PROCEEDINGS
OF THE

6TH MINERAL WASTE UTILIZATION SYMPOSIUM

EUGENE ALESHIN
EDITOR

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INDUSTRIAL WASTES—SCRAP METAL—MINING WASTES—MUNICIPAL REFUSE

EUGENE ALESHIN
EDITOR

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Eugene Aleshin
Editor

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FOREWORD

The United States, as a modern industrialized nation, is the product of constantly advancing technology. Our mobility, our affluence, and our high overall standard of living are manifestations of technological progress. So is solid waste pollution.

Technology can and does create pollution. Fortunately, it can also be applied to control and abate this very same pollution. In these days of energy shortage, we can no longer ignore the importance of solid wastes, no matter what form they take on -- industrial, mining, agricultural or domestic. The importance of handling, discharge and conversion of solid wastes is of public concern. Our environment must be made compatible to ecological consequences. It is the objective of the Sixth Mineral Waste Utilization Symposium to be of service to those who are sincerely concerned in both energy and environment, and who wish to share their views to evolve either directly or indirectly in the practice of recycling and disposal of solid wastes.

Recycling is an economic phenomenon. The extent a given material is recycled is a function of the values of so-called secondary materials in relation to so-called virgin materials. These relative values can change as a result of many factors, including changing technology, tax policies, transportation and new applications. It is the theme of this Symposium to look at both technical and economic factors, to describe progress over the last ten years, to point out problems resulting from utilization of solid wastes and development of new solutions to these problems.

Seymour A. Bortz
Symposium Chairman

CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

A Paper in the
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Jointly sponsored by the
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Held in Chicago, Illinois on
May 2-3, 1978

KEYNOTE ADDRESS

TOTAL RESOURCE RECOVERY

by

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Biographical Sketch

Mr. Kirby is the principal Bureau of Mines authority on technology, research and development relating to metallurgical processes and materials. He is responsible for implementing appropriate research programs and for the effective performance of the Bureau's eight research centers and facilities engaged with metallurgical and materials research, including the environmental aspects of such work.

Mr. Kirby was born in Washington. D.C., in 1925. He attended Catholic University of America where in 1950 he received a Bachelors Degree in Chemical Engineering. Soon thereafter he joined the Bureau of Mines at College Park, Maryland, where he gained recognition as a project leader in metallurgical process evaluation. In 1966, he transferred to the Bureau of Mines Washington headquarters where he worked as a Staff Metallurgist in the Division of Metallurgy until 1970 and as Senior Staff Metallurgist until 1972. He served as Chief, Division of Metallurgy from 1972 to 1976, when he was appointed to his present position.

TOTAL RESOURCE RECOVERY

Ralph C. Kirby

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Washington, D.C.

Dr. John Morgan, Acting Director of the Bureau of Mines, asked me to represent him today and to express his regrets at being unable to address this group. Congressional hearing obligations keep him from being here.

Dr. Morgan's inability to be in two places at once illustrates an interesting point.

There is a paradox of time: few people have enough time; yet everyone has all the time there is.

Someday there may well be a comparable resource paradox.

Then, total resource recovery will be required.

Nature concentrated her riches in complex deposits around the world. It is our challenge to discover and use them wisely. True conservation means maximum employment of our resources--and minimum waste. Total resource recovery implies the utilization of all materials extracted from the ground. Consider, for the moment, the Mascot mines in Jefferson City, Tennessee. There, the deposit contains 4 pct zinc and over 95 pct limestone. The ore is mined and concentrated for zinc recovery. The tailings from flotation are dried and sold as agricultural lime. The float-sink reject is sold as crushed stone. The mine and mill recover, for economic use, nearly all of the rock extracted from the earth's crust. Total resource recovery is approached.

Without total resource recovery we will have to find a way to renew nonrenewable resources. Part of the answer lies in secondary resource recovery and mineral waste utilization. We are meeting at the 6th Symposium in this series sponsored by the Bureau of Mines to address part of the problem. At this symposium we should review not only what we have learned in the last two years, but also what has been learned in the ten years since the first symposium. Where have we made progress? Where have we failed? And what can we do to more closely approach total resource recovery? We hope that this symposium will serve as a forum to answer these questions.

To set the stage for this look backward as well as forward, I want to examine the current state of resource recovery technology, technology development needs, and appropriate roles for various segments of society in meeting those needs.

The Problem Defined

In meeting society's needs for metals, minerals, and fuels, the extractive and basic materials industries have had to treat progressively lower grade ores. The average copper ore, at the turn of the century, was 3 pct copper. Today it is less than 1 pct. Iron ore, at the turn of the century, was so rich that it needed only to be mined and shipped to the blast furnace. Further processing was unnecessary. Beneficiation began as washing and screening, and only recently has it begun to include concentration and induration steps.

The demand for more materials, coupled with the necessity for treating lower grade ores, has resulted in an inevitable trend--the production of increasing volumes of solid, liquid, and gaseous wastes. The extent to which these wastes are made into usable byproducts represents progress towards total resource recovery. The extent to which they are discarded as useless waste--or even harmful waste--represents the remaining problem. Table 1 quantifies the mineral industry solid waste problem in 1975. Total mineral waste generation from nonfuel minerals now exceeds two billion tons per year (5), and exceeds municipal waste generation by a factor of more than 15.

Table 1.
Solid Wastes Generated by the Mineral Industries (5)

Industry	Bulk Weight of Waste, Million TPY
Copper	960
Phosphate Rock	350
Iron and Steel	420
Lead-Zinc	23
Aluminum	15
Other	380

Effluents and emissions, such as acid mine waters and sulfur dioxide, also create problems. Analysis, at each major step in the materials system, is warranted.

Mining and Concentrating

Mining and concentrating produce the bulk of the wastes generated by the minerals industry: Gangue, tailings, and mine water are the principal problems. These problems have been addressed over many decades with research, development, and commercialization. Several examples of successful resource recovery merit mention.

Recovery of copper by cementation, it should be remembered, began as an approach to more complete resource recovery. It was first practiced in the Spanish copper mines during the Sixteenth Century. It emerged in this country as a waste-rock-plus-ferrous-waste system. At Utah Copper, it incorporated a third waste--acid mine water. Today the Utah Copper Division of Kennecott Copper pumps about 60 million gallons of sulfuric acid solution a day over strip mine waste rock at the Bingham pit. This acid is derived from the iron and copper sulfide residues contacted by the waste water. The copper content of a very few pounds per ton of waste rock is dissolved in the acid solution. It is then recovered as cement copper by circulation of the leach solution over "tin" cans where the iron precipitates the copper. Today cementation is used throughout most the U.S. copper industry, and accounts for about 10 pct of our domestic production.

Mine water can also be used. During 30 years of its operating life, Copper Range Company's Champion mine supplied water to the city of Houghton, Michigan. When the mine was closed, that city acquired control of the water. The "waste" outlived the primary product (1).

Examples of similar successes abound--turning broken marble slabs into ground "whiteners" for paint and plastics applications, using chert from Missouri lead mining for road construction, and extracting uranium from mine waste or phosphate processing streams are three of the many such cases.

To illustrate typical problems that remain, phosphate slimes continue to accumulate. Present industrial practice permits a recovery of only about two-thirds the phosphate value. The remainder is lost in the beneficiation waste, especially the Florida clay slimes. Solids in the slimes remain in suspension and do not settle out, resulting in serious environmental problems. The Bureau of Mines is working on a direct acid digestion process for Florida ore which will increase phosphate recovery, as phosphoric acid, to over 90 pct; and produce a filter cake that will get around slimes storage problems. If such research becomes commercial practice, it will extend our phosphate reserves significantly and, simultaneously, reduce the environmental risks of phosphate processing. In addition, other Bureau R&D is aimed at recovering phosphate from existing slime ponds or from newly formed slimes. Slimes would still be formed during beneficiation of phosphate ore for uses other than acid production.

Technology is needed not only for phosphate but also for the reuse of vast quantities of finely ground material which, at present, still accumulates from processing other ores. In the near term, we must improve tailings stabilization--and much work is now going on. In the mid and long term, some of these materials must emerge as useful byproducts to improve total resource recovery. The fundamental need, then, is for technologies which will convert these materials into usable objects--at a cost which makes such processes economically attractive.

It has been our experience that, when processes emerge which are environmentally attractive and economically acceptable, they will be adopted. Certainly widespread use of copper cementation demonstrates this point. The beginnings of a byproduct uranium industry also illustrate that adoption does occur. The keys remain, however: a combination of profit potential and regulation motivate industry to adopt new practices--if conditions are favorable--or constrain industry if it means hindering service to, and performance in, the economy.

Processing and Refining

Ore concentrates, when smelted and refined, yield valuable metals. They also yield a variety of slags, drosses, and offgases. Slags have found a variety of uses--increasing the resources recovered from concentrates. Some drosses are also recycled. Offgases, notably SO_2, are targets for consideration.

Iron and steel slag offers an instructive example of resource recovery. Tens of millions of tons of blast and steel furnace slags accumulated until after World War II. Modest quantities were used in road construction, cement, and mineral wool. Then a vigorous marketing program coupled with an expanding construction economy solved this disposal problem. Today almost 30 million tons of blast furnace and 10 million tons of steel furnace slags are marketed annually for use in highway and airport construction, railroad ballast, bituminous concrete construction, and cement production. Slags now sell for $4 to $6 a ton.

Some 6.9 million tons of iron and steel slag are produced each year in France, and 3.3 million tons are sold to cement manufacturers there. This slag achieves 75 pct energy savings when used in Portland cement (3). In South Africa, half a million tons of "Slagment" is sold. Sales of "Slagment" could be higher if more iron and steel slags were available. In Great Britain, a similar product named "Cemsave" is marketed (3, p. 294).

Clearly, slags from ferrous metal have been found useful and salable. Similarly, foundry dusts have become valuable byproducts--particularly as soil conditioners. These are examples of resource recovery in its best sense--converting useless wastes into economically sound byproducts.

Problems remain in this area, however, which can and should be addressed by research.

Copper smelter slag, although useful in the same manner as steel slag, contains 25-35 pct iron. This iron would be useful in the cementation process if it could be recovered in shapes offering the desirable surface-area-to-mass ratio exhibited by tin cans. We have investigated this problem, and devised a method on a small scale. If the method is adopted, the economic value of smelter slag could be upgraded.

Bureau of Mines research projects are developing methods for recovering chromium and nickel from ferroalloy flue dusts, stainless steel furnace dusts, mill scale, foundry sand, chrome-bearing refractories, and other materials. Table 2 presents the amounts of these strategic and critical elements that are available as wastes. Success in this effort, if followed by commercial acceptance, could make a significant impact on import dependence.

Emissions, particularly SO_2, present serious problems for smelters. Currently, many smelters recover some of the sulfur dioxide in the form of sulfuric acid. This acid is used within the plant or sold. Smelters, however, can recover far more sulfuric acid than they or their customers can possibly use. Thus, at present, there is a significant waste of sulfur which could be put to useful purposes, such as extending petroleum-based asphalt. With the total resource recovery concept in mind, the Bureau pioneered the citrate process for removing sulfur from stack gas and recovering it in a storable, transportable, and more useful form as elemental sulfur. The recent pilot plant tests at the Bunker Hill smelter demonstrated the technical soundness of this approach. Scale-up of the process, for application to the more dilute stack gases emitted by coal-burning power plants, is now underway at the St. Joe Mineral coal-fired powerplant outside Pittsburgh.

Table 2. Cr and Ni in Wastes, TPY

Source	Cr	Ni
Ferroalloy Flue Dusts	3,500	--
Slags	1,000	--
Stainless Steel Furnace Dusts	2,500	700
Centerless Grinding Swarfs	2,000	600
Mill Scale	3,600	1,000
Pickle Liquor	800	800
Slags	1,000	250
ECM and EDM Sludges	1,300	2,600
Foundry Sand	21,000	--
Refractories	19,000	--
Etching	4,000	1,000
Plating	2,000	3,900
Catalysts	800	2,500
Chromate and Dichromate Production	4,000	--
Leather Tanning	270	--
Paint Pigment	75	--
Textile	1	--
Phosphating Metal Coating Wastes	--	10-20
NiCd Batteries	--	?

Because establishments in the private sector must remain profitable, if they are to supply the economy with both products and jobs, financial incentives and regulatory actions provide the stimuli for action. Because the Federal government promulgates regulations concerning waste disposal and environmental protection, it has the responsibility to help industry find economically sensible solutions. The discharging of that responsibility comes through technical research--with the aid of academic institutions and the active cooperation of industry.

Product Manufacturing

The myriad industrial processes that give us final products all produce scrap. Most of this is generated as prompt industrial scrap, and forms the foundation for the $4-billion secondary materials industry. The manufacturing community understands the value of its residues, and practices recycling more than any other sector of the economy. Its high resource recovery rate is closely related to a recognition of the economic value of those production residues.

Prompt industrial scrap has the most desirable charac-teristics (other than home scrap). It is of known chemical composition. Few, if any, unpleasant surprises result from its use. It is generally in a metallic state, which offers energy conservation over processing primary minerals. Capital costs for secondary smelter installations, on an annual capacity basis, are significantly lower than those for primary smelters.

The technologies for using these materials are well developed. The electric furnace and mini-mill for recovering ferrous metals; the secondary smelters for aluminum, copper, and other nonferrous metals; and the glass furnace charged with 10-20 pct cullet are well established.

What is less well established is a smooth economic pattern to stabilize the flow of prompt scrap. Because this scrap provides the marginal increment of raw materials supply necessary for meeting relatively strong levels of demand, its use fluctuates widely. Fortune Magazine dubbed 1974 as "the tinsel days" for scrap dealers--whose products were in extreme demand. 1975 could be considered the "tattered days" for the steel mills, and the nonferrous scrap consumers also slashed their purchases drastically.

A useful solution to this problem--on a total basis--may be the development of more technologies where scrap is the basic raw material rather than a marginal increment of supply. Electric furnaces offer this potential for steelmaking--particularly in the mini-mills. In larger electric furnace establishments, scrap must compete with pre-reduced iron pellets. The secondary smelters of nonferrous metals, which now recycle their own drosses as well as those from primary smelters, are closer to having scrap as the basic raw material.

Obsolete Wastes

After products have been made and used, they either wear out or become obsolete. They are discarded. In addition to the 135 million tons of municipal solid waste discarded each year, some 9 million automobiles are junked. Batteries, too. Stoves and other household appliances are discarded. Buildings are torn down. The discards of a modern society continue to pile up.

These residues, rejects from our materials system, have commanded the bulk of society's attention in the waste processing area. Table 3 presents municipal processing plants now on stream. Clearly, such processes have become commercial. And, although "bugs" and "glitches" exist, we know how to sort trash into useful components.

Table 3. Municipal Refuse Recycling Plants

Operational	Size, TPD	Committed or Being Built	Size, TPD
Ames, IA	200	San Diego, CA	200
So. Charleston, WV	200	Hempstead, NY	2,000
Baltimore County, MD	1,500	Akron, OH	1,000
Chicago, IL	1,600	Chicago, IL	1,000
Milwaukee, WI	1,600	Bridgeport, CT	1,800
Nashville, TN	400	Monroe County, NY	2,000
Harrisburg, PA	720	Pompano Beach, FL	100
Saugus, MA	1,200	Tacoma, WA	500
Norfolk, VA	360	Niagara Falls, NY	2,200
Braintree, MA	240	Newark, NJ	1,000
Ft. Wayne, IN	300	Lane County, OR	500
New Orleans, LA	650	Albany, NY	750
Franklin, OH	150	Duluth, MN	400
East Bridgewater, MA	1,200		
	10,320		13,450

In the automobile area, the progress since 1960 has been amazing. The widespread use of shredding technology increased junk automobile recycling to a level of 90 pct. The shredder improved the quality of the ferrous scrap and made it more useful to steelmakers. At the turn of this decade, Huron Valley Steel Corporation developed a sink-float system to handle the nonferrous material from auto shredders. Today, Huron recovers over 25,000 tons each of zinc and aluminum annually.

Most lead from scrap auto batteries is reclaimed and recycled by several other firms. Nearly one half of our annual consumption of lead is met from secondary sources.

Despite this progress, technical problems and opportunities in the obsolete scrap area are significant.

An example is the plastics in automobiles. This use of plastics is increasing steadily. By 1980, the average car may contain 400 lb of plastics. We are also working on methods to segregate individual plastics economically. This project, being performed in cooperation with Ford and General Motors, has already achieved a promising method for isolating polyurethane foam. Such successes will help achieve systems where plastics are recycled--thus saving valuable petroleum and natural gas feedstocks. These issues must be addressed if we are to approach total resource recovery.

Society motivates moves in this area of resource recovery from wastes, and advances are coming rapidly. There is sufficient economic and legal incentive to continue this thrust. What appears as an unmet need is the technology to use some of the marginal commodities which emerge from the solid waste stream.

Technology Status

The systems for classifying and separating many product and waste streams are well developed. This holds true at most levels of the materials processing system. Minor problems and exceptions will always exist, but they are not sufficient to impede meeting our raw material needs.

Numerous systems also exist, and are well entrenched in the U.S. commercial system, to use particular waste products. These include copper cementation, slag usage, secondary smelting of prompt industrial scrap, and the recovery and reuse of metallic elements in junk automobiles. It is popular to say that all resource recovery technology began in the 1960's or--stretching the point--those ancient years, the 1950's. One must pause for a moment, however, and consider that nearly 4,000 years ago, Europe's metals trade was reorganized to insure more complete collection, recovery, and reutilization of bronze scrap. Early American settlers and pioneers had to practice recycling. For instance, old buildings were burned to recover nails. Over a century ago, Charles Dickens was writing about reclaiming values from "dust heaps" in his book, Hard Times. That those dust heaps could be given as dowries makes a salient point: technologies had developed in response to economic incentive.

Technology Needs

To say that technology has emerged does not imply that such technology is totally adequate. There are both short-and long-term needs which must be met if we are to chart a course toward total resource recovery.

In the near term, we must conceive and create more product development and utilization technologies. What is needed is a clear identification and ordering of priorities for product utilization technologies which can be developed by research.

Over the longer term we must seek out systems to evaluate and develop as many "ore bodies" as possible from this total resource recovery perspective.

Uses for the separated fractions must be developed. Certainly, each new waste processing operation must be based not on a national perspective, but rather on the marketability of what is separated and recovered. One direction that R&D should take is to assure the usefulness and applicability of materials to reuse in the best form. This is part of the path to renewing nonrenewable resources.

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SESSION NO. 1

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CONGRESSIONAL AND AGENCY ROLES IN RESOURCE RECOVERY

Frank McManus
Resource Recovery Report
1707 H Street, N.W.
Washington, D.C. 20006

ABSTRACT

Congress and its cognizant committees have taken the leadership in passing solid waste/resource recovery legislation and in convening oversight hearings to assure that Congressional aims are carried out.

Virtually every federal agency is or has been involved in some aspect of resource recovery but none has exercised the leadership role which Congress gave them. Four agencies have important responsibilities to promote reprocessing of our wastes. The Environmental Protection Agency is inclined to regulate solid wastes more aggressively than promote resource recovery. The Department of Commerce has not yet funded its statutory mandate. The Department of Energy has the money and a new $300 million program of loan guarantees but almost no staff or top level support to carry it out. The Bureau of Mines in the Department of the Interior needs a public relations consultant and a Congressional liaison to convey its fine record of progress in resource recovery.

CONGRESSIONAL AND AGENCY ROLES IN RESOURCE RECOVERY

Frank McManus

Resource Recovery Report
Washington, D.C.

The conventional wisdom in Washington is that the Congress always reacts to problems, is last to act. Sometimes that is true but in the case for processing wastes for energy and materials, Congress has clearly been the prod behind the federal agencies. Lest we get too euphoric, I suspect that this phenomenon exists because it is one of the few environmental issues that no one is opposed to.

As you know Congress passed the Solid Waste Disposal Act in 1965 which gave rise later to some original work by the Bureau of Solid Waste Management in the Department of Health, Education and Welfare. Dick Vaughan, our next speaker, was the director of that distinguished Bureau, then in the Public Health Service. Earlier the Bureau of Mines, of course, had been quite active in resource recovery as evidenced by this series of symposia begun in 1968, and its work in College Park and elsewhere.

Nevertheless, it was the then Senate Public Works Committee which in 1969 and 1970 took the leadership and passed the Resource Recovery Act. It was also during 1970, that President Nixon created EPA and a group of industry and labor leaders founded the National Center for Resource Recovery. Since that time, a great deal of resource recovery progress has taken place but the federal role has been much less than the public had eagerly anticipated. The principal culprit is almost universally agreed to be the Office of Management and Budget (OMB). Most seem to agree that OMB analysts, who fear a massive multi-billion dollar waste-water type program, are the real villains. I don't agree with that assessment but that is another subject.

Senator Randolph has sustained an interest in the Resource Recovery Act and its implementation. He held a number of hearings as chairman of the powerful Public Works Committee and as Chairman of a special panel after he relinquished the chair of the cognizant subcommittee. When Senator Randolph's renamed Environment and Public Works Committee finished work on its bill in May 1976, no one thought the House would or could pass a similar bill.

A new House subcommittee surprised everybody by acting on a bill introduced by its Chairman, Fred Rooney. He and his Subcommittee on Transportation & Commerce staff drafted a new bill, introduced it in June and held hearings almost immediately. Soon thereafter, the subcommittee and full committee passed the bill. Keep in mind that both the Democrats and Republicans were holding their national conventions during that summer and some members of Congress took vacation.

Among the major changes which the House Committee made were new duties for the Department of Commerce to "encourage greater commercialization of proven resource recovery technology." The subcommittee felt that EPA neither should nor could attempt to regulate as well as promote resource recovery. It was also clear that the members felt there was an important role for the federal government in advancing resource recovery and that EPA was not carrying out this role. In the space of three weeks the House passed it's bill and staffs of both House and Senate Committees worked long hours to reconcile differences so that the Senate and House each agreed on a bill which President Ford signed on October 21, 1976.

One major deficiency of the law, is the failure to provide a specific role for the Department of the Interior. Ironically, many members of Congress and many more Congressional staff had visited the two prototype waste recovery systems which the Bureau of Mines has been operating at College Park, Maryland just 10 miles from Capitol Hill.

I describe the genesis of RCRA to give you a notion for how strongly the Congress feels about resource recovery. Now lest you think the Congressional progenitors went on to other things, they didn't! Within six months Congressman Rooney held oversight hearings. In 1978 Mr. Rooney held an additional three days of oversight hearings and Senator Randolph has also scheduled three days of oversight hearings. Moreover, Congressman Brown, Chairman of the Environmental & Atmosphere subcommittee, has scheduled oversight hearings on the research, development and demonstration portions of the law. Oversight hearings on new legislation is not common. I hope you agree that inadequate federal agency action in resource recovery does not reflect the views of Congress. One final manifestation of Congressional interest has been the work of two congressional agencies the GAO and the OTA.

GAO, Congress' investigatory agency has undertaken several solid waste/resource recovery studies during the past several years. Two are underway now: one is a comprehensive assessment of bio-conversion developments and the other describes and evaluates various resource recovery systems for municipal solid wastes in four categories: those which are operating; under construction; in advanced planning and those in some stage of feasibility study. GAO's posture has been that of an advocate for resource recovery.

In the meantime the Office of Technology Assessment is about to release a comprehensive analysis of "resource recovery, recycling and reuse of materials from municipal waste." The study has been underway for more than 2 years and has generated a great deal of expectation and controversy. It assesses transportation rates, tax policy, product disposal charges, the beverage container issue, and incentives and disincentives for recycling.

An extraordinary number of federal agencies are engaged in resource recovery activities. The Committee allocated me a maximum of 15 minutes so that I will limit my remarks to two of the three agencies: DOE and the Department of Commerce and a brief remark on several others. I am going to assume that Bureau of Mines personnel will cover their program better than I could and that the EPA programs are well known.

The Department of Energy (DOE)

At this very moment DOE officials are dedicating a 50-100 ton/day refuse to methane conversion system at Pompano Beach, Florida. The novel facility was designed and built by a Chicago-area contractor, Waste Management, Inc. (WM), which will also operate it. Built at a cost of $3.65 million with DOE support, the plant will separate organics from inorganics and mix it with sewage sludge in two 350,000-gallon digesters. Inside, a complex group of organisms converts the mix to a 55-75% methane gas which will be used to heat the digester. During the two-year test program WM hopes to sell the excess gas to a local gas transmission company. Five additional DOE research projects are underway to complement this effort.

Among the other current DOE projects are:

- an assessment of needs and constraints for small resource recovery systems.
- support of the National Center for Resource Recovery ETEF plant in Washington.
- assessment of the technical, economic and institutional elements of the Ames, Iowa resource recovery plant
- development of a larger calorimeter for determining the heat value of waste.
- improved conversion of cellulose to fuels and chemical feedstocks.
- integration of a refuse-fired combustion unit into Tacoma, Washington's steel distribution system.

The miniscule DOE staff working on energy recovery from waste has supervised completion of such projects as:

A comprehensive assessment of European urban waste recovery technology, principally waterwall incinerator, was commissioned and published. Several case studies are available and others are being completed.

A study was conducted to determine whether or not ammonia could be economically produced using the Union Carbide PUROX pyrolysis system.

All of these projects were formerly ERDA projects and do not include a similar number oriented to industrial energy conservation or bioconversion.

A significant new report had been commissioned by the former FEA now a part of DOE: "Overcoming Institutional Barriers to Solid Waste Utilization as an Energy Source" sets forth seven categories of federal action to "spur utility participation in MSW (Municipal Solid Waste) energy recovery." Such actions span the range of modest federal test programs to the provocative - disallowing utility fuel adjustment rate increases unless MSW is considered as a fuel. The study analyzes both the electric and natural gas utilities, their structure and financing, responsibilities and constraints, and assesses the economics of waterwall incineration, RDF systems and pyrolysis.

The Department of Commerce

Commerce is one of the agencies with a great opportunity to impact resource recovery but its top management has not yet decided whether or not to comply with the law. Commerce was given a significant role by RCRA which it had not sought out. Its statutory job is:

1) to develop "specifications for recovered materials" - a job which the National Bureau of Standards is well qualified to handle;

2) to stimulate "markets for recovered materials";

3) to promote "proven technology"; and

4) provide a "forum for the exchange of technical and economic data relating to resource recovery facilities."

Commerce got these important assignments because Congressional staff felt that EPA was cast in the role of a regulator while Congress wanted a promoter for resource recovery.

The Assistant Secretary of Commerce for Science and Technology testified at the March 8 oversight hearings on the Department's activities. Commerce "is planning an international conference for 1979 on industrial-municipal resource recovery and utilization parks", one of several efforts the Department is considering "to encourage investment in resource recovery and reuse facilities that will enhance community economic development, increase utilization of recovered materials, and more effectively use energy resources in our society." Commerce staff have studied markets and uses for recovered materials and they are also "addressing the economic, technical and institutional barriers to the use of recovered materials."

Among the specifications for secondary materials being developed from data developed by the National Bureau of Standards are those for glass, waste tires and construction debris. NBS has also developed a plan to study problems of refuse-derived fuel and develop specifications for such fuel. Recently, a new program manager was appointed after Dr. Yakowitz was promoted to the Director's office. NBS will be co-sponsoring, with EPA and the National Governors' Association, a conference on May 30 and 31 to plan for the mandatory use of recycled products in purchasing specifications.

The Office of Minority Business Enterprise is actively considering a number of new business opportunities for minority businessmen in resource recovery. Two grants have been made: to the Southwest Alabama Farmers' Cooperative to investigate the economic feasibility of producing alcohol fuel and to analyze the cost/benefits of co-op produced alcoholfuel as compared to petroleum fuels and to the National Black Veterans' Organization to plan and operate a pilot recycling program in Washington, DC.

One of the real powerhouses to advance resource recovery could be the Economic Development Administration (EDA). EDA has a $5-6 billion budget to support public works projects and to create jobs. EDA has financed several studies and one project which bears on resource recovery but these initiatives have come from the EDA field offices, not from the policy makers in the Secretary's office.