"Recycling Into The 90's"

Recycling Report to the Governor and the Legislature
as required by
N.J.S.A. 13:1E Section 50 - 99.11 et seq.

Prepared by:
New Jersey Department of Environmental Protection
Division of Solid Waste Management
Office of Recycling
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EXECUTIVE SUMMARY

This report is submitted to the Governor and the State Legislature in acccordance with the Mandatory Source Separation and Recycling Act, N.J.S.A. 13:1E 99.11 et seq., Section 50. Its purpose is to outline the implementation of the act and the success of the county and municipal recycling programs.

Since 1987 recycling has become a way of life for New Jersey residents. In 1988, 2,749,345 tons of material were recycled in New Jersey, as reported to, and documented by the Office of Recycling. This is up from 1,830,000 tons recycled in 1987. This equates to 24 percent of the total waste stream which includes paper, metal, glass, plastic containers, yard waste, auto scrap, concrete, asphalt and wood waste. 1989 figures should document that New Jersey has surpassed its mandated goal.

All 21 counties have prepared district recycling plans which designate the materials to be recycled, designate collection and marketing strategies, develop enforcement procedures and identify facilities for leaf composting. Municipalities have developed collection systems for the mandated materials. In all counties these materials include newspaper, glass, aluminum from the residential sector, corrugated containers and office paper in the commercial sector. Plastic containers and tin food containers are also mandated in some of the counties.

The Recycling Fund provides grants and loans for recycling programs. This fund, which averages $12 million annually, is realized from a $1.50 per ton surcharge placed on all solid waste dumped at New Jersey landfills and transfer station. Financial assistance has been provided biannually to the counties for program and educational materials, and tonnage grants have been awarded to the municipalities on an annual basis. $4.6 million is distributed annually to municipalities based on the amount of materials recycled. The fund also provides low interest business recycling loans to New Jersey businesses. Loans are provided for a minimum of $50,000 and may be available for as much as $3,000,000. Loans have been used to streamline processing equipment, to modernize tire retreading operations, to expand glass container recycling, and recently, to upgrade and expand the volume of operation at a paperboard mill using post-consumer material. Businesses may also receive a 50% tax credit against their New Jersey Corporate Business Tax for the purchase of recycling equipment. In 1989, 253 tax credits were approved for equipment used for processing, transporting and manufacturing post-consumer material.

A number of required reports have been prepared by the Department, as per P.L. 1987, c. 102. These include the Market Development Study which was completed by Arthur D. Little, Inc. and reports on recycling of tires and beverage containers. These reports outlined the present recycling of these materials, and gave recommendations for increasing their recycling rates.

With the banning of leaves from landfills it became necessary for municipalities, which collect leaves, to take them either to approved compost facilities or to be mulched on farmland. A number of initiatives, both regulatory and legislative, were developed to streamline procedures and provide additional composting facilities in the State. A system has been put in place by the Department to approve recycling facilities which recycle materials other than the designated materials such as concrete, asphalt, wood waste and tires. Regulations outlining this approval process have been completed, and will be printed in the New Jersey Register in the next few months.

State procurement of recycled paper and paper products has surpassed the mandated goal of 45% of the funds by 1989. At the present time 59% of State expenditures for paper and paper products are spent on recycled paper and paper products. In addition, the Department of Transportation is using recycled asphalt pavement, concrete and reinforced steel from scrap iron.

A number of research studies are being undertaken using research and market development monies from the Recycling fund. These include; a study of increased use of glass and tires in asphalt by the Department of Transportation; a study of claims of degradability of plastic film; a study of the feasibility of composting grass clippings with leaves; a study of the use of shredded newspaper as animal bedding; a study of the efficacy of charging for the collection of solid waste on a per container basis; a study in Warren County on collection methods for the removal of household batteries from the waste stream and a study of various types of packaging and their effects on the environment(including energy use) from manufacture to disposal.

Changing the habits of New Jersey residents has required an extensive outreach and educational program. This has included workshops, seminars and courses for government officials and other professionals, such as school teachers. A number of publications have been developed and are made available to the general public. A contract with a public relations agency has increased visibility of the recycling program through the use of billboards, bus cards, public service announcements, exhibitions at conferences, advertisements in magazines and a recycling magician who has performed at schools all over the State.

State agencies are also recycling and over 70 State locations now have office paper recycling programs in place. In addition, State institutions and correctional facilities have multi-material recycling programs in place. New Jersey State parks have been assisted in developing recycling programs.

All 21 counties have programs in place for newspaper, glass, aluminum, corrugated and office paper, and in some cases, tin-plated steel containers and plastic containers. However, a number of materials present special problems because of

difficulties in collection, difficulties in marketing or because they may contain hazardous materials. In order to increase our recycling goals, assistance may need to be provided to increase the recycling of these materials. These materials include; used motor oil, lead-acid batteries, consumer batteries, white goods, auto scrap, tires, plastic, construction and demolition waste and grass clippings.

NEW JERSEY RECYCLING PROGRAM

On April 20, 1987, the Governor signed the New Jersey Statewide Mandatory Source Separation and Recycling Act (the Recycling Act, N.J.S.A. 13:1E-99.11 et seq.) into law. This expanded the previously enacted 1981 Voluntary Recycling Act (P.L. 1981 c. 278). The goal of the Recycling Act is to recycle a minimum of 25 percent of the municipal solid waste stream. Materials included in this goal are metal, glass, paper, plastic containers and food waste recycled from the residential, commercial and institutional waste streams. Hazardous and manufacturing waste recycling are not included. The 25 percent calculation also does not include leaves which are specifically mandated as a source separated material, nor does it include auto scrap, asphalt, oil and construction/ demolition waste, although the municipalities are given credit for the recycling of these materials in the tonnage grant program.

To achieve the 25 percent recycling goal, the twenty-one New Jersey counties were required to develop district recycling plans designating at least three materials that must be recycled from households, businesses, and institutions. The counties are also responsible for designating the strategy for the processing and marketing of the materials.

In 1988, 2,749,345 tons of material was recycled in New Jersey, as reported to, and documented by the Office of Recycling. This equates to 24 percent of the total waste stream which includes paper, metal, glass, plastic containers, yard waste, auto scrap, concrete, asphalt, and wood waste. County recycling rates for the total waste stream range from a low of 5 percent to a high of 37 percent. Statewide, the amount of designated materials, paper, glass, metal, and plastic containers recycled from the municipal waste stream (60% of the total waste stream) is 14 percent. When 1989 numbers are received and finalized,it is expected that the State will have surpassed its goal.

Municipalities are responsible for providing for the collection of the materials either directly or through contract and for adopting source separation ordinances and enforcement procedures to assure compliance by residents and businesses.

New Jersey's recycling program is funded through a $1.50 per ton recycling tax collected at sanitary landfills and solid waste transfer stations. This tax, which raises approximately $12 million per year, stipulates that the fund must be allocated as follows: 40 percent to municipalities and counties for tonnage grants; 35 percent for low interest loans and loan guarantees to

recycling businesses and industries and for research into collection, market stimulation, re se techniques and market studies; 10 percent for a public i formation and education program; 8 percent for county program grants; and 7 percent for state administrative costs.

COUNTY RESPONSIBILITIES

Each county has submitted a district recycling plan to the Department of Environmental Protection (Department), Division of Solid Waste Management, Office of Recycling. However, four counties owe the Department modifications to their district recycling plans. The district recycling plans designate the materials to be source separated and recycled in the residential, commercial and institutional sectors; designate collection and marketing strategies; enforcement procedures; and identify facilities for leaf recycling, among other required elements.

Typically, the counties have mandated newspaper, glass and aluminum to be recycled in the residential sector, and newspaper, glass, aluminum, corrugated cardboard and office paper to be recycled in the commercial and institutional sectors. In addition, Atlantic, Cape May, Cumberland, Mercer, Ocean, Somerset, Sussex and Warren counties have mandated plastic containers and Bergen, Camden, Cape May, Cumberland, Mercer, Monmouth, Ocean, Sussex and Warren counties recycle ferrous metal (typically tin and bi-metal cans).

Many counties and municipalities collect commingled recyclables at the curb and transport them to processing facilities. At these facilities commingled source separated recyclables are processed into individual streams, i.e. separation of aluminum cans and green, brown and clear glass bottles into separate recyclable streams.

There are presently twelve counties with operating processing facilities and six counties with planned facilities. Five of the operating facilities are privately owned.

Other county and municipal programs collect recyclables which are totally source separated by the generator prior to collection. Materials are often separated by color, material type, etc. These totally separated recyclables are essentially direct to market without need for further processing.

Enforcement of recycling is a major activity in some counties. Middlesex County has established an excellent recycling enforcement program. The Middlesex County Department of Health, with assistance from the County's Department of Solid Waste Management, inspects vehicles delivering solid waste to the County's two landfills. The contents of randomly selected

vehicles are inspected as the waste is unloaded. If the load contains recyclables, a Notice of Non-compliance is issued to the driver. With a second offense, a Notice of Violation is sent to the solid waste hauler. Third and subsequent offenses result in penalty assessments of $100 each. In cases where a generator is identified, the Field Recycling Inspection Team then makes visit to the generator. The combination of generator and landfill inspections has helped increase both generator and solid waste hauler awareness of the recycling law and improved compliance.

COUNTY FINANCIAL ASSISTANCE

In accordance with the Recycling Act, counties may apply for financial assistance to maintain or expand existing recycling programs or develop new recycling programs and to educate the general public about recycling. These are state grants from the dedicated recycling fund.

Two types of recycling grants are available for application: Program activities and Public Education. Program Administration contracts are available only to counties. However, Public Education funding is available to non-profit agencies and other recycling education agencies as well as county governments. The intent of both types of contracts is to increase the amount of materials recycled.

To be eligible to apply for a grant, a county must have a fully approved District Recycling Plan. The county must also accept recyclables from State Parks within their jurisdiction. County Utilities and Improvement Authorities are also eligible for funds on behalf of the county and as long as the county's governing body authorizes this designation.

Since 1983, nearly $6.3 million has been awarded to counties and municipalities through Program Administration and Public Education grants. A total of $1,965,992 was awarded in the 1987-88 grant cycle while $2,500,000 was awarded in the 1989-90 cycle.

Program funds have been used to purchase recycling equipment and reimburse personnel costs and other administrative expenditures. Public education funds have provided for the cost of educational materials, school recycling programs, advertisements, and other public information activities. Funding is currently based on population with a $25,000 minimum grant amount.

MUNICIPAL RESPONSIBILITIES

Municipalities are responsible for providing collection or maintaining a recycling depot, although a number of counties provide this service to the municipalities. Municipalities collect recyclables at the curb separated by type (i.e. glass and aluminum separate) or commingled. If collected commingled, the recyclables are delivered to processing facilities for further separation.

Because recycling is also mandatory in the commercial sector, a number of municipalities also provide collection for commercial establishments. For example, Mahwah Township, Bergen County, requires commercial establishments to separate recyclables according to Mahwah's recycling ordinance and to provide accessible recycling areas. Multi-family dwellings are scheduled for recycling pickup along with the commercial establishments. Commercial collections are scheduled for two days a week. Larger producers of material, such as restaurants and bars, are scheduled for collection according to need. This recycling service is offered to commercial establishments at no charge.

Leaves, which are banned on a year-round basis from transfer stations, sanitary landfills and resource recovery facilities, must be recycled. If the municipality collects the leaves, they must be delivered to a facility that is permitted or approved by the Department of Environmental Protection or they may be mulched into the soil on horticultural land.

The Recycling Act requires municipalities to notify all persons occupying residential, commercial, and institutional premises of local recycling opportunities and the source separation requirements of the municipal recycling ordinance at least once every six months. In order to fulfill this requirement, the municipality may place an advertisement in a local newspaper, post notices in public places, or include a notice with other official notifications periodically mailed to residential taxpayers.

Municipalities may enforce recycling requirements through local health offices. Woodbury City, Gloucester County, operates a local enforcement program where a municipal employee randomly checks refuse containers throughout neighborhoods. A red sticker is affixed to the refuse container with recyclables. When the disposal truck stops at the home, the hauler does not empty the container with the red sticker. The resident is required to remove the recyclables from the refuse before it will be removed. This has been very effective in accelerating compliance with the law.

MUNICIPAL FINANCIAL ASSISTANCE

The Tonnage Grant Program (Program) was created by the voluntary Recycling Act of 1981, and by the Recycling Act as an incentive for municipalities to recycle. The Program, which is administered by the Office of Recycling, allows for a percentage of the Recycling Tax Fund to be reimbursed to municipalities for materials documented as recycled in the previous calendar year. The materials need not be recycled only through a municipal recycling program. Eligible materials can come from various sources, for example, a supermarket which recycles corrugated paper could be credited to the municipality as well as motor oil recycled by a service station.

The Program has grown at a substantial rate since the first year of the program. In 1982, 241 applicants recycled over 250,000 tons of material. In 1983, 313 towns recycled more than 492,000 tons. In 1984, 339 grant recipients recycled approximately 652,000 tons. In 1985, 405 municipalities recycled nearly 890,000 tons. In 1986, 424 communities recycled almost 1,140,000 tons. In 1987, 471 applicants recycled in the excess of 1,830,000 tons. The most recent grant year (1988) showed 520 grantees recycling nearly 2.73 million tons of material; a 1,083 percent increase over a seven year period. Chart Number 1 shows the increase in tonnage recycled from 1982-88. Chart Number 2 shows the increase in recycling from 1984-88 by material.

An increase in the landfill surcharge tax from $0.42/ton to $1.50/ton was established on July 1, 1987 by authority of the Recycling Act. The Tonnage Grant Fund had previously averaged between $2.0 and $2.2 million annually. The increase in the tax has increased the fund to over $4.6 million per annum.

The dollar per ton reimbursement was previously determined by dividing the amount of money available in the Tonnage Grant Fund by the total amount of material documented as being recycled Statewide. The Recycling Act allowed the Department to make some changes to the method by which these funds were distributed through the Program. In an effort to promote municipal involvement in recycling, a Bonus Grant was instituted. The Bonus Grant allows for as much as 50 percent of the total Tonnage Grant Fund to be distributed solely for materials which are collected at the expense of the municipalities or counties. Different rates may be established to promote or encourage the recycling of specific materials.

SUMMARIES OF REPORTS REQUIRED BY THE RECYCLING ACT

The following reports were released by the Department, in October, 1989.

Beverage Container Report

In accordance with the Recycling Act, N.J.S.A. 13:1E-99.19, the Department was required to make a "written determination as to whether a convenient and economically feasible mechanism for the collection, recycling, and marketing of plastic or bi-metal beverage containers is available to counties and municipalities in New Jersey." The Department determined that a convenient and economically feasible mechanism for the collection, recycling and marketing of plastic beverage containers does not exist in New Jersey at this time. In addition, it was determined that the focus on plastic beverage containers was too narrow. The Department recommended that all plastic packaging containers be targeted in order to remove the greatest amount of plastic from the waste stream.

A number of options to increase plastics recycling in New Jersey were identified along with their positive and negative attributes. The options identified include mandatory source separation of plastic containers, a deposit on plastic containers, a tax on plastic containers, or a ban on the use of plastic containers. Regardless of the option chosen, it was concluded that financial assistance to municipalities for the collection of plastics must be provided.

Bi-metal beverage containers were not found to present a collection or marketing problem. They were found to be a small fraction of the municipal solid waste stream, normally collected in conjunction with aluminum cans. However, it was noted that marketing problems may arise if their percentage in the waste stream increased. As a result, the Department recommended that the steel industry make a public commitment to take back the bi-metal containers sold in New Jersey at the fair market value in a method similar to the one used by the aluminum industry. Furthermore, the Department recommended a ban on bi-metal beverage containers in the State if this commitment did not occur within one year. Bi-metal beverage containers are composed of an aluminum top with steel sides and bottom, and should not be confused with tin-plated steel food containers.

Tire Report

In accordance with the Recycling Act, N.J.S.A. 13:1E-99.20, the Department was required to prepare a report on convenient and economically feasible methods for tire recycling or disposition of tires. Additionally, the Department was required to investigate various methods for the recovery or reuse of tires

including incineration, artificial reef construction, retreading, asphalt paving materials manufacture, sludge composting and energy recovery.

In response to this legislative mandate, the Department contracted with Arthur D. Little, Inc. (ADL) of Cambridge, Massachusetts to conduct a market development study, and to develop recommendations for the development of markets for certain recyclable materials. In support of this study, Opinion Research Corporation, of Princeton, New Jersey, provided a survey of municipal and industrial representatives involved in the day-to-day business of recycling. The report included the following recommendations:

1. Both short and long term strategies to address New Jersey's tire problem. These short term strategies are designed to better handle tires at existing landfills, alleviate the cost of transporting the tires to existing markets, and stress tire volume reduction through utilization of chipping and shredding equipment. The long term strategies are designed to stimulate market demand to make the recycling of tires through retreading, tire derived fuel and crumb rubber applications more economically viable;

2. The funding of a rebate system of $2 for a passenger tire and $5 for a truck tire, which would emanate from a surcharge on tire sales. Rebates would be paid directly to end-markets for the use of scrap tires and to municipalities or counties which incur scrap tire transportation and processing costs;

3. A portion of the revenue collected should be used for a dedicated tire recycling research and development and education fund to be administered jointly by the Department and the Commission on Science and Technology. An appropriation from the fund would be used for state and local enforcement activities for prosecution of illegal dumpers in conjunction with an increase in penalties;

4. Funding should be provided for the Department of Transportation to study the applicability of rubber modified asphalt;

5. State permitting and bonding requirements for scrap tire haulers and recycled tire processors should be instituted. Tire jockeys should be bonded to insure the ability of the industry to pay for clean-up of any future illegal tire dump sites;

6. State government and its political sub-divisions should investigate the use of retreaded tires for fleet vehicles. State economic development agencies should give tire recycling manufacturers and processors locating in New Jersey high priority;

7. Only chipped or sliced tires should be permitted at landfills. As recycling options increase this ban will be extended to prohibit disposal of any tire; and

8. The state may wish to consider making tire companies responsible for the tires they sell, up to and including their disposal. Therefore, tire manufacturers would be responsible for removal of their product at illegal tire dump sites.

Market Development Report

The Office of Recycling contracted with Arthur D. Little to conduct a legislatively mandated market development study for waste paper, plastics, ferrous automotive scrap, tires, and batteries (automotive and consumer cells). In support of this study, Opinion Research Corporation, of Princeton, New Jersey, performed a survey of municipal and industrial representatives involved in the day-to-day business of recycling.

The objectives for conducting these market development studies for waste paper, plastics, ferrous scrap, tires, and batteries (automotive and consumer cells) were to:

1. develop necessary data on current and potential future demand for the recyclable materials to be studied;

2. identify those factors that are most critical in determining the current and future demand by commercial or industrial consumers for the recyclable materials to be studied;

3. provide a detailed assessment of the economic competitiveness of the New Jersey recycling infrastructure in the area of the recyclable materials to be studied; and

4. identify actions which could be taken by the State and local governments to enhance the demand for the recyclable materials to be studied.

As a result of work conducted under the first task, the State was provided with necessary data on the current and potential future supply of and demand for waste paper, plastics, tires, batteries, and ferrous automotive scrap. For each of these items, Arthur D. Little, Inc. developed supply/demand assessments, outlined the collection and marketing networks for these materials, and identified barriers to the recycling of these materials.

This study of markets for recyclable materials indicated that the various recyclable materials covered are in very different stages of development. For the major tonnage waste streams, paper and ferrous auto scrap, New Jersey has a mature, relatively well functioning market structure. The plastics recycling market for polyethylene terephthalate (PET), and, to a lesser degree, high-density polyethylene (HDPE), is just now beginning to expand; the current barrier to plastics recycling is the lack of sufficient supply of recyclable material due to an inefficient collection infrastructure. A portion of the tire recycling industry, retreading, is another mature market, but is insufficient to utilize the majority of the scrap tires available; those methods that could comprise a significant market for scrap tires have not been successfully established. The recycling of consumer batteries (nickel/cadmium and alkaline) is currently nonexistent and would require the development of an entirely new industry.

LEAF RECYCLING:

Emergency Rule

The Recycling Act bans leaves from solid waste transfer stations, sanitary landfills, and resource recovery facilities. Municipalities which collect leaves can either compost the leaves at permitted or approved compost facilities or have them mulched on farmland. In order to expeditiously authorize the operation of leaf and vegetative waste compost sites and to provide guidelines for proper mulching of leaves on farmland, Governor Kean signed an emergency rule adoption on October 25, 1988 which amended the Department's solid waste regulations set forth in N.J.A.C. 7:26 and added the following new rules:

1. N.J.A.C. 7:26-1.7(g): A temporary certificate of authority to operate may be granted to vegetative waste composting facilities which accept greater than 20,000 cubic yards of leaves annually or that, in addition to leaves, compost other yard wastes such as grass clippings and tree branches.

2. N.J.A.C. 7:26-1.11, Exemption from Solid Waste Facility Permitting may be granted to leaf composting facilities with a capacity of up to 20,000 cubic yards annually and which compost leaves exclusively. To receive approval, the owner or operator of the proposed facility must submit a Filing Package, which includes, among other information, a site plan prepared by a professional engineer. This package must be submitted to the Department, host Municipality and host county solid waste coordinator. In addition, the proposed facility must be included in or consistent with the county's solid waste management plan and must follow certain performance standards.

3. N.J.A.C. 7:26-1.12, Exemption from Solid Waste Facility Permitting may be granted to leaf mulching operations on agricultural or horticultural lands. Leaf mulching operations must also be included in or consistent with the county's solid waste management plan and must follow certain operational standards.

P.L. 1989, c.151

In New Jersey, a prime place to compost leaves is on agricultural and horticultural land. On August 9, 1989, Governor Kean signed into law P.L. 1989, c.102, which makes it easier for farmers to receive Departmental approval to compost leaves. This act allows farmers who qualify for farmland assessment to compost up to 20,000 cubic yards of leaves annually. However, instead of hiring a professional engineer to submit the required filing package to the Department, P.L. 1989, c.151 allows the farmer to work with the local soil conservation district in preparing the filing package.

STATE PROCUREMENT OF RECYCLED PAPER AND PAPER PRODUCTS

The Recycling Act, N.J.S.A. 13:1E-99.27, required that not less than 10 percent of the dollar amount of paper and paper products purchased by the State after July 1, 1987 be made from recycled paper. This requirement increased to 30 percent July 1, 1988 and 45 percent July 1, 1989. The Recycling Act also requires that priority purchasing must be given to products with the highest post-consumer material content.

In 1988, 59 percent of State expenditures for paper and paper products were for recycled paper and paper products. State expenditures for paper products containing 50 percent recycled content or more was $1,997,641.43. Total expenditures for recycled paper, paper products and virgin paper were $3,412,721.42. In addition, if archive boxes and record storage boxes are included (which are estimated to have 35 percent post-consumer content) the total would increase to 62 percent. This exceeded the mandated 45 percent requirement.

Department of Treasury Fiscal Year 1989 Procurement Figures:

Toilet Tissue - $498,831.75
80% minimum recycled content

Napkins - $141,120.00
80% recycled content

Towels - $787,355.38
100% recycled content, 20% post-consumer waste

Newsprint - $48,000.00
100% recycled content

Fine Paper - $521,834.30
50% recycled content

STATE PROCUREMENT OF ASPHALT AND CONCRETE

The Recycling Act, N.J.S.A. 13:1E-99.28 and 29, states that the Commissioner of Transportation shall, upon consultation with the Department, review and modify all bid and paving material and sub-base specifications relating to the purchase of recyclable asphalt pavement, crushed concrete sub-base, foundry slag and paving materials utilizing recycled materials. This may, include but is not limited to, crumb rubber from automobile tires, ash and glass. It also states that the specifications for the purchase of asphalt or recycled asphalt pavement encourage the use of fuel derived from waste oil as a furnace or boiler fuel by manufacturers of asphalt or recycled asphalt pavement.

Department of Transportation Fiscal Year 1989 Procurement Figures:

32,300 tons pavement/asphalt
262,000 tons bituminous pavement (blacktop)
7,150 tons reinforced steel from scrap iron
37,856 tons recycled concrete aggregate
4,479 tons fly ash

RECYCLING CENTER REVIEW AND APPROVAL

The Recycling Act, N.J.S.A. 13:1E-34, addresses the operations of recycling centers and indicates the regulatory climate in which they will function. So long as a facility is to receive only source separated metal, glass, paper (including corrugated and other cardboard) or plastic containers, no Department solid waste facility regulation will occur. However, Department approval is required for the receipt of other materials.

The Office of Recycling has used this section of the Recycling Act to review and approve projects involving the recycling of certain construction/demolition debris such as concrete, brick, block, asphalt, tree stumps and other wood waste, and tires. Currently, the Department is reviewing thirty-five such facility applications and has approved large scale tire, wood waste and concrete recycling centers. The approval procedure requires the submittal of information regarding materials to be received, equipment to be utilized and end-

markets for the materials, among other things. The intent of this procedure is to prevent the operation of illegal solid waste facilities, while legitimizing actual recycling centers. It is estimated that if all of the facilities presently under review are approved, these centers would provide between 10,000 and 20,000 tons of processing capacity per day in New Jersey. Such a development would allow for a great increase in the recycling of the bulky waste stream and would result in the saving of valuable landfill space and natural resources.

MARKET DEVELOPMENT

Business Recycling Loans

Business recycling loans, ranging from a minimum of $50,000 to a maximum of $500,000 or higher for certain projects that are deemed necessary by the Department, are available to qualified businesses. The Department has authorized loans in excess of $500,000 for manufacturers. Two loans, one for $3 million and one for $1.5 million, will be given to two paper mills in the State. The maximum term of the loan is 10 years at fixed rate of (3) points below the Prime Rate. A minimum 10 percent equity contribution of the total cost of the project is required from the business.

New Jersey businesses which collect, separate, process and convert post-consumer waste materials into new or marketable products are eligible for these loans. Recyclable materials include: paper, metal, glass, plastics, textiles, tires, food waste, motor oil, leaves, wood and wood products, asphalt, brick and concrete.

Since the first business recycling loan was granted in July 1985, $4.4 million has been issued to New Jersey recycling businesses.

Business recycling loans have been used for the purchase of state-of-the art commercial balers by waste paper processors, the modernization of tire retreading operations, the expansion of glass-container recycling processing activities, the acquisition of tree stump crushing and recycling technology, increased efficiency and volume of operation in a paperboard manufacturing facility using post-consumer recycled input, and upgrading of an existing industrial wastepaper recycling operation for the purpose of recycling post-consumer magazines and sorted office paper.

Chart Number 3 lists the approved loans, the amounts they were awarded and the county where they are located.

Recycling Equipment Tax Credit Certifications

The Recycling Act, N.J.S.A. 54:10A-5.3, provides for the availability of a 50 percent tax credit to corporations operating in New Jersey that purchase recycling equipment. The recycling equipment tax credit is applied directly (dollar-for-dollar) against the New Jersey State Corporate Business Tax. To be eligible:

1. Recyclable materials must be post-consumer in origin;.

2. Recycling equipment must be purchased as of October 1, 1987, or thereafter, and used exclusively in New Jersey; vehicles used to collect recyclable materials must be used primarily (at least 50% of the time) in New Jersey, but may transport materials out-of-state for marketing purposes;

3. equipment purchased must be certified as eligible by the Department; and

4. not more than 20 percent of the total tax credit can be applied in any one year, i.e., five year minimum tax application, and a corporation must pay a minimum of 50 percent of its New Jersey State Corporate Business Tax liability while drawing down its eligible credit.

The recycling equipment tax credit program is intended to divert recyclable materials from landfills while creating new markets, new jobs and increased production, attracting investment and sending a signal of a positive, cooperative business climate to recycling businesses.

During 1989, there were 253 certifications approved at a total cost of $13,636,238.55. This equates to a reduction in State Corporate Business Taxes of $6,818,119.28 ($13,636,238.55 divided by .50) amortized over a minimum of five years ($6,818,119.28 divided by 5 = $1,363,623.86). The five year minimum is the maximum impact on State Treasury receipts; the actual impact depends on individual corporate profitability (the tax credit can be carried forward until totally drawn down) and the actual month that the equipment was certified (this can impact on different fiscal years).

Of the 253 certifications granted, 170 were for the purpose of processing source-separated recyclable materials; 60 were for transporting source-separated recyclable materials; and 23 were for manufacturing, utilizing recyclable materials as feedstock. A breakdown of the 63 corporations receiving certifications by type of material processed, transported or used in manufacturing follows (some corporations handle more than one material):

corrugated (40); newspaper, high-grade or mixed paper (27); aluminum (18); scrap metal (16); glass (11); plastic (5); wood (3); compost (1); oil (1); tires (1); concrete (1).

RESEARCH STUDIES:

Tires and Glass in Asphalt

In an effort to identify further end-uses for recycled materials, the Office of Recycling has been working with the Department of Transportation (DOT) to conduct a Department funded study of the feasibility of usage of these materials in highway construction projects. Incorporation of scrap tires and mixed, crushed glass (cullet), among other recycled materials, is being investigated.

Scrap tires can be ground and mixed with the asphalt, replacing a percentage of the aggregate used in the mix. The rubber adds elasticity to the pavement, which is claimed to extend the life of the pavement, help with de-icing, and decrease noise levels - while providing an additional market for scrap tires. Mixed glass cullet is a commodity with virtually no market value at this time. Substituting this material in the sub-base of paving projects for the more traditional materials provides an additional end-use for the material while providing cost-savings on the fill materials traditionally used. Finally, it is intended that recycled materials which can be utilized within the entire right-of-way of construction projects will be investigated, including the use of recycled wood chips on landscaping projects.

Both the Office of Recycling and DOT are actively working on this project, presently establishing the scope of work and timeframe for the study. There are many technical problems which must be resolved when incorporating recycled materials into construction projects. However, the DOT has thus far adopted a cautious, albeit optimistic, stance regarding the research.

Plastic Film Degradability

Conventional plastic materials such as polyethylene, polypropylene, polystyrene, polyvinyl chloride and polycarbonate are highly resistant to biodegradation. In the case of polyethylene, which is a n-alkane molecule of approximately 10^5 molecular weight, recalcitrance is due to the extreme size of the molecule. If the size of the polyethylene molecule is reduced by physico-chemical means to a molecular weight of less than 500, the material becomes biodegradable. Biodegradable are to some extent also the plasticizers that make they polyethylene pliable and that may account for 25-35% of the total weight of the plastic film. Common plasticizers are the phthalate esters

(diethyl- dibutyl- and dioctyl phthalate), adipate esters (ethylhexyl- and dioctyl adipate) some higher alcohols and modified plant oils (epoxidized soybean oil).

In response to a mounting solid waste disposal problem combined with aesthetic concern about plastic litter, an increasing number of manufacturers now market disposable plastic items claimed to be degradable. Although such products are manufactured and distributed under numerous brand names, smaller manufacturers often blend conventional plastic resins such as low density polyethylene with "degradable master batches" supplied by a few larger companies. The claims made for these products are as follows:

1. Degradation initiated by photosensitizer: Materials contain proprietary photosensitizer. When exposed to sunlight/UV light, free radical reactions are initiated that may continue in the absence of light. As a result, the polymer chain breaks into lower molecular weight fragments. The plastic loses its mechanical strength and eventually becomes a coarse powder.

2. Degradation initiated by oxidant: Materials contain proprietary oxidizers such as metal catalysts and unsaturated and otherwise modified plant oils. Across an unsaturated double bond, chemical oxidation is initiated leading to self-propagating free radical reactions that may attack the polymer chain itself. The partial chemical oxidation may be augmented and completed by microbial degradation. This type of degradation is claimed to occur also in the absence of sunlight.

3. Biodegradable fillers: The plastic material contains a biodegradable component such as specially treated starch or cellulose, or an easily degradable plasticizer such as adipate. Loss of the degradable ingredient causes loss of mechanical strength. Increased porosity and microbial proliferation is claimed to cause also some biodegradation of the polymer fiber.

Unfortunately, promotional claims are not always valid. Definitions in the field are vague. Since conventional plastics, when buried, may persist for several centuries, even a slight and not practically important increase in degradability may be exploited for promotional purposes. Therefore, prior to promoting the use of plastic products claimed to be degradable, an independent and impartial evaluation of the degradability claims needs to be performed. The Department has contracted Rutgers University to test commercially available "degradable" plastic bags versus non-degradable bags for photodegradation, autoxidation and biodegradation after various exposure periods. The study will be completed December 1990.

Yard Waste

The Department is currently funding a two year research project on yard waste composting with the Rutgers University, Cook College Department of Environmental Science. This project is researching the following composting concerns: is the fungus Aspergillus fumigatus a serious human health concern for areas around compost sites; how can grass clippings be composted without producing malodors; does mixing grass with yard brush using a tub grinder speed the composting process and cut down on odor formation; and are there herbicide residues in the finished compost after grass clippings have been composted?

In addition to answering these questions, the "Leaf Composting Manual for N.J. Municipalities", a how-to book on composting written by Drs. Peter Strom and Melvin Finstein of Rutgers University, will be expanded and renamed, "Yard Waste Composting Manual for N.J. Municipalities".

Animal Bedding

Instead of using straw for animal bedding at farms, many farmers are switching to newspaper. Newspaper is more absorbent, longer lasting and less dusty than straw and is presently available for only the cost of equipment to shred and labor to properly prepare it. When farmers use newspaper for animal bedding they are freeing up cropland, which was previously used to grow straw, to grow more profitable crops. Using newspaper as animal bedding is an excellent outlet for newspaper, which is presently difficult to market. The Office of Recycling purchased three newspaper shredding machines for the Department of Corrections. These shredders are located at three of the state farms and are shredding newspaper which is used as a bedding material for cattle. After use, the newspaper, which has decomposed, is land applied because it is an excellent soil fertilizer. This is a highly visible program as the state farms serve as demonstration and research facilities where other farmers may come and learn, thus stimulating additional interest in using newspaper for animal bedding.

Per-Container Solid Waste Rates

A per-container rate system for solid waste collection places a fee on each container set out at the curb as compared to a flat fee for solid waste collection. This provides a means for rate payers to control their disposal charges by controlling the amount of waste they generate, therefore providing an incentive to recycle. In addition, this system may even influence consumer purchasing habits towards the purchase of materials with less packaging and products with greater durability; thus reducing the amount of solid waste generated overall.

Per-container rate collection systems for solid waste have been implemented by a number of communities in New Jersey, including High Bridge Borough, Hampton Borough, Readington Township, Flemington Borough, and South Bound Brook Borough. In addition to the above local activities, P.L. 1989, c. 244, signed into law on January 2, 1990, authorizes municipalities to impose solid waste charges on a per-container basis.

The actual effectiveness of this system in discouraging waste generation via source reduction and recycling has not been documented. A study to analyze the impact of per-container rates on recycling volumes and solid waste volumes and weights has been proposed. This analysis will be used to determine the practicability and feasibility of establishing a uniform system of per-container rates for solid waste collection in all or part of the state.

Packaging Study

Packaging comprises as much as 30 percent by weight and 34 percent by volume of the waste stream. In addition to its tremendous presence in the waste stream it is composed of a variety of materials such as glass, metal, plastic, and paper. Packaging composed of plastic has been the subject of a variety of bills and municipal ordinances since the passage of the Recycling Act. Measures proposed, and in some cases enacted, ban packaging materials such as polystyrene and polyvinyl chloride. The environmental impacts associated with the disposal of these packaging materials is often cited for the banning of the material. While effective in removing the material from the waste stream, packaging bans do not protect the environment from the potential impacts imposed by substitute packaging.

All packaging materials create some environmental impacts in their production, use and disposal. In order to better evaluate appropriate environmental policy with respect to packaging materials one must investigate each material's associated environmental impact. The Department's Division of Science and Research and Office of Recycling has commissioned such a study. It is presently being performed by Tellus Institute, a private research firm based in Boston, Massachusetts. The study entitled "Assessing the Impacts of the Production and Disposal of Packaging" has two broad objectives. The first is to quantify the environmental impacts (energy and raw material use, air and water pollution) of the production of packaging materials. The second is to categorize the economic and environmental impacts of packaging on the solid waste system, in general and in particular, in New Jersey. This study will be completed December of 1990.

Battery Project

The Department is considering funding a county-wide consumer dry-cell battery collection and recycling project in Warren County. Results from this pilot project will serve as a basis for recommending dry-cell battery recovery and recycling in other counties.

The Pollution Control Financing Authority of Warren County is the administering agency for this project. Collection began in June, 1989. Currently the project has three collection sites in operation with a total of 100 sites contemplated once funding from this grant is received. These locations have received an average of 850 batteries per month, with September yielding 925 batteries. Four battery types, i.e., button mercury, nickel cadmium, lithium, and alkaline, comprise the dry-cells collected to date. After being categorized and tabulated, these batteries were included for disposal as part of the most recent Household Hazardous Waste Cleanup Day for Warren County. This interim disposal measure was utilized in lieu of recycling until funding is received from Department.

Perceived public health issues notwithstanding, Warren County is concerned about excessive levels of heavy metals, particularly cadmium, contained in the residual ash generated at the resource recovery facility. A significant amount of this ash has required expensive disposal as hazardous waste. The battery collection and recycling project seeks to divert dry-cell batteries as well as rechargeable batteries from incineration.

Some Northeast and other states, including New Jersey, are considering funding a dry-cell battery composition and market development study based on a proposal submitted by Bronx 2000, New York City. This project is anticipated to fill the current void in essential market data needed to develop and implement additional battery collection and recycling programs.

PUBLIC INFORMATION ACTIVITIES

Twenty percent of the recycling fund is dedicated to recycling education. A portion of this is allocated directly to counties and non-profit environmental agencies for educational programs and a portion is used for educational activities at the State level. These activities include development of publications for local governments, provision for courses at Cook College, and support of the Keyes Martin Statewide contract.

The Office of Recycling disseminates a variety of educational/informational materials and programs to its various constituencies. For children, promotional materials such as pens, pencils, rulers, magnets, stickers, T-shirts, and pens have

been available to schools. Additionally, Mr. R.E. Cycle, a magician, and the Peppermint Puppeteers, explain the method of recycling to primary level school children. A video tape entitled "Alu-Man The Can" is available for school children. An education curriculum and brochure are also available to school programs.

Publications for adults include the following:

1. General Public - general recycling brochure, a video entitled "Give Your Trash A Second Chance", a source reduction brochure, brochures on facilitating recycling programs in multi-family units, and an office paper recycling brochure;

2. Municipal and County Officials - a guide to recycling markets, and educational communications guide, a booklet and video entitled "Steps to Organizing a Municipal Recycling Program"; and

3. Business and Commercial Sector - "State Incentives for the N.J. Recycling Industry" brochure describes the market incentives available to the business community. The brochure includes a description of the loan program, tax credit program, sales tax exemption on the purchase of recycling equipment, and the market development study performed by the Arthur D. Little marketing firm.

The Office of Recycling quarterly newsletter, entitled "Recyclegram" was recently incorporated into the Division's "Commpost" newsletter. This publication is sent to municipal and county recycling coordinators.

Publications:

1. General Recycling Brochure
2. State Incentives for the New Jersey Recycling Industry
3. Waste Reduction Brochure
4. Guide for Landlords and Managers of Multi-Family Units
5. Guide for Superintendents and Tenant Councils in Multi-Family Units
6. A Model for Recycling in Multi-Family Buildings Report
7. A financial assistance report
8. Multi-Family Housing Brochure
9. Article Reprints for Recycling Update Appearing in League of Municipalities Magazine
10. Have Fun with Mr. R.E. Cycle Brochure
11. A Guide to Markets
12. Getting the Word Out
13. Office Paper Brochure
14. Leaf Composting Manual
15. Tire Report
16. Beverage Container Report

17. Questions & Answers on Office Paper Recycling
18. Steps In Starting A Municipal Recycling Program
19. Incorporating Recycling in the Local Master Plan
20. Guide to Food Waste Recycling

Contract for a Statewide Advertising and Public Education Program

In 1987, a $2.4 million three year contract was awarded to Keyes Martin Public Relations to promote recycling in New Jersey. The major objective of the program was to develop and implement a coordinated three-year educational and motivational communications campaign. The intent of the first year was to increase awareness and understanding of the citizens of the State that recycling is a key factor in solid waste management and that individuals are the key to the success of recycling in New Jersey.

The slogan, "Sort It Out Before You Set It Out", was the theme of the campaign. This message conveyed to individuals that it was their responsibility to comply with the law and that complying with the law was as simple as sorting their recyclables from their trash.

During the first year of the contract, Keyes Martin developed and produced a TV public service announcement (PSA) and a radio public service announcement to assist in heightening recycling awareness in New Jersey. This PSA was used widely on public television and demonstrated the problem of vanishing landfill space and the need for recycling with the creative help of a sea gull. Transit advertising, using the billboard design, also made the recycling theme highly visible. Bus displays included tail-light, side, and interior cards. Advertising was also initiated on train station platforms and terminals. They also developed a billboard design which was posted at key locations throughout the State. Because of the rural nature of parts of New Jersey, billboards would not have been effective. Therefore newspaper advertisements were developed and placed in those newspapers with high readership in these particular counties. Keyes Martin developed press kits and news releases for special events. Regional workshops for recycling and clean communities coordinators were held throughout the state to update the coordinators on the latest program developments. A slide presentation and script were previewed at that time, as well as a newspaper advertisement that could be used by municipalities and counties.

Keyes Martin has also assisted the Environmental Exposition, the Recycling Forum, and other organizations with their recycling related activities, including conferences, seminars, and workshops.

A Multi-Family Recycling Task Force was formed during the first year of the contract. As a result of surveys conducted by the Task Force members, a report was published and two brochures were developed during the second year. These addressed the special needs of those living and working in multi-family housing units.

In the second year of the program, the basic advertising program was continued, while reinforcing and expanding the message in selected areas. Transit and billboard advertising was increased to target new audiences in counties adopting mandatory recycling in late 1988 and early 1989.

Business advertisements were developed and placed in various magazines, including Time. They highlighted various types of businesses with successful recycling programs such as a hospital, a restaurant, a convenience store, and a large corporation in New Jersey.

In the summer, a tow plane carrying the recycling message flew along the New Jersey coast on weekends.

Many collateral items with the recycling message were designed including clip artwork, banners, magnets, pens, pencils, rulers, poster, T-shirts, and stickers. Quantities are given to municipalities, counties, schools, and environmental organizations.

In year three, the program will continue to reinforce the basic recycling message, "Sort It Out Before You Set It Out". The major projects will include success stories at the municipal level and in the business community, a "Buy Recycled" advertising and public relations campaign to encourage consumers to purchase recycled products, a source reduction campaign to introduce citizens to the concept of reduce, reuse, recycle, and a campaign to increase recycling and use of recycled products in the business and commercial sectors.

Recycling Courses - Cook College

Since 1980, the Office of Recycling has implemented courses with the assistance of Cook College. In 1985, a contract with Cook College was implemented for the administration of courses which are essential for the training of municipal and county recycling coordinators. These courses are run at least twice a year for seven weeks in each semester.

With the advent of mandatory recycling, the demand for training courses from government officials plus other professionals, such as school personnel, has significantly increased.

Cook College conducts all registration functions associated with the courses. They design the curriculum in collaboration with the Office of Recycling, schedule instructors and guest speakers, make field visit arrangements including transportation, arrange meals, and provide all instructional materials and informational brochures, flyers, and press releases. Office and other Department personnel serve as instructor and guest speakers.

The following courses are examples of the programs provided. These courses are designed for municipal and county recycling coordinators, public works officials, apartment house superintendents, building managers, landscape contracts, and educators.

Municipal Recycling Practice and Theory

The Municipal Recycling Practice and Theory course is designed to show current modes of recycling and explore new ideas for recycling in the municipal area. This is accomplished through numerous field trips to recycling programs, recycling industries, and through classroom lectures. The course is extremely popular and is frequently over-subscribed.

Advanced Municipal Recycling

In order to meet the State mandated goal of a 25% recycling rate, municipalities must concentrate their efforts on specific areas such as 1) the collection of additional materials from the residential sector, other than newspaper, glass, and aluminum (e.g. plastic); 2) the implementation of collection programs in multi-family buildings; 3) the implementation of recycling programs in the commercial sector; and 4) implementation of office paper recycling programs in government buildings and private industries. This assists municipal and county coordinators in achieving these objectives.

Leaf Composting

Attendees learn the methods of composting, leaf composting technology, trouble shooting composting problems, siting and permitting of facilities and available leaf composting equipment.

This course is designed to provide information about municipal scale leaf composting to those responsible for leaf disposal at various public and private levels.

Leaf Collections

This course provides an overview of leaf collection management in New Jersey, a comparison of leaf collection

methods, equipment and costs, ideas on bagging and new innovations to existing collection methods to those involved in leaf collection programs.

Making Schools Part of the Solution: Recycling Workshop for Teachers

This seminar educates teachers about the role recycling plays in our state's solid waste management strategy and assists them in instituting a recycling curriculum. A two day workshop for teachers provides an overview of the State program and an outline of three curriculums, including "Here Today, Here Tomorrow", a recycling curriculum. Teachers who have used these curriculums explain how they have presented them and staff from the Department give suggestions for integrating the curriculum into actual lesson plans. Also, a one day seminar educates school administrators about recycling, their particular obligations under the mandatory recycling law, and assists them in the development of school recycling programs.

Plastics Recycling

This program explores methods of collection, incorporation of a plastic recycling system into existing recycling programs, and how and where to market the materials once they are collected.

Economics of Recycling

This course examines recycling programs from the budgetary viewpoint and presents recycling coordinators with a fiscal management plan for their recycling programs.

Multi-Family and Apartment Recycling Seminar

This seminar demonstrates strategies for implementing recycling programs in apartment and multi-family unit housing. Topics include storage methods, educational and promotional ideas, and collection arrangements with private haulers and municipalities.

STATE AGENCY RECYCLING PROGRAMS

Four years prior to the institution of mandatory recycling, Executive Order #57 (12/2/83) mandated all state departments, agencies, offices and instrumentality including state universities and colleges to implement waste paper recycling programs and where feasible, develop programs to recycle other materials.

The Executive Order requires each department, agency, office and other instrumentality to appoint a representative to assist the Office of Recycling in the development and implementation of the recycling program.

To date, there are over 70 state locations recycling office waste paper, compared to 49 in 1987. More than 20 of these locations have multi-material recycling programs.

A two year state contract was awarded in June of 1989 for pick up of high grade office paper at all state locations throughout the state. Under the terms of the contract, the State will receive from $79.79 to $160.00 per ton according to the market value and the region in which the paper was collected. The Statewide contract enables State agencies to recycle without having to bid for services.

At the present time, only two State departments have appointed specific "recycling/solid waste coordinators," the Department of Human Services and the Department of Corrections, to work with the Office of Recycling in reaching out to all satellite locations.

In the Department of Human Services, where some 26,000 people are institutionalized, the benefits of recycling have become both social and economical. Clients, as part of the vocational habilitation/rehabilitation programs, separate the grades of paper for recycling. Programs are in place to collect corrugated cardboard, leaves, scrap iron, tires, food waste, x-rays, rags, used oil, tin and aluminum. Two years ago, the Department of Human Services recycled 2,500 pounds per month of mixed recyclables. Today, they are recycling 350,000 pounds per month with an anticipated savings of $100,000 per year in cost avoidance through combined recycling and waste reduction.

In the Department of Corrections, 13 correctional facilities are recycling office paper with Leesburg and Southern State prisons recycling food waste, oil, tires, cement, aluminum, corrugated and metal. There is a separate inmate work detail within the facilities for the collection of recyclables. An average prison can generate six to ten thousand aluminum cans per month, 10,000 pounds of corrugated, 75,000 pounds of food waste and 2,000 pounds of office waste paper.

In the spring of 1988, with the technical and financial assistance of the Office of Recycling, New Jersey's state parks began collecting commingled recyclables. 55 gallon drums were used throughout the system as collection containers. The park superintendents coordinate the emptying and storing of recyclables. Presently, recyclables are donated to the municipality in which the park is located.

At the present time, all revenues derived from the sale of high-grade office paper are returned to the General Treasury. The paper program has earned the state over $100,000.00 in revenues and over three million pounds of paper have been recycled with a substantial savings to the State in solid waste disposal fees.

Each recycling program is designed specifically to accommodate the logistics of a location. A system to recover the recyclable materials generated at that site is organized. In the office paper program, employees collect recyclable paper at their desks. Some employees use a desk top folder to store their recyclable paper. When the folder is full it is emptied into centralized recycling barrels located around the office. Once those barrels are full, the maintenance staff collects the recyclable paper and places it into bulk storage containers usually on the loading dock of the building. The State contracted vendor picks up the collected paper and reimburses the state based on the market value at the time of pick up.

Other recyclable materials are collected in designated containers usually found in common areas and stored for pick up by the municipality.

Education sessions and recycling awareness day ceremonies are coordinated in conjunction with program development and management. Similar programs are coordinated several times during the course of the year with private industry.

RECYCLING EFFORTS

All twenty-one counties have recycling programs in place and are well on their way to meeting the State goals for certain recyclable materials. These include newspaper, office paper, corrugated cardboard, aluminum, glass containers and leaves, and, in some cases, tin plated steel food containers.

There are other recyclable materials which are more difficult to recycle:

1. because of difficulties in collection;

2. because they may contain hazardous components and therefore require special regulation or treatment; or

3. because they are difficult to market.

The following sections discuss these more difficult to recycle materials and the problems they create for recycling.

USED MOTOR OIL

The Recycling Act contains several sections pertaining to the recycling of used motor oil. These sections contain posting requirements for motor oil retailers and used oil collection centers (present used oil collection centers are service stations and re-inspection stations), and labeling requirements for all containers of motor oil sold at retail or at wholesale for direct retail in the State. The Office of Recycling is currently working with the Division of Regulatory Affairs in revising the existing Used Oil Recycling Regulations (N.J.A.C. 14A:3-11.1 et seq.) to make them consistent with the requirements of the Recycling Act. The revised regulations will include enforcement provisions, which are lacking in the existing version of the regulations.

The Office of Recycling has also begun work on a Statewide used oil collection and recycling program. An initial survey indicated that out of 567 municipalities in the State, approximately 200 have a municipal used oil collection site available to their residents. These sites vary widely, and may consist of a 55 gallon drum or tank at the public works yard, or a specially-designed used oil collection tank located at the municipal recycling center. Many of these municipal programs could be upgraded or significantly expanded. Approximately 14 municipalities offer curbside collection of used motor oil, along with other recyclables.

The Statewide used oil recycling program will focus on publicizing the existing municipal and county collection sites, and developing additional sites in areas that lack sufficient collection capacity. An extensive public education campaign will be a major component of the recycling program.

In order to ensure the development of environmentally-sound used oil collection sites, the Office of Recycling is working with representatives of the Division of Hazardous Waste Management in drawing up guidelines for siting collection tanks. These guidelines, along with information on available tank types, costs, etc., and other educational materials, will be made available to any municipality that wishes to site a new tank, or to upgrade an existing collection site.

An educational campaign on used oil recycling which will focus on the problems associated with improper disposal of motor oil, the recyclability of motor oil, and the availability of used oil collection sites for residents is being developed.

EPA-Funded Used Oil Recycling Pilot Projects

EPA Region II has recently provided funding for two used oil recycling pilot projects in New Jersey. The Office of Recycling assisted in the selection of the two municipalities, and continues to offer assistance in the development of the programs. Winslow Township, in southern Camden County, was chosen because of its rural/suburban character, its location in the Pinelands, and the lack of any used oil collection facilities in town. The City of East Orange, in Essex County, was selected because of its urban nature and relatively dense population base. The pilot projects will consist of evaluating the needs of the two municipalities, assessing the options for collection (i.e., curbside versus drop-off, type of collection tank, etc.), and providing collection tanks, educational information and overall guidance for the project. Information from the two pilot projects will be utilized in the Statewide used oil recycling campaign.

LEAD-ACID BATTERIES

Each year, approximately 2.3 million used automobile (lead-acid) batteries become available for recycling in New Jersey. A single year's generation is equivalent to 20,700 tons of lead, all of which has the propensity to enter our environment if not handled properly. The 18 pounds of lead found in the average automotive battery, if disposed of as conventional solid waste, can cause groundwater contamination if directed to landfills or residual ash contamination at resource recovery facilities.

Approximately 75 percent of lead-acid batteries sold in the U.S. are currently being recycled, with the lead being used to make new batteries. In New Jersey, the market forecast for lead-acid batteries continues to be strong as secondary lead retains its competitive edge over virgin lead. New battery recyclers continue to come on line to service localities generating spent lead-acid batteries. Those entrepreneurs now involved range from established scrap dealers, to battery retailers, to the providers of new collection services. Cost to the generator at present is nominal, with most service provided in exchange for the batteries.

DRY-CELL BATTERIES

Commonly known as household batteries, dry-cell batteries come in a variety of sizes and types suited for different personal applications, e.g., flashlights, radios, small appliances, toys, cameras. While the actual composition of dry-

cell batteries will differ by type, current technology is such that all common dry-cells contain varying amounts of heavy metals seen as essential to product function and performance.

Counties with operating or planned resource recovery facilities are devising front-end and back-end collection systems to remove dry-cell batteries from potential incineration. Perceived public health issues notwithstanding, resource recovery facility operators are concerned about excessive levels of heavy metals, i.e., cadmium, mercury, lead, contained in residual ash, which require expensive disposal as hazardous waste.

The Market Development Study prepared for the Department by Arthur D. Little, Inc. estimates the total number of dry-cell batteries sold in New Jersey at 73.3 million. The market for dry-cell batteries has experienced an approximate 10 percent growth rate per year and is projected to continue at this growth rate through 1993. Thus, the estimated number of dry-cell batteries sold in New Jersey in 1990 will be 107.3 million.

Dry-cell battery manufacturers do not recover primary components from spent batteries due to the processing and resultant recovery not being cost-effective at this time. A marginal degree of private recovery does exist but is currently limited to silver and mercury "button batteries" commonly used in watches, calculators, and cameras.

A proposed county-wide dry-cell battery collection project in Warren County is being considered for funding. Results from this pilot project will serve as a basis for recommending similar action in other interested counties. The Department is also considering funding a dry-cell battery composition and market develop study based on a proposal submitted by Bronx 2000, New York City. This project is anticipated to fill the current void in essential market data needed to develop and implement additional battery collection and recycling programs.

WHITE GOODS

White goods are estimated to represent up to 1 percent of the solid waste stream in New Jersey, or approximately 95,000 tons per year. Tonnage grant figures show that 15,101.6 tons of white goods were recycled in 1988, or a 15.9 percent recycling rate. This rate is believed to be grossly under-reported, however, due to the fact that many municipalities will report white goods tonnage to the Office of Recycling as a component of their overall ferrous metal tonnage recycled. In addition, recycled white goods tonnage registered a 40.2 percent decrease over the 32,287.8 tons recycled in 1987, due to the PCB capacitor issue which surfaced in mid-1988. While there are many problems

associated with white goods recycling, the value of the metal has remained fairly stable over time, making it a viable recyclable item.

White goods are primarily collected by municipalities for recycling as a service to residents, or are removed by large appliance firms when a new item is purchased and installed. Markets for the material include metal baling and shredding operations in New Jersey. Sufficient recycling capacity exists to handle the generation of material. The main issue regarding white goods is the capacitors included in the items manufactured prior to 1979, some of which may contain PCB fluids which can be released into the environment as a result of their processing. In July of 1988 the EPA made public research findings from studies conducted at scrap metal facilities, which indicated a presence of PCBs at some sites. The scrap metal industry stated that they believed the PCBs to be coming from white goods, although in actuality, it is believed that only 5 percent of white goods contain PCB capacitors. The response from the scrap metal shredding operations was to stop accepting these items. As the EPA was focusing its study on shredders and not on balers, baling of these items continued. However, many of the white goods which were once recycled were now being sent to landfills.

The shredders soon found that they were losing a large percentage of their raw material by continuing their non-acceptance of white goods. One shredder said his metal input dropped by approximately 20 percent. Due to this shortage of processible metal, some shredders have begun to modify their operation to enable the environmentally safe acceptance of white goods again. One shredder has established a capacitor removal program, prior to shredding the white goods. Another has modified an on-site baler by lining the pit with steel and installing a drainage system connected to a holding tank to catch fluid runoff. The tank is then drained by a licensed hazardous waste hauler. One shredder still does not accept white goods. Baling operations in New Jersey continue to seek out white goods for processing, raising the concern that capacitors may be ruptured during baling. The amount of white goods being processed by balers continues to rise, and it is believed that recycled white goods tonnage will rebound in 1989.

Without a clear policy from the EPA, the states seem to be adopting piecemeal strategies, some more strict than others. It does not seem likely that the EPA will address this problem soon.

AUTO SCRAP

Each year in New Jersey, approximately 500,000 autos are scrapped. Traditionally, these junked autos pass from the owner to an auto dismantler. The dismantler removes any salable parts

from the item, and then sells the hulk to an auto shredder (after removing the gas tank, battery, exhaust system, tires, and draining the fluids). Auto shredders in New Jersey generate over 500,000 tons of ferrous scrap annually from the processing of junk automobiles, 20 percent of which is sold within the United States and 80 percent which is shipped overseas. The resulting fluff (non metallic parts of the auto such as glass, plastics, rubber and dirt) requires disposal. Each ton of auto scrap processed generates roughly 0.8 tons of ferrous scrap, 0.05 ton of non-ferrous metal scrap (primarily aluminum) and 0.15 tons of fluff.

The auto recycling infrastructure is well established in New Jersey, with a virtual 100 percent recycling rate (junk autos are not being received at solid waste facilities). Markets for the scrap metal produced by the shredders are expected to remain strong for the foreseeable future. The primary problem facing the industry is the disposal of the fluff. The material is presently disposed of as waste. Although efforts have been made to find alternative uses for this material, to date nothing has come to fruition.

TIRES

New Jersey generates in excess of 8.4 million passenger car scrap tires and 1.28 million scrap truck tires annually. This amounts to 141,600 tons of waste annually.

The majority of New Jersey's tires that are recycled are manufactured into retreaded tires. This equals approximately 21 percent by total combined weight of truck and passenger car tires. Truck tire retreading consumes 720,000 truck tires in New Jersey annually, leaving 560,000 truck tires for disposal. The remaining 5 to 9 percent of tires that are recycled are used in miscellaneous whole and split tire applications, such as artificial reef construction, are ground-up for use in asphalt or rubber reclaiming, or chipped or used whole as a tire derived fuel outside of New Jersey. The Office of Recycling estimates that only 1 to 2 percent of tires are legally disposed of in transfer stations or landfills, with the rest disposed of in a non-secure manner throughout New Jersey and outside of the State.

The primary problem facing the recycling of tires is the lack of markets for reprocessed tires. Several viable recycling technologies have been developed for scrap tires, however, the economics have not been favorable to large scale implementation of these technologies as of this date. Coupling this with the fact that tipping fees charged at legitimate solid waste and recycling facilities for the disposal of tires creates enormous economic incentives to illegally dispose of the material, reveals the scope of the problem. Tires, once illegally disposed, pose a

serious public health threat. Uncontrolled disposal of tires provides a shelter for vermin, and they become a particularly suitable breeding place of encephalitis-carrying mosquitoes as well. In addition to public health problems, tire piles also pose a danger to life and nearby property because they are potential fire hazards. The Enforcement Element of the Department's Division of Solid Waste Management considers tire dump sites unregistered solid waste facilities, and issues "Cleanup and Removal to Authorized Facility" orders to the owners when a pile is discovered. Tire pile owners, however, often claim that they cannot find a disposal site for the tires, or file for bankruptcy when faced with cleanup orders. With no state money presently available for cleanup of tire piles, it is generally impossible to get a site cleaned up.

PLASTIC

Plastic containers are one of the recyclable materials that may be designated by a county for collection and recycling by a municipality. Eight of the twenty one counties in the State have mandated plastic containers for recycling. This includes Atlantic, Cape May, Cumberland, Ocean, Mercer, Somerset, Sussex, and Warren Counties. Approximately 200 municipalities have instituted plastic collection programs since the passage of the Recycling Act. This compares to a handful of municipal programs collecting plastics prior to the passage of the Recycling Act. Plastic recycling efforts in the State have been initiated and supported by the Plastic Recycling Corporation of New Jersey (PRCNJ). Supported by the soft drink industry, the PRCNJ has primarily focused upon recovering plastic soda bottles (polyethylene terephthalate - PET) and plastic milk, water and detergent bottles (high density polyethylene - HDPE) from the waste stream.

A variety of additional types of plastics are found in the municipal solid waste stream. These include polypropylene (PP), polystyrene (PS), polyvinyl chloride (PVC), and other types of polyethylene such as low density polyethylene (LDPE). Industry efforts to recycle additional types of plastics were announced in 1989. The National Polystyrene Recycling Company (NPRC), an industry-funded organization, was formed in 1989. The NPRC plans to site a post-consumer polystyrene recycling plant in Philadelphia, Pennsylvania which is scheduled to be operational by the end of 1990. Occidental Chemical Corporation, in Berwyn, Pennsylvania announced the establishment of a nationwide, post-consumer, PVC bottle, buy-back initiative. Union Carbide announced its plans to construct a plastics recycling facility in Piscataway. This facility will accept a mix of post-consumer plastics that include polyethylene wrap (plastic bags), rigid

polyethylene household and industrial containers (milk and detergent bottles), and polyethylene terephthalate soft drink and liquor bottles.

How effective these industry efforts will be in capturing a greater portion of the plastic waste stream is questionable. As noted in the Beverage Container Report to the Legislature, the cost of collecting additional plastics at the curb will fall upon municipalities. It is the opinion of the Department that financial assistance to municipalities must be provided for the collection of plastics. The expansion of end markets for post-consumer recycled plastics is also encouraged through a state government procurement program. In addition, it is important to note that the plastic recycling efforts presently underway focus on plastic packaging. A variety of durable goods such as toys, furniture, computers, telephones, and parts of automobiles are also made of plastic.

CONSTRUCTION AND DEMOLITION WASTE

While it is often difficult to calculate the amount of construction and demolition (C & D) waste generated, it appears that at least 3 million tons of C & D waste is generated annually in New Jersey, or about 20-25 percent of the total solid waste stream. C & D waste is generated by several different types of activities, such as building construction sites, building demolition sites, roadway construction sites and land clearing sites. An examination of the composition of the C & D waste stream reveals that many of the materials found in this waste stream are recyclable. Wood waste, tree stumps, concrete, bricks, blocks, asphalt, asphalt-based roofing scrap, wallboard, metal, corrugated cardboard and electrical wiring are all recyclable components of the C & D waste stream. These materials, if properly separated at the point of generation, are highly recyclable into a variety of construction and landscaping products.

Source separation, i.e., separation at the point of generation, of C & D waste is feasible. Furthermore, there is currently strong economic incentive for contractors to separate recyclable C & D materials because the tipping fee charged at recycling centers is usually considerably less than the cost of solid waste disposal. There is also strong incentive for contractors to purchase construction materials made from this same material because recycled materials typically cost less than virgin materials. In addition, the private sector has shown great interest in establishing recycling centers for various components of the C & D waste stream.

Currently, the transport and disposal of C & D waste is an area fraught with possibilities for waste flow violation.

However, an increasing awareness of the source separation requirement and recyclability of this material, combined with the growing number of approved recycling centers for these materials and an enhanced enforcement effort, will result in a reduction in the amount of violations associated with C & D waste. As of this date, the Department has approved six recycling centers located in Cape May, Essex, Gloucester, Hudson and Middlesex counties. In addition, there are currently thirty-four recycling center applications under Departmental review. The increasing number of approved recycling centers will not only be beneficial to the environment, but will also be economically beneficial to those operators who are complying with the source separation requirement and waste flow rules.

GRASS CLIPPINGS

Although it is difficult to determine the amount of grass clippings generated in New Jersey, it is estimated that grass clippings amount for as much as one million tons annually, if set out at the curb. (Grass clippings weigh approximately 1,000 pounds/cubic yard.)

Due to the large amount of grass clippings generated, due to the fact that grass clippings are a good source of nitrogen when recycled back into the lawn, and due to the possibility that grass clippings could increase the nitrogen oxide compound emissions at resource recovery facilities, the Department is promoting homeowner recycling of grass clippings. Together with the New Jersey Agricultural Extension Service and representatives from the lawn care industry, an education campaign is being developed to inform residents on ways to implement a proper lawn maintenance program. A proper lawn maintenance program consists of the following: reducing the amount of grass clippings generated by avoiding excessive lawn fertilization and watering; leaving the grass clippings on the lawn so that they are recycled back into the soil; using the grass clippings as a source of organic matter in the garden; and backyard composting.

RECYCLING BUSINESS LOANS

APPLICANT	COUNTY	LOAN AMOUNT
American Wood Recyclers	Camden	300,000.00
Babek Commercial Tire Service	Middlesex	165,000.00
Colontonia	Camden	110,000.00
Commercial Recycling inc.	Camden	200,000.00
Filpat Manufacturing Co. inc.	Mercer	100,000.00
Gavin Metal Co.	Gloucester	267,000.00
George's Salvage Co. inc.	Sussex	200,000.00
Giordano's Scrap Metal Co.	Cumberland	300,000.00
Glass Cycle Systems	Morris	100,000.00
Glass Cycle Systems	Morris	200,000.00
Homasote Company	Mercer	300,000.00
J Goldberg	Middlesex	188,000.00
Kohlbrenner Scrap Metals	Burlington	245,000.00
Monmouth Processing Co.	Monmouth	300,000.00
Papier Jacques Coeur inc.	Bergen	155,000.00
R. Lobosco & Sons Recycling inc.	Passaic	219,300.00
R. Lobosco & Sons Recycling inc.	Passaic	165,900.00
Tab inc.	Camden	90,000.00
Tony Canale inc.	Atlantic	274,800.00
Yaffa's Sons inc.	Camden	193,537.00
Zozzaro Brothers	Passaic	350,000.00
		$4,423,537.00

MATERIALS RECYCLED 1984 - 1988

MATERIALS :	1984	1985	1986	1987	1988
Paper					
Newspaper	124,404.6	169,276.6	212,975.9	283,541.8	359,879.4
Corrugated	120,067.0	151,882.8	155,367.8	222,246.2	293,126.0
Hi-Grade	19,385.4	20,202.2	29,647.2	35,935.9	43,659.1
Mixed Paper	9,885.3	12,962.3	8,902.7	27,025.8	94,045.1
Total Paper	273,742.3	354,323.9	406,893.6	568,749.7	790,709.6
Glass	20,861.2	25,603.5	31,235.6	42,941.9	75,618.1
Co-Mingled				15,649.5	59,091.8
Metals					
Aluminum	686.0	3,103.0	3,934.8	5,657.4	7,742.3
Ferrous Cans	4,414.5	71.7	2,151.8	1,082.7	7,318.0
Ferrous Scrap	40,538.6	114,495.5	108,165.8	207,233.8	305,028.4
Non-Ferrous	5,500.7	22,947.9	44,615.1	37,637.9	33,953.5
Auto Scrap	28,916.7	67,230.4	107,989.5	145,469.0	200,969.0
Total Metals	80,056.5	207,848.5	266,857.0	397,080.8	555,011.2
Organic					
leaves	126,788.7	145,772.5	186,499.4	227,550.9	309,382.6
Woodchips	10,652.2	32,716.3	36,185.5	246,530.3	262,243.8
Grass Clippings	1,093.9	708.6	2,035.2	4,664.9	10,616.6
Food Waste	20,348.5	26,476.6	25,748.2	31,391.3	40,347.8
Manure	13,294.6				
Total Organic	172,177.9	205,674.0	250,468.3	510,137.4	622,590.8
Other					
Asphalt & Concrete	98,491.3	86,123.8	165,855.7	282,321.6	623,044.2
Motor Oil	4,443.5	8,662.7	11,149.0	13,690.9	13,480.2
Batteries	1,030.9	747.9	762.8	354.2	2,696.4
Tires & Rubber	1,513.3	891.2	1,744.8	1,435.3	5,387.3
Plastic	26.2	104.1	6.6	193.0	1,655.3
Textiles			16.6	855.5	60.0
Brick			4,188.2	300.0	
Total Other	105,505.2	96,529.7	183,723.7	299,150.5	646,323.4
TOTAL	**652,343.1**	**889,979.6**	**1,139,178.1**	**1,833,709.8**	**2,749,344.9**

TOTAL TONS RECYCLED STATEWIDE IN NEW JERSEY