washington
Phoenix, AZ 85003
(602) 262-7555

Martha Anderson
University of Arizona
Department of Risk Management
Tucson, AZ 85721
(602) 621-1556

Jon Arundale
BCR, Inc.
P.O. Box 1311
Aurora, IL 60507
(312) 892-6800

Walker Banning
Southern Waste Information Exchange
P.O. Box 6487
Tallahasse, FL 32313
(904) 644-5516

Melvin D. Biringer
Garrett Turbine Engine Company
111 S. 34th St.
Phoenix, AZ 85010
(602) 231-4465

Debra A. Bollinger
Bollinger Industries, Inc.
8335 N. Beech
Fontana, CA 92335
(714) 822-7714

Clifford Bradley
Papago Plating Company
2312 E. Washington
Phoenix, AZ 85034
(602) 273-1408

Dr. David Brener
DeVoe-Holbein Canada, Inc.
175 Bouchard Blvd., Unit 20
Dorval, Quebec
CANADA
(514) 636-6042

Clyde S. Brooks
Recycle Metals
41 Baldwin Lane
Glastonbury, CT 06033
(203) 633-7406

James G. Burke
International Plastic Recycling, Inc.
211 East First Street
Dixon, IL 61021
(815) 288-2239

Robert Cairns
Samaritan Health Service
215 E. McDowell Rd.
Phoenix, AZ 85004
(602) 239-2637

Marcia Carlson
Chemical Waste Management, Inc.
3003 Butterfield Rd.
Oak Brook, IL 60521
(312) 654-8800

Alan Charbonneau
World Resources Company
8113 W. Sherman Street
Phoenix, AZ 85043
(602) 233-9166

Don G. Clark
DuPont Company
F & FP Department
Barley Mill Plaza #19
Wilmington, DE 19898
(302) 992-2536

Terence P. Curran
NYS Environmental Fac. Corp.
50 Wolf Rd. - Room 538
Albany, NY 12205
(518) 457-4222

Lewis Cutler
Northeast Industrial Waste Exchange
90 Presidential Plaza, Suite 122
Syracuse, NY 13202
(315) 422-6572

Ed Davis
Arkansas Industrial Development Commission
Energy Division
No. 1 Capitol Mall
Little Rock, AR 72201
(501) 371-1370

David G. Dempsey
Enwright Associates, Inc.
P.O. Box 5287
Greenville, SC 29606
(803) 232-8140

Elaine T. Eby
United States Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460
(202) 382-7930

Harry O. Eiler
Precision Energy Systems, Inc.
1025 Morse
Schaumburg, IL 60193
(312) 980-6979

Lori S. Feldman
Catalyst Disposal Services
#250, 603-11th Ave., SW
Calgary, Alberta, T2R 0E1
CANADA
(403) 264-8778

Benjamin Fisler
Southwest Solvents D.I.P.
6760 W. Allison Rd.
Chandler, AZ 85226
(602) 961-1040

Richard B. Flegel
Gould
P.O. Box 190
Chandler, AZ 85244-0190
(602) 899-0343

Mary Helen Flowers
University of New Mexico
Occupational Safety
Medical Bldg. 3, #137
Albuquerque, NM 87131
(505) 277-2753

R.L. (Dick) Floyd
Union Carbide Corporation
P.O. Box 8361
So. Charleston, WV 25303
(304) 747-3380

Leland R. Frishe
Samaritan Health Service
215 E. McDowell Rd.
Phoenix, AZ 85004
(602) 239-5990

Carol T. Gaddy
Arkansas Energy Office
1 State Capitol Mall
Little Rock, AR 72207
(501) 371-1370

Barry Garelick
Versar
P.O. Box 1549
Springfield, VA 22302
(703) 750-3000

John R. Gattuso
Eaton Corp/Cutler-Hammer
2225 Avenue A
Lehigh Valley Industrial Park
P.O. Box 2047
Bethlehem, PA 18001
(215) 866-0751

Fred A. Gershman
E.I. du Pont de Nemours
F & FP Department
Barley Mill Plaza #192278
Wilmington, DE 19898
(302) 992-2851

Ed Gilbert
Handy & Harman Electronic Materals Corporation
2113 E. Mohave St.
Phoenix, AZ 85034
(602) 275-1525

Jim Ginley
GEO/Resource Consultants, Inc.
1100 6th St. SW, Suite 201
Washington, D.C. 20024
(202) 382-2711

Jim M. Glenn
Pennsylvania Department of Environmental Resources
Bureau of Waste Management
P.O. Box 2063
Harrisburg, PA 17120
(717) 787-7382

Walter W. Goldstein
Chem/Mart Corporation
640 N. LaSalle St.
Chicago, IL 60610
(312) 787-8800

Dan L. Hammond
Arkansas Energy Division
1 State Capitol Mall
Little Rock, AR 72201
(501) 371-1370

Michael S. Haskes
National Metals
320 S. 19th Ave.
Phoenix, AZ 85005
(602) 258-8074

Joseph T. Heatherly
Inspiration Consolidated Copper Company
P.O. Box 4444
Claypool, AZ 85532
(602) 473-7000

Steve Hogg
Bud's Oil Service
1340 W. Lincoln St.
Phoenix, AZ 85007
(602) 258-6155

Lee Horley
University of Arizona
Risk Management
1143 N. Cherry
Tucson, AZ 85719

Peter J. Hushek
Phoenix Heat Treating
2405 W. Mohave
Phoenix, AZ 85009
(602) 258-7751

Skip Jacobs
S & J Recycling Company
244 Briar Lane
Highland Park, IL 60035
(312) 831-2230

James R. Jewett
Intel Corporation
2402 W. Beardsley Rd.
Phoenix, AZ 85027
(602) 869-3621

Michael C. Jimenez
City of Phoenix-Personnel
620 W. Washington
Phoenix, AZ 85003
(602) 262-7555

Eugene B. Jones
Southern Waste Information Exchange
P.O. Box 6487
Tallahasse, FL 32313
(904) 644-5516

John M. Jones
U.S. Pollution Control, Inc.
2000 Classen Center, Suite 400 S
Oklahoma City, OK 73106
(405) 528-8371

Bob Kerr
Kerr & Associates, Inc.
2634 Wild Cherry Place
Reston, VA 22091
(703) 476-0710

Charles B. Kilzer
Arizona Public Service
P.O. Box 53999 St. 1720
Phoenix, AZ 85072-3999
(602) 250-2790

Robert O. Kincart
Resource Recovery of America, Inc.
2300 Highway 60 West
Mulberry, FL 33860
(813) 425-1084

Faith Gavin Kuhn
National Association of Solvent Recyclers
1333 New Hampshire Ave., N.W.
Washington, D.C. 20036
(202) 463-6956

Rick E. Kuljian
AM & Associates
5312 Production Drive
Huntington Beach, CA 92649
(714) 895-9664

Art H. Kuljian
Argonne National Laboratory
9700 S. Cass Avenue
Argonne, IL 60439
(312) 972-3233

Gabrielle Lambert
Canadian Inventory Exchange Limited
P.O. Box 1135
Ste-Adele, Quebec JOR 1L0
CANADA
(514) 229-5344

Al C. Lang
AM & Associates
5312 Production Drive
Huntington Beach, CA 92649
(714) 895-9664

Philippe LaRoche
Canadian Inventory Exchange Limited
P.O. Box 1135
Ste-Adele, Quebec JOR 1LO
CANADA
(514) 229-6511

Dr. Robert Laughlin
Ontario Research Foundation
Sheridan Park
Mississauga, Ontario LSK183
CANADA
(416) 822-4111

Larry D. Lecompte
Inspiration Consolidated Copper Company
P.O. Box 4444
Claypool, AZ 85532
(602) 473-7080

James J. Lemmon
Urban Research Association
414 S. Mill Ave.
Tempe, AZ 85281
(602) 968-7216

Ron E. Lowrance
Gila River Products, Inc.
6615 W. Boston St.
Chandler, AZ 85226
(602) 961-1244

Charles R. Mahar
Polaroid Corporation
1265 Main St., Bldg. W6
Waltham, MA 02254
(617) 684-4629

Stephen Mahfood
Missouri Environmental Improvement Authority
P.O. Box 744
Jefferson City, MO 65102
(314) 751-4919

Robert L. Mahoney
Defense Reutilization & Marketing Service
Luke Air Force Base
Luke Air Force Base, AZ 85709
(602) 856-7144

Mary E. Malotke
Tencon & Associates
P.O. Box 12
Terrace Park, OH 45174
(513) 248-0012

Gary Mann
Hevmet Recovery, Ltd.
P.O. Box 278
Port Colborne, Ontario L3K 5W1
CANADA
(416) 834-0034

Norman E. Mayer
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103
(505) 823-4038

Robert F. McCartney
E.I. du Pont de Nemours
Engineering Department
Wilmington, DE 19898
(302) 366-3296

Mary A. McDaniel
Piedmont Waste Exchange
Urban Institute
University of North Carolina-Charlotte
Charlotte, NC 28223
(704) 597-2307

Charles L. McEntyre
Tennessee Valley Authority
248 401 Building
Chattanooga, TN 37401
(615) 751-7310

Stephen C. McGowan
Kocide Chemicals
1508 VIP Blvd.
Casa Grande, AZ 85222
(602) 836-0607

Eugene B. McGurl
C.M. Laboratories, Inc.
P.O. Box 8002
Portland, ME 04101
(207) 772-3689

Ron McHugh
Environmental Protection Agency
400 "M" Street, SW
Washington, D.C. 20204
(202) 382-3132

Suellen M. Mele
569 W. 12th St., #8
Eugene, OR 97401
(503) 342-2304

Gary A. Meyer
Parker, Milliken, Clark, O'Hara, & Samuelian
333 S. Hope St., 27th Floor
Los Angeles, CA 90071
(213) 683-6500

Norman L. Miller
Cox Arizona Publications
120 W. 1st Ave.
Mesa, AZ 85201
(602) 898-6585

Denise S. Nagle
McCulloch Corporation
900 Lake Havasu Ave.
Lake Havasu, AZ 86403
(602) 855-4171

Max E. Norman
Chamber of Commerce of Greater Kansas City
600 Boatmens Center
920 Main Street
Kansas City, MO 64105
(816) 221-2424

Gary J. Olson
New Hampshire Resource Recovery Association
National Recycling Coalition
P.O. Box 721
Concord, NH 03301
(603) 224-6196

Dr. Paul Palmer
On-Screen Directories, Inc.
7345 Healdsburg Ave. Suite 524
Sebastopol, CA 95472
(707) 823-4331

Melanie A. Pearson
County of Fairfax
12300 Lee Jackson Hwy.
Fairfax, VA 22030
(703) 691-4634

Tom Pepe
Liaison Group
2018 N. Normal Ave.
Tempe, AZ 85281
(602) 941-2166

Charles A. Peterson
Bud's Oil Service
1340 W. Lincoln St.
Phoenix, AZ 85007
(602) 258-6155

Donna N. Peterson
Minnesota Technical Assistance
W-163 Boynton Health Service Program
University of Minnesota
Minneapolis, MN 55455
(612) 376-4404

Alfred Quesnel
Arizona Republic/Gazette
120 E. Van Buren St.
Phoenix, AZ 85004
(602) 271-8000

Allan E. Raymond
S.C. DHEC
2600 Bull St.
Columbia, SC 29201
(803) 758-5681

Robert Redenbaugh
Wagner Plastics
1127 W. State Street
Ontario, CA 91761
(714) 986-3066

Bob Rhone
Southwest Solvents
6760 W. Allison
Chandler, AZ 85224
(602) 961-1040

J. D. Roebuck
ENSCO
P.O. Box 721
Maricopa, AZ 85239
(602) 253-1507

Rosalia Rojo
City of Los Angeles
Bureau of Sanitation
200 N. Main St., Rm. 1410
City Hall East
Los Angeles, CA 90012
(213) 485-5347

Raymond H. Rozen
Chem Sources, Inc.
11565 Laurel Canyon Blvd., #117
Mission Hills, CA 91340
(818) 365-4534

Mary Janet Ruzicka
Motorola
8201 E. McDowell Rd.
Scottsdale, AZ 85205
(602) 897-4822/949-6828

Nick Sciarro
Maricopa County Highway Department
3325 W. Durango St.
Phoenix, AZ 85009
(602) 233-8600

Mr. M. G. Shaver
3M Company
1050 N. Hazel Street
Building 450-2-02
St. Paul, MN 55144
(612) 733-2872

Margo Ferguson Siekerka
Industrial Materials Exchange Service
2200 Churchill Road, #24
Springfield, IL 62703
(217) 523-8700

William M. Sloan
Maryland Hazardous Waste
Facilities Siting Board
60 West Street - Suite 200A
Annapolis, MD 21401
(301) 269-3432

John P. Smith
DRMO-Tucson
P.O. Box 15011
Tucson, AZ 85708
(602) 748-4085

Jarrell Southall
ENSCO
P.O. Box 721
Maricopa, AZ 85239
(602) 253-1507

Dan Stites
City of Phoenix Public Works
1724 E. Indian School Rd.
Phoenix, AZ 85016
(602) 248-7915

Bill Stough
Great Lakes Regional Waste Exchange
470 Market, SW
Grand Rapids, MI 49503
(616) 451-8992

Matthew A. Straus
U.S. Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460
(202) 475-8551

Claude Terry
PPM, Inc.
1875 Forge St.
Tucker, GA 30084
(404) 934-0902

Gene Theios
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, IL 62706
(217) 782-2445

J. Tirpack
5312 Production Drive
Huntington Beach, CA 92649
(714) 895-9664

Michael O. Tompkins
ITT Cannon - Electric
2801 E. Airlane
Phoenix, AZ 85034
(602) 275-4792

Frank Trembacki
Da-Trex Enterprises, Inc.
4343 S. Pulaski Road
Chicago, IL 60632
(312) 927-9888

Philip Tzschoppe
Tzschoppe Industries, Inc.
8275 Telephone Road
Evansville, IN 47715
(812) 476-6422

Nancy L. Van Dyke
Fairfax County Comprehensive Planning
10640 Page Ave.
Fairfax, VA 22030
(703) 691-4253

William Vins
Gilbert Engineering
5310 W. Camelback
Glendale, AZ 85301
(602) 245-1050

Tony Vlahopoulos
Payson Refuse Service, Inc.
P.O. Box 542
Payson, AZ 85541
(602) 474-2540

"BJ" Walden
All Western Oil, Inc.
P.O. Box 2457
Mesa, AZ 85204
(602) 892-8135

Tom Webb
City of Phoenix Public Works
1724 E. Indian School Rd.
Phoenix, AZ 85016
(602) 248-7915

Harry Wells
Hevmet Recovery, Ltd.
P.O. Box 278
Port Colborne, Ontario L3K 5W1
CANADA
(416) 834-0034

Randi Wexler
Metropolitan Service Dist.
Solid Waste Department
2000 S.W. First Street
Portland, OR 97201-5398
(503) 221-1646 ext. 230

Alma H. Williams
Sierra Club
4055 W. Wonderview
Phoenix, AZ 85019
(602) 841-4969

Richard E. Wing
Eaglebrook Environmental of Arizona
P.O. Box 6351
Mesa, AZ 85206
(602) 827-7848/830-7869

Mark S. Wise
Chemetals
7310 Ritchie Hwy
Glen Burnie, MD 21061
(301) 768-6600

David L. Zelechowski
Anocad Plating & Painting
2540 W. Cypress
Phoenix, AZ 85009
(602) 272-7131

BLANK

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