

**REPORT OF THE
SOLID WASTE COMMISSION**

TO

THE GOVERNOR

AND

THE GENERAL ASSEMBLY OF VIRGINIA



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**COMMONWEALTH OF VIRGINIA
DEPARTMENT OF PURCHASES AND SUPPLY
RICHMOND**

1978

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Report of the

Solid Waste Commission

To

The Governor and the General Assembly of Virginia

Richmond, Virginia

December, 1977

To: Honorable Mills E. Godwin, Jr., Governor of Virginia

and

The General Assembly of Virginia

I. INTRODUCTION

The need to study the problems of solid waste management in Virginia with particular emphasis on the causes, collection, and disposal was acknowledged during the 1973 General Assembly by the passage of Senate Bill No. 856. This legislation, introduced by Senator Stanley C. Walker, created the Commission to Study and Advise Upon the the Disposal of Solid Wastes. During the 1976 Session of the General Assembly the name of the Commission was changed to the Solid Waste Commission in Senate Bill No. 383.

The Commission was also charged with the study of energy-saving methods of solid waste disposal by Delegate Alan A. Diamonstein in House Joint Resolution No. 217 during the 1977 General Assembly. A section regarding conclusions in this area is included in this report to the 1978 Governor and General Assembly. (See Appendix I.)

The members of the Commission as of July 1, 1978, are: Dr. Robert F. Testin, Richmond; William M. Beck, Jr., Norfolk; Callis H. Atkins, Ruckersville; Delegate Richard M. Bagley Hampton; R. E. Dorer, Norfolk; Ernest C. Edwards, Jr., Chase City; Joseph M. Guiffre, Alexandria; Delegate Joan S. Jones, Lynchburg; Jonathan Murdoch-Kitt, Richmond; Edward T. DiBerto, Virginia Beach; William T. Reed, Manakin-Sabot; Delegate Richard L. Saslaw, Annandale; and Senator Stanley C. Walker, Norfolk. Mr. William M. Amrhein has been retained as counsel to the Commission. Ms. Susan T. Gill of the Division of Legislative Services served as staff to the

Commission. The Commission regrets the death of Mr. J. D. Pennewell from Chincoteague in June, 1977.

II. DELIBERATIONS: MEETINGS AND WORKSHOPS

The full Commission met five times during the past year and held seven workshops throughout the State to inform localities of the October, 1976, passage of the federal Resource Conservation and Recovery Act (Public Law 94-580) and to make them aware of some of the probable effects of this Act upon the State as well as localities. The Commission also asked for testimony from public and private officials on their problems in solid waste management under existing Virginia law. The Commission held workshops during the spring and summer in Charlottesville, Harrisonburg, Danville, Manassas, Richmond, Norfolk, and Wytheville. Much of the testimony was centered around the following areas: landfill operations, green boxes, collection systems, disposal of trees and brush (including pit incineration), resource recovery, necessary components of a state solid waste management plan, industrial and hazardous wastes and transportation of refuse. The information obtained was of great assistance in determining the needs of the Commonwealth in the area of solid waste management.

III. REVIEW OF SOLID WASTE LEGISLATION

A. At the federal level. As a result of Public Law 94-580, solid waste is now defined as "Any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining and agricultural operations, and from community activities". Only solid or dissolved materials in domestic sewage or irrigation return flows, and otherwise regulated industrial discharges and nuclear wastes do not come under the law's definition.

Also much broader is the definition of "disposal" as "the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters." The federal Resource Conservation and Recovery Act of 1976 (Public Law 94-580) was passed in order to promote the protection of health and the environment and to conserve valuable material and energy resources by—

(1) providing technical and financial assistance to State and local governments and interstate agencies for the development of solid waste management plans (including resource recovery and resource conservation systems) which will promote improved solid waste management techniques (including more effective organizational arrangements), new and improved methods of collection, separation, and recovery of solid waste, and the environmentally safe disposal of nonrecoverable residues;

(2) providing training grants in occupations involving the design, operation, and maintenance of solid waste disposal systems;

(3) prohibiting future open dumping on the land and requiring the conversion of existing open dumps to facilities which do not pose a danger to the environment or to health;

(4) regulating the treatment, storage, transportation, and disposal of hazardous wastes which have adverse effects on health and the environment;

(5) providing for the promulgation of guidelines for solid waste collection, transport, separation, recovery, and disposal practices and systems;

(6) promoting a national research and development program for improved solid waste management and resource conservation techniques, more effective organizational arrangements, and new and improved methods of collection, separation, and recovery, and recycling of solid wastes and environmentally safe disposal of nonrecoverable residues;

(7) promoting the demonstration, construction, and application of solid waste management, resource recovery, and resource conservation systems which preserve and enhance the quality of air, water, and land resources; and

(8) establishing a cooperative effort among the Federal, State, and local governments and private enterprise in order to recover valuable materials and energy from solid waste.

The Commission has met with representatives from the Environmental Protection Agency in Washington, D. C., as well as in the Region III headquarters in Philadelphia regarding the timetable for implementation of the Act, the designation of a lead state agency and the elements of the Act. In March, 1977, Dr. Testin and Mr. Dorer attended a public hearing in Richmond conducted by EPA. The purpose of the hearing was to discuss the content of the Act, the specific objectives to be achieved and timetables for meeting these objectives. In July 1977, Mr. Amrhein and Ms. Gill attended a public hearing held in Washington, D. C. designed to receive public comment on the Act as was required by the federal law. Mr. Amrhein and Dr. Testin met with the Regional III EPA representatives in Philadelphia to review the intent of the federal Act, the Commission's interpretation of dates for guidelines, provisions for lead agency and components of a state plan for use at the regional workshops. Representatives from EPA met with Mr. Amrhein and Leonard Vance of the Attorney General's Office assigned to the Health Department to review proposed changes in Title 32 of the Code of Virginia relating specifically to solid waste. In November, 1977, Ms. Gill and Mr. DiBerto attended the National Solid Waste Management Association/Environmental Protection Agency Sixth Congress on Waste Technology and Recovery of Energy Resources to obtain an update on EPA's progress in promulgating guidelines for the States particularly in reference to landfills and hazardous

wastes.

B. At the State Level.

The Virginia Code Commission is at present in the process of bringing the language in the Code in Title 32 in line with federal requirements in the Resource Conservation and Recovery Act and has received assistance from the Attorney General's Office, the Solid Waste Commission, and the Health Department. Also, the Commission has considered the possibility of recommending changes within the Code of Virginia with regard to the function and responsibility for solid waste management within State government. In order to make a decision on changes regarding reorganization and consolidation of existing solid waste legislation the Commission retained the services of Mr. Will Allcott to review existing legislation throughout the Code relating to solid waste. With the assistance of the Division of Legislative Services staff and Commission counsel, a computer "word search" of the entire Code was done. Key words or phrases used in the area of solid waste were programmed through the computer which enabled the Commission to see where and with what frequency these words were used in the Code.

It was noted that the vast majority of laws dealing with solid waste are located in three categories of the Code;

1, laws having only local application;

2) certain codified acts with particular significance to the area of solid waste, and

3) laws which relate to solid waste and to each other but for various reasons are not centralized in one part of the Code. It was Mr. Allcott's opinion, with which the Commission concurred, that the laws in the Code of Virginia relating to solid waste are readily identifiable and fairly easy to locate. Virginia does not have a number of antiquated and unenforceable laws in the area of solid waste. However, it may be concluded that laws pertaining to solid waste in the Code (with the exception of Title 32) do not have any particular philosophical or unifying base but instead result from legislation passed primarily to remedy problems perceived by the General Assembly to which solid waste bears an incidental or a peripheral relation. At this point the Commission sees no need to revise or relocate this existing legislation throughout the Code of Virginia.

It should be noted that within the broader solid waste functions as addressed by RCRA, no mention has been made of resource recovery in the recodification of that section of Title 32 dealing with solid waste. This is an integral part of the solid waste problem which needs to be addressed at the State level.

IV. REVIEW OF SOLID WASTE

MANAGEMENT IN VIRGINIA

A. Collection and Transportation.

As was noted earlier in the report, the Commission obtained valuable information from the workshops held during the past year. One area of discussion brought up in every workshop was that of collection and transportation. The problems incident to collection and transportation of solid waste differ markedly throughout the Commonwealth, but many of the problems are similar in nature though they differ by degree. Some localities undertake the responsibility for collection and transportation as part of their normal operation.

Some localities have entered into contracts with private enterprise for the performance of all or part of this function. Such contracts allow the localities to pinpoint more closely the cost for performance of this service because there is only one budget expense to be considered. The problems of employees, equipment, and operation are passed on to the private individual although they become a part of the cost factor in conjunction with the profit factor. The implicitness from the local government point of view in contracting for this service has to be balanced with the problem of the quality of the service performed and the ability of the private individual to cope with the expanding volume of solid waste created by the growing population.

Under both systems, different localities tend to use different types of collection, and the variety does not seem to have any predictable basis or explanation. Some localities collect solid waste on a door-to-door basis. This method obviously has greater use in the more highly populated metropolitan areas. Some localities in rural areas have employed a system of pickup of solid waste from a location at or near a mailbox. This method has become quite popular in those areas where it is in use because the homeowner has only to deposit his solid waste at the specified location while the collector normally does not have to enter private property to perform his work.

The most widely employed system of collection in rural areas, and relatively most successful, is the Green Box Program. The green boxes vary in size from the small 4 cubic yard box (which seems to be the most popular size) to the larger 40 cubic yard size used by some localities at fewer locations. One locality uses a compactor in its large green boxes although there was much concern about the possible liability that might ensue from an accident during such use. Administrators continue to have problems finding suitable locations for any size box.

Almost all localities which use the green boxes as a method of collection experienced the problem of overflow of trash around the green boxes as a result of careless littering in the adjacent areas. The maintenance and replacement of green boxes, and associated equipment (trucks and front end loaders), has not yet become a major problem because of the relatively short time that the program has been in use, but it will become a budgetary problem in the near future. There is an

additional problem in the use of the facilities of one locality by residents of adjacent localities that do not employ the green boxes.

B. Disposal

The disposal of solid waste throughout the Commonwealth is achieved primarily by the use of the sanitary landfill for both municipalities and industries with the latter often utilizing city or county facilities for the disposal of its wastes. Industry as a whole is becoming more aware of the problem of solid waste disposal and in some instances is assuming a leadership role in development of solid waste disposal facilities.

The Commission feels that there is some lack of information about the disposal activities of industries in general. In many cases the nature and volume of the waste and the method of disposal are unknown. Localities still encounter problems incident to use by industry of county or city disposal facilities. The volume of industrial waste and, at times, the system for disposal create problems for the localities. The identification of industrial wastes and their disposal is the subject of a current study being conducted by the Bureau of Solid Waste and Vector Control under a federal EPA grant.

The problems incident to the use and operation of landfills tend to be the same throughout the Commonwealth, although varying in application or degree of severity. Of primary concern is the problem of location, including sheer unavailability of land in some areas. For those localities who have adequate facilities for the foreseeable future, there seems to be no problem expressed at the workshops. The localities which need to find new or additional land for such use encounter major obstacles in the nature of citizen opposition to specific locations. Landfill operators encounter daily problems in terms of the wide variety of material which is brought to the landfill for disposal. Brush, tires, carcasses, and chemical compounds of unknown formula head the list. There seems to be a conflict of opinion with reference to the question of whether a city or county should charge a fee for the privilege of the disposal of waste at a landfill. Some localities make no charge at all to encourage use of the landfill and to discourage promiscuous dumps. Some type of training of employees who are involved in the problem of disposal at landfills is lacking in general throughout the State.

The larger metropolitan areas encounter problems of disposal because of the large volume of waste generated in urban areas. Generally, there is adamant opposition to the use of a facility by an adjoining locality. In many cases a situation is mollified by the charge of the fee for the privilege of disposal at the site, but localities remain possessive in regard to their currently limited disposal sites.

C. Resource Recovery Projects.

The Commission has followed the various resource recovery projects developed throughout the Commonwealth to promote recovery of materials and energy from solid waste. The project in the Charlottesville area to

supply power to the University of Virginia by incineration of waste is beyond the drawing board stage as is the project sponsored by Harrisonburg and Rockingham County to supply steam for Madison College and the hospital there. A Richmond metropolitan task group, consisting of representatives of Richmond city and Henrico and Chesterfield counties and representatives of the business community in the area has been functioning for several years. The objective of the task group is to study the solid waste disposal problem in the metropolitan area and develop long-range

Solutions to the solid waste management problems of the metropolitan areas. The task group engaged Roy F. Weston as a consultant for the project. Initial project funding came from Richmond, Henrico, and Chesterfield; and this was supplemented by a grant from the U. S. Environmental Protection Agency. The consultant submitted a final report in the fall of 1977 to the task group recommending a resource recovery system for the metropolitan area. This resource recovery system would extract salable materials from the municipal refuse in three-community region and produce refuse-derived fuel for a sale to local industries. The report recommended the creation of a metropolitan authority to implement the program. This plan is now awaiting action by each of the three communities involved in the program.

In Northern Virginia recycling centers are not getting sufficient volume but are getting a considerable amount of newspaper. "Paper snatchers" in Northern Virginia have been prosecuted and convicted.

The Washington Metropolitan Council of Governments in conjunction with the National Center for Resource Recovery had planned a resource recovery facility for Lorton, the I-95 project. This proposed facility was designed for 1300 tons per day of solid fuel, metal and glass. However, the I-95 project has not gotten federal Congressional Funding System analysis of shredding modules which will define the location of five plants. The city of Alexandria has exchanged letters with PEPCO concerning reopening discussions on the subject of supplying Refuse Derived Fuel to PEPCO.

Perhaps the most significant development in terms of size and scope is the project between the Southeastern Virginia PDC and the United States Navy which involves the collection and disposal of waste from Chesapeake, Franklin, Isle of Wright, Norfolk, Portsmouth, South Hampton, Suffolk, and Virginia Beach. This waste will be used as a fuel derivative to supply steam and energy to the Norfolk Naval Shipyard Facilities at Portsmouth. The long-range potential of saving in terms of land use, manpower, and budget expense is by far the greatest asset of this project. The Commission is also aware of the proposal of the Tennessee Valley Authority for a steam generator at Galax and the considerations under way by the City of Norton and Marion for generation of steam as a result of energy recovery in those areas.

V. PROBLEM AREAS AND COMMISSION RECOMMENDATIONS

A. Organization of State Government.

The Commission has considered for the past several years the position of solid waste in the overall organization of State government in Virginia. It has concluded in conjunction with the position of the federal government as well as the majority of state governments, that solid waste should be elevated to an equal level with water and air. It is the third largest local expenditure in the State after highways and schools and receives little focus in terms of its importance not only in the immediate but also long-range situation in Virginia. The Solid Waste Commission supports the recommendations of the Commission on State Governmental Management that two secretaries replace the existing Secretary of Commerce and Resources. In addition it is recommended that all of the existing solid waste functions presently within the Bureau of Solid Waste and Vector Control should be located in a Department of Solid Waste Management under the proposed Secretary of Natural Resources (or existing Secretary of Commerce and Resources if the proposal is not passed by the General Assembly). The Solid Waste Commission feels that this relocation would assist in allowing solid waste management the attention it need from the State perspective. The Commission vote on the relocation of solid waste in State government was as follows: Yeas—Edwards, Guiffre, Beck, Diberto, Reed (the Chairman concurring); Nays—Atkins, Dorer.

B. Weight limits on refuse trucks.

The Commission discerned from its workshops the need to change weight limits on trucks. Weight limits on trucks need to be changed for exemption of trash haulers allowing higher gross weights, i.e., 5,000 pounds more per axle. An argument for larger loads can be made in terms of energy-saving.

C. Disposal of Certain Items at Landfills.

Many items currently deposited at landfills do not belong there and cause problems in terms of landfill maintenance such as trees and rock (mixed with dirt and rocks), fabrics, scrap wire and wire rope, burial of animals, agriculture wastes (herbicides and insecticides), tires, white goods. The problem of trees and brush is one area in which there seems to be a workable solution. The Commission has approached the Air Pollution Control Board regarding more permits for burning this debris at landfills in certain atmospheric conditions. The APCB is at present considering these recommendations which it received favorably. The Commission vote was unanimously in favour of this course of action.

D. Communications with Regional Solid Waste Management Associations.

The Commission decided as a result of its regional workshops to establish close and permanent ties with the officials in the seven solid waste management associations in the Commonwealth. Various Commission members are now assigned to monitor solid waste activities in a specific associations and to assist the localities in information gathering as well as make them aware of plans on the State and federal levels. This will provide better state /local relations in the area of solid waste.

E. State Aid to Localities.

Local governments are held responsible under State law for the proper disposal of solid wastes generated within their respective jurisdictions. The State Health Department is currently responsible for the standards under which local governments must operate. These standards have cost localities millions of dollars since they went into effect in April of 1971. Localities feel that not only local but State money should be used in order to meet the established standards. The new federal RCRA may well increase the cost of solid waste disposal in localities.

The production of solid waste is directly proportional to the population of a given area. As quantities increase, the cost per ton decreases. A suggested formula was developed:

$\$30,000 + \$0.75 \text{ per person} = \text{State Contribution.}$ Total State funds to finance this program would be \$8,000,000. The money is to be used for bulldozers, operators, etc., at locations where disposal sites have not been properly handled.

F. Regional Landfills.—Despite the political problems inherent in the disposal of one community's solid waste in another political jurisdiction, the Commission believes that implementation of regional landfill sites is essential.

G. The Commission endorses the concept of State support for the funding of solid waste management systems through full faith and credit backing of revenue bonds.

VI. PLANS FOR FY 1978–1979

A. Reorganization of State Government in Terms of Solid Waste.

As was noted earlier in this report, one problem area acknowledged by the Commission was the location of solid waste within Virginia State government. If the Commission on State Governmental Management recommends a Department of Solid Waste Management, on an equal level with the State Water Control Board and Air Pollution Control Board and located with the current Secretary of Commerce and Resources, or the new Secretary of Natural Resources, passes the 1978 General Assembly, then the Commission will endeavor to work closely in an advisory capacity with this group. Also, the Commission will support the changes currently being reviewed by the Code Commission to bring solid waste management law within the State in line with RCRA.

B. Virginia Conference on Industrial Waste Exchange.

The Commission has expressed an interest in sponsoring a conference to bring together representatives from industry, solid waste management facilities, state and local governments working in the area of solid waste for the purpose of discussing the problems, profits, and advantage of

industrial waste exchange. The outgrowth of such a conference would most beneficially be a clearing house for the reuse of industrial wastes. The Commission plans to sponsor a Conference of this nature during the next year.

C. Resource Recovery Projects Already in Existence.

One of the most important aspects of Solid Waste management, yet one still in its infant stages in much of the State, is that of resource recovery. The Commission plans to set up an information exchange on resource recovery projects already in existence in the State as well as those in the planning process. The Commission also plans to investigate these operations in other states in hopes of providing Virginia with valuable information as to how to best pursue resource recovery from the solid waste stream.

D. The Commission has been made aware of the Litter Control Program in the Department of Conservation and Economic Development and its progress during the past year. With a budget of \$1.2 million per year, the Division of Litter Control has launched an all-out war of litter. One half of the money appropriated to the Division must be returned to localities for assistance in litter control. Education is at the top of the list in the program developed by the Division including school and local officials as well as the general public. The Commission wishes to continue its association with the Division of Litter Control and assist the Division whenever possible in its litter control program.

Respectfully submitted,

Robert F. Testin, Chairman

Callis H. Atkins, Vice-Chairman

William M. Beck, Jr.

Richard M. Bagley

R. E. Dorer

Ernest C. Edwards, Jr.

Joseph M. Guiffre

Joan S. Jones

Jonathan Murdoch-Kitt

Edward T. DiBerto

William T. Reed

Richard L. Saslaw

Stanley C. Walker

DISSENTING STATEMENT OF R. E. DORER

PROBLEM AREAS

A. Organization of State Government

I felt compelled to vote against the section of the Solid Waste Commission's report that endorses the reorganization of State Government as it applies to solid waste. I have a limited understanding of the proposals of the Hopkins Committee and, therefore, my objections are based on general considerations rather than specifics. There is need to upgrade the status of solid waste in the state structure. This has become more apparent because of the passage of Federal legislation which defines solid waste as any end material, and the importance of properly handling hazardous wastes.

I feel that the State Health department is the best qualified agency in the State to carry out the provisions of the new regulations because:

1. It has had years of experience in this field.
2. It can be scaled to handle the increased concerns without creating confusion and inefficiency inherent in creating a new agency.
3. Public health aspects will still need the expertise and sanction of the Health Department. Hence, the responsibility for solid waste under the proposed reorganization will be divided between two secretaries.
4. In most areas of the State, the method of solid waste disposal will continue to be the sanitary landfill for years to come; and even where resource or energy recovery projects are introduced, there will also be the need for a sanitary landfill and this is primarily a public health matter.

My main objections are based more on philosophical lines. It is my belief that reorganization for the sake of change has no merit; reorganization gives the illusion of improvement while, in fact, it causes confusion and inefficiency, especially during the period of reorganizing; reorganization does not save money; the public will not be served any better.

Based on the above, it seems to me to be logical to upgrade the present status of solid waste management within the State Health Department to meet the needs of expanded responsibilities rather than start from scratch with a whole new organization.

Respectfully submitted,

Rowland E. Dorer, Commissioner

DISSENTING STATEMENT OF CALLIS H. ATKINS

The latter portion of this section of the Commission's report supports the transfer of solid waste management from the State Health Department to a proposed Department under a proposed Secretary of Natural Resources.

I agree that solid wastes management should be upgraded substantially. However, I do not agree that the State Health Department should be relieved of responsibility for the protection of the public health which is of major importance in the handling and disposal of solid wastes. Indeed the protection of public health and environment is cited in State and Federal legislation as a major justification for solid wastes management programs.

To provide this protection the hazards must be prevented or minimized before they result in morbidity or mortality. The Kepone situation illustrates what can happen in the absence of adequate safeguards.

In 1977 the Governor designated the State Health Department as the State Agency to plan and develop a state-wide solid wastes program in collaboration with the Federal Government. The planning of this program is in progress by that Department. The Bureau of Solid Wastes and Vector Control is serving as a nucleus. That Bureau is understaffed and too low in the Department. However it made good progress in carrying out its limited responsibilities prior to the Federal legislation of 1976. That act greatly extends State and Federal functions in this area. The Commissioner of Health plans to upgrade and strengthen solid wastes management in his Department. I believe that this is the proper approach. This should be more efficient and economical than a new Department.

Callis H. Atkins

Member of the Commission

APPENDIX I

House Joint Resolution No. 217 requested the Virginia Solid Waste Commission to study the feasibility of pollution-free, energy saving methods for the disposal of solid waste and to present all relevant information gathered with any legislative and other recommendations in its annual report to the 1978 Governor and the General Assembly.

The feasibility of pollution-free energy saving solid waste disposal systems has been demonstrated in several locations in the United States and in other countries. Good commercial practicality indicates that solid waste management systems should incorporate energy recovery in order for the overall system economics of these facilities to be commercially acceptable. In general, the recovery of energy in one form or another from the organics (or combustible portion) of the solid waste stream is a prerequisite to an efficient solid waste management system. However, energy saving systems present a relatively complex issue, since there is some variability in the proportion of paper, food wastes, lawn and yard wastes, and plastics, as well as moisture content of an input refuse stream that will be reflected in the quality or quantity of the fuel product produced or energy recovered. This applies to not only municipal refuse but to industrial type wastes as well.

The combustible materials present in a refuse stream can vary seasonally and with the locality. These factors also add to the variability potentially present in a fuel or recovered energy product.

Energy recovery systems in the form of district heating and cooling loops are currently being utilized in several communities in this country in which the primary fuel is municipal refuse. These localities include Baltimore, Maryland, and Nashville, Tennessee. In addition, district heating facilities that burn refuse are being considered in New York City; Akron, Ohio; and Philadelphia. Such a district steam generator can be either very small scale or core city sized, depending on the fuel available and desired system size.

There are many less obvious methods of energy savings potentially available in municipal refuse processing systems. These can include burning of municipal refuse on the site where it is generated to provide hot water or steam, or increasing the size of the energy recovery system to encompass several buildings or facilities. Energy savings are also available in the form of more efficient collection and disposal techniques and vehicles, the use of strategically located transfer stations and, as is currently in practice in some communities, refuse collection in central business districts outside normal business hours to reduce both collection vehicle time and fuel wastage as well as reduce traffic congestion.

Fuel recovery systems can be either those that produce a dry "fluff-type" refuse-derived fuel or they may take the fluff fuel and compact it into pellets, cubes, or briquettes. This fuel is analogous to coal and would be handled in a similar manner. Other systems pyrolyze either the organic fraction, or, prior to separation, all of the raw refuse. Pyrolysis is the

conversion of the organic fraction into either a gas with a heating value of from 10 percent to 50 percent of natural gas, or into oil with a heating value of about 70 percent of No. 6 fuel oil.

Other systems take the raw refuse and burn it directly in a large steam generating incinerator. This practice is widely used in Europe and Japan and has been introduced in the United States in several localities.

The processing of a municipal refuse stream necessitates the accumulation of material in one location. Current practice is to have the collection vehicles discharge their refuse into either a transfer station strategically located in the collection area from which the refuse is hauled in large transport trailers to a processing plant, or, in other system, at the collection vehicles discharge collected refuse directly at the resource recovery plant site.

An innovative transport method has been developed in Sweden which involves pneumatic transport of the refuse to a central facility through an underground system of transport pipes. This type system is currently in use at Disney World in Florida.

Recovery of ferrous metals, nonferrous metals, and glass in municipal refuse processing systems not only adds substantial revenues to a resource recovery system, but decreases the quantity (and ultimately the cost) of residuals disposal. On a national scale, recycling of metals is a significant energy saver, thus making an indirect but valuable contribution to our national energy use profile.

The Solid Waste Commission is maintaining close contact with the resource recovery industry to maintain an up-to-date awareness of national resource recovery industry activity. There are 19 projects now in operation or "under shakedown" in the United States. These projects involve 11,000 tons per day of municipal refuse, or about 2 percent of the total refuse generated in the United States. Fourteen of these, involving about 90 percent of the tonnage, will recover a fuel or energy in some form.

An additional nine communities now have resource recovery systems under construction amounting to about 9,600 tons per day, or 1.6 percent of refuse generated in the United States. Eight of these, involving 90 percent of the tonnage, will recover fuel or energy in some form.

A third group of 34 communities now have systems under design, under contract for design, or have construction funding requested. This group involves about 8 percent of refuse generated in the U. S. The final category, that of feasibility, is being undertaken by 75 localities, totaling 75,000 tons per day, or about 13 percent of municipal refuse generated in this country. Together these projects involve all of the known technologies for resource recovery and will include about 25 percent of the municipal refuse generated in this country.

In summary, the technical feasibility of producing a solid fuel from municipal refuse has been established. The burning of this fuel for space

heating or steam generation is also "state-of-the-art", with both economics and the logistics of fuel handling being investigated by the National Center for Resource Recovery and others.

In the State of Virginia there has been a significant amount of activity directed toward resource and energy recovery. The municipalities involved are listed below:

Richmond – The city of Richmond and Henrico and Chesterfield Counties have recently received a consultant report which recommends that the Metropolitan Richmond area undertake resource recovery facilities that would produce refuse-derived fuel. Markets for fuel, metals, and glass have been established.

Petersburg – The same consulting engineers that produced the Richmond Metropolitan area study have conducted a similar study with similar recommendations in the Petersburg area. Consolidation of these two operations into one large resource recovery facility may be worth consideration in order to achieve the economics of scale that one would anticipate in a large facility. The Resources Conservation and Recovery Act of 1976 encourages this type of joint operation.

Norfolk – The Southeastern Virginia Planning District Commission is at or near completion of a consultants' study that is tentatively planning the production of a refuse-derived fuel and recovery of metals and glass.

Hampton – The Peninsula Planning District Commission has nearly completed a study of a system designed to handle the 1,000 tons per day of refuse generated in the Hampton area. In addition, the Hampton/Fort Monroe/Langley Field area is working cooperatively to determine the feasibility of a small steam generated boiler that would supply steam to the Fort Monroe or Veterans Administration facilities.

Salem – The city of Salem is seriously considering a 100 per day refuse-fired steam generating facility with steam to be sold to the Mohawk Rubber Company in Salem.

Pulaski – Pulaski County has also commissioned a consultants study to determine the direction in which its in solid waste disposal or resource recovery program should be directed.

Norfolk – The Norfolk Naval Station has for the past 10 years been using base-originated solid waste to fuel a boiler that supplies steam for use on the Base.

Portsmouth – A boiler plant is currently under construction in Portsmouth that will burn commercial/industrial type waste, with steam to be used at the Portsmouth Naval Shipyard.

Northern Virginia The Washington Metropolitan Council of Governments, in conjunction with the National Center for Resource Recovery, had a proposed 1,300 tons per day solid fuel, metal, and glass resource recovery facility planned for installation in Lorton, Virginia (the I-95 Project). This project was dependent on Federal funding for construction. When this funding was not available the project was delayed, but is expected to be revived at the time such funding does become available.

Charlottesville – The University of Virginia has a plan to incinerate area solid waste to supply steam to the University.

Harrisonburg-Rockingham County – A project to supply steam to James

Madison University from incinerated solid wastes has been sponsored by **Harrisonburg and Rockingham County**.

Norton and Marion – The cities of Norton and Marion are considering steam generation from refuse.

Galax – The Tennessee Valley Authority has expressed interest in transporting the municipal refuse from the Tri-Cities area, and from the Galax area to a Tennessee location to burn it at a steam generating power plant.

