

**A STUDY OF RECYCLING FOR
THE STATE OF HAWAII**

Conducted by

Resource Conservation Consultants, Inc.

A Report to the Governor and the Legislature of the State of Hawaii

Submitted by the

**Legislative Auditor of the State of Hawaii
Honolulu, Hawaii**

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FOREWORD

Act 248, 1988, requested the Office of the Legislative Auditor to conduct a study of Hawaii's waste streams to assess the availability of markets for recycled materials, recycling programs in other states, and the economic viability of recycling in Hawaii. The Legislature also sought ways to encourage service stations to participate in used oil collection programs to protect the environment.

To provide the professional and technical expertise for the study, we engaged the services of Resource Conservation Consultants, an Oregon firm specializing in recycling. The consultant conducted research and analysis of the market conditions and economics of recycling in Hawaii and other states and current used oil collection activities.

We join Resource Conservation Consultants in expressing our appreciation to the many individuals in government and the private sector who cooperated with and assisted us in this study.

Newton Sue
Acting Legislative Auditor
State of Hawaii

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Chapter 1

INTRODUCTION

Purpose of Study

Act 248, 1988 asked the Office of the Legislative Auditor to study Hawaii's waste streams because of legislative concerns about solid waste management and recycling.

The purpose of the study is to assess:

- the availability of markets for recycled materials;
- the economic viability of recycling in Hawaii;
- other states' recycling programs; and
- ways to encourage service stations to participate in used oil collection programs.

This report presents our findings and recommendations on the issues listed above.

Organization of the Report

Chapter 1 is this introduction; Chapter 2 provides background information on recycling and recent trends around the country to incorporate recycling into governmental solid waste management programs.

Chapter 3 provides data about the amount of recycling in Hawaii and the amount of waste being disposed of in the State. For comparison, information is presented about recycling rates in other states and countries.

Chapter 4 describes the market conditions for materials from Hawaii. It assesses the economics for collecting, processing, and shipping recyclable materials to these markets.

Chapter 5 identifies the constraints to recycling in Hawaii.

Chapter 6 describes recycling programs in other states and Chapter 7 contains recommended strategies for the State.

Finally, Chapter 8 discusses used oil recycling.

Chapter 2

BACKGROUND INFORMATION

Definition and History

Recycling is the conversion of waste materials into new products. Examples are the melting of glass bottles to make new containers, and the use of newspapers to make new paper or cellulose insulation. The term “recycling” encompasses three activities: collection, processing, and marketing. For recyclable materials to be usable, they must first be collected from residences and businesses, processed, and then shipped to markets.

For most of its history, recycling has occurred in the industrial and commercial sectors. Traditionally, paper and metal trimmings from manufacturing processes have been reused or recycled. Large commercial operations such as printers have recycled their waste materials. In the 1970s, with the development of the environmental movement in the U.S., residential waste became an increasing target for recycling. Recycling was seen as a way to save resources and energy and reduce the amount of waste disposed in landfills. Manufacturers began to recycle aluminum cans, newspapers, and glass bottles.

Governmental Involvement in Recycling

Increasingly, governments are viewing recycling as one way to address a garbage crisis. As landfills fill up and new sites are difficult to find and costly to operate in an environmentally sound manner, recycling is becoming a part of solid waste management. Called an integrated approach, this solid waste management strategy incorporates a variety of methods to deal with trash--waste reduction, recycling, incineration, and landfilling being the most common. At least five states have enacted laws that codify a priority for waste management approaches: reduction, reuse, recycling, energy recovery, and land disposal.

All levels of government have taken an interest in recycling. The U.S. Environmental Protection Agency (EPA) was active in the late 1970s in researching recycling methods and publishing reports. Until recently, the federal government left solid waste management to state and local governments. This changed in 1988, when the EPA set a goal of recycling 25 percent of the nation’s waste in four years. EPA has been developing a research and policy agenda in recycling.

Many states adopted major recycling programs in the 80s. States have passed laws mandating recycling, funded efforts to enhance recycling markets, conducted promotional campaigns, and developed offices dedicated to recycling activities.

Local governments, too, have been involved. In contrast to the state and federal actions that focus more on policies, cities and counties in many areas are actually operating recycling services--collecting materials from residents and preparing them for sale to markets. An estimated 700-800 municipal programs offer curbside collection of more than one residential recyclable material. This move towards municipal recycling services is because the cost of garbage collection and disposal is borne by residents or governments at the local level.

Recycling is seen by some local governments as a way to moderate the increasing costs of waste disposal. This theory, called avoided cost of disposal, states that every ton of material recycled saves the cost of disposing of that ton of waste in a landfill or other facility. Although not all costs of collecting and disposing of a ton of waste are avoided by recycling, many communities recognize the economic and environmental benefits of saving landfill space for use in later years and credit such savings to their recycling programs.

Recycling Programs in Other States

Over the last decade, the number of state recycling programs has increased dramatically. In 1988 alone, at least 24 states passed laws related to solid waste and recycling.

State recycling activities include regulation, such as mandatory recycling collection and deposit legislation; market development; program and facility funding through grants, loans and tax incentives; technical assistance; and education. Selected state programs are summarized on Table 2.1.

Regulation. State government regulation in recycling can take several forms. States can require counties or municipalities to prepare a recycling plan and/or to carry out a recycling program. States also can require residents to separate recyclables from their garbage. In addition, states can regulate products, disposal sites, and transportation of recyclables.

Required recycling plan. Some states require municipalities or counties to submit a recycling plan. Typical features of such plans are a market assessment, selection of targeted materials, establishment of recycling goals, recommendations for action, and a public involvement strategy.

For example, Illinois' Solid Waste Planning and Recycling Act requires Chicago and large counties to develop comprehensive waste management plans, emphasizing recycling and landfilling. The plans must ensure that 25 percent of the municipal waste stream is recycled within five years.

Table 2.1

SELECTED STATE RECYCLING ACTIVITIES

<u>State</u>	<u>Local Government Requirements</u>	<u>Beverage Deposit or Redemption System</u>	<u>Product Regulation</u>	<u>Waste Control Regulation</u>	<u>Transportation Regulation</u>	<u>Recycled Product Procurement</u>	<u>Grants & Loans</u>	<u>Tax Incentives</u>	<u>Technical Assistance</u>
Alabama									
Alaska									
California		X				X	X		X
Colorado									
Connecticut	X	X	X	X		X	X		
Delaware		X							
Florida	X	X	X			X	X	X	
Illinois	X					X	X	X	X
Indiana								X	
Iowa		X				X			
Kentucky								X	
Maine		X				X			
Maryland	X					X			
Massachusetts		X							X
Michigan		X				X	X		
Minnesota				X		X			X
Missouri						X			
Montana									X
Nebraska							X		
New Hampshire									X
New Jersey	X			X		X	X	X	
New York		X				X	X		
N. Carolina								X	
Ohio						X	X		
Oklahoma								X	
Oregon	X	X		X	X	X		X	
Pennsylvania	X			X		X	X		X
Rhode Island						X			X
Tennessee									
Texas					X				
Vermont						X			
Virginia									
Washington			X			X	X		
W. Virginia									
Wisconsin			X	X		X	X	X	

Source: Resource Conservation Consultants.

Required collection programs. Some states require local governments or private haulers to offer recycling collection services to residents.

Many state laws set a statewide recycling goal. For example, in Pennsylvania, at least 25 percent of all municipal waste must be recycled by January 1997. Pennsylvania cities of more than 5,000 must initiate a recycling program by 1991. The state will help municipalities achieve this goal by providing grant moneys for start-up costs.

Required participation in recycling. Connecticut, New Jersey, Pennsylvania, and Rhode Island stipulate public participation in recycling programs. Rhode Island also mandates participation of businesses.

Deposit system. Some states require a deposit on recyclable products or containers.

Beverage containers. The products most commonly sold with a deposit are beverage containers: glass, aluminum, and plastic. Nine states (Connecticut, Delaware, Iowa, Maine, Massachusetts, Michigan, New York, Oregon, and Vermont) have passed "bottle bills" requiring such deposits (see Appendix A). In most of these states, the beverage bottler or distributor charges the retailer a specified deposit which the retailer then passes on to the consumer. The consumer reclaims the deposit when the container is returned to a retail outlet that sells the particular product, and the retailer reclaims the deposit from the distributor, in addition to a handling fee. The unreclaimed deposits are kept by the distributor, though in recent years some states have considered legislation to allocate these funds for recycling programs.

Though unpopular with industry groups, these laws are effective in increasing the recycling rates for the targeted materials. In Oregon, the return rate for deposit containers is above 90 percent.

A variation on the standard bottle bill outlined above is the California Beverage Container Recycling Act which has met with controversy. Under this system, the distributor pays a one-cent-per container fee to the state. Consumers can redeem the container at certified collection centers. If a redemption center is not set up within a half-mile of a major retailer, the retailer must do so or pay a fine. The law sets minimum redemption rates for each type of container. If these rates are not met by a certain time, the per-container fee increases.

Required redemption. In several states, sellers of specific recyclable products are required to take back used products when new products are purchased. For instance, in Pennsylvania sellers of batteries must accept used batteries when a new battery is purchased. Redemption systems are meant to increase recycling and to prevent improper disposal of environmentally damaging materials.

Product bans. Some states limit the use of non-recyclable materials in products where an alternative, recyclable material can be used. This differs from a “disposal ban,” which bans the product from disposal sites. Disposal bans are usually aimed at forcing the recycling of certain materials, while product bans are usually aimed at stopping the use of products not considered recyclable.

Connecticut and Minnesota have banned the plastic can, a plastic and aluminum product which cannot be recycled unless the two materials are separated from each other.

Washington’s Liquor Control Commission will not buy liquor in plastic bottles in order to promote the use of glass containers, for which there are readily available markets.

Six states have passed laws requiring coding of plastic products, so that the different types can more easily be distinguished and aggregated for recycling.

Waste control regulation. The way a state defines, controls and manages its waste can provide incentives to recycle.

Disposal bans. Disposal bans seek to encourage people to separate materials by banning certain materials from disposal facilities. Bans place the responsibility on haulers or landfill operators to ensure that their customers do not dispose of the restricted materials. Connecticut has proposed to ban cardboard boxes, newspapers, and glass containers from municipal landfills and incinerators. Temporary exemptions would be granted for such products as tires, plastic containers, and dry-cell batteries in cases where no markets could be found.

Minnesota bans the disposal of yard waste in landfills or resource recovery plants. New Jersey and Pennsylvania ban the disposal of leaves. Minnesota does not allow landfilling of lead-acid batteries.

Flow control. The term “flow control” refers to legislation that allows municipalities to take control of the waste stream. Local governments need such control to obtain financing for an incinerator or resource recovery plant because a certain amount of refuse per day is needed to operate cost-effectively. Resource recovery plants must be sized appropriately in relation to the waste stream. A disincentive to recycling could result if a local government passes an ordinance requiring that all household waste, including recyclables, be taken to the disposal facility.

Transportation regulation. Revising transportation regulations may facilitate recycling. Both Oregon and Texas have special trucking regulations aimed at reducing the cost of trucking recyclables. Texas has a special, reduced tariff for “Commercial Wastes Moving For Recycling.” The designated materials include junk batteries, crushed or broken glass, and other commercial wastes moving to be recycled, not including iron or steel scrap.

Recycled product procurement. States can take numerous actions to stimulate or help markets for recyclables. Those discussed below bear directly on increasing the purchase of products with recycled content by governments and individuals.

Government purchasing. In the last 10 years, nearly 20 states have enacted state procurement guidelines, most of them focusing on paper. State purchasing helps increase demand for recycled content products and improves markets for secondary materials. It sends a signal to manufacturers to step up production and distribution of these products, and sets an example and standard for the private sector. It may not, however, directly increase recycling in the state where the law is enacted.

Increased government purchasing is usually accomplished by one of two methods: price preference or set asides.

Price preference. A price preference modifies the usual competitive bid situation to give recycled content products an edge. For instance, a 10 percent preference allows the recycled content product to be competitive with a virgin product costing 10 percent less. Seven states have price preferences for recycled content paper or other products. California, with a 5 percent preference, has purchased significant amounts of recycled paper at very little extra cost.

Set asides. Set asides are another method of increasing recycled content purchases. In four states, a specific percent of total paper purchases must be recycled paper. Maryland's set aside requirement, in effect since 1977, was phased in: 5 percent in the first three years, 25 percent in the following four years, and 40 percent after that. The state has spent more than \$17 million on recycled paper since the program began and is now surpassing its 40 percent goal.

Promotion of recycled products. Several states have education and information programs directed at consumers, businesses, and state agencies to change shopping or purchasing behavior in favor of recycled products.

In Illinois, a staff member from the Department of Energy and Natural Resources promotes recycled products procurement to other state agencies. In Michigan, a new consumer education program targets six materials: plastic lumber; shredded newsprint for animal bedding, insulation, and erosion control; writing papers and greeting cards made of recycled paper; retread tires; re-refined oil; and packaging made of recycled paper. Industrial and individual consumers are urged to "Buy Recycled."

Financial support. Loan and grant programs can be used to develop collection and processing operations and markets. States have the discretion to assist projects or programs considered most beneficial, cost-effective, or necessary.

Grants. States can assist collection programs, processors, and manufacturers by outright transfers of money. Eleven states have grants for recycling programs or businesses. Grants can be earmarked for capital and/or operating expenses for equipment; feasibility, design, or engineering studies; site and facility acquisition; or operations.

The Clean Michigan Fund has \$5 million for grants for market development, recycling capital costs, recycling operating costs, composting capital costs, composting operating costs, and resource recovery education. Maximum grant amounts range from \$15,000 to \$500,000 depending on the grant category.

New Jersey rewards municipalities with grant money on a per-ton-recycled basis. The tonnage grant, funded by a landfill surcharge, has declined from \$7 per ton in 1982 to \$1.50 per ton in 1986. The decline is related to the modest increase in recycling during those years and to the shrinking pool of surcharge funds as more in-state disposal facilities close.

Loans. Loans are another form of financial assistance, one that is sometimes more politically acceptable than outright grants. Loans are advantageous for for-profit businesses because they do not create an immediate tax burden on the company.

Illinois, Minnesota, New Jersey, and New York have loan programs. New Jersey's Office of Recycling has about \$5 million available for loans annually. Businesses can borrow \$50,000 to \$500,000 for fixed assets such as recycling equipment. Loans are limited to 90 percent of the eligible project costs, and no more than 20 percent of the fund can go to one borrower. Borrowers repay the loan over 10 years at three percentage points below the prime interest rate. Thus far, waste paper processors are the largest group of borrowers, usually using the loans to purchase balers.

Tax incentives. A state can make special exceptions to its tax laws to facilitate economic activities such as recycling. Possible tax incentives include deductions, exemptions, credits or reduced tax rates on sales, property, gross income or other taxes. At least eight states have enacted tax incentives for recycling. Recycling businesses may also qualify for other tax exemptions intended for a larger class of businesses.

Sales tax exemption. States can exempt sales taxes on manufacturing, processing, or collection equipment. While many states have sales tax exemptions under which some recycling businesses might qualify, three states--Florida, New Jersey, and Wisconsin--have exemptions specifically for recycling processors or end users.

Wisconsin's sales tax exemption is typical. Initially targeted only at manufacturers using either virgin or recycled materials, the law was expanded to include collectors and processors of secondary materials, thus making recycling center operators and scrap metal dealers eligible. The exemption applies to the 5 percent tax on both equipment and materials.

Investment tax credit. An investment tax credit allows purchasers of recycling equipment, structures, or land to apply a percentage of the investment against income tax. Some version of this tax credit is available in New Jersey, Oklahoma, and Oregon.

Property tax exemption. Property tax exemptions for recycling businesses are found in four states: Indiana, Kentucky, North Carolina, and Wisconsin. These exemptions generally allow businesses to avoid some or all of the property tax they would normally pay on equipment, buildings, or land. A drawback of property tax exemptions is that they can disrupt local government finances. For instance, in one North Carolina county, a company accounting for 30 percent of the tax base obtained the exemption.

Technical assistance. Technical assistance includes services and information provided to recycling programs, processors, and manufacturers.

Marketing assistance. Market studies can help locate, characterize, and quantify the potential buyers for a recycled content product. Product testing can help assure these markets that the recycled content product meets their performance standards. Export advice and help in applying for loans or permits are among other forms of assistance provided to businesses by state agencies.

Several states produce directories of collection locations and recycling markets. For example, the Illinois Department of Energy and Natural Resources publishes a market directory of companies that buy residential and commercial recyclables, with information on these companies' processing requirements. The directory, which is updated periodically, also includes a list of brokers and waste paper processors.

Program design assistance and training. Numerous states assist local governments and private recycling programs with workshops, conferences, seminars, guidebooks, instruction manuals, and feasibility studies. For instance, the Massachusetts Department of Environmental Quality Engineering is conducting a series of leaf and yard waste composting workshops for municipalities. The Pennsylvania environmental agency is preparing a videotape on how to start a municipal recycling program. Minnesota is organizing a clearinghouse of waste education materials.

Education and promotion. States can publicize recycling opportunities and the benefits of recycling to the public and to businesses. Some of the most common methods are discussed below.

Media materials. Several states provide or assist in the design of publicity materials for television, radio, and newspapers.

Hotlines. Hotlines operate in 18 states, answering questions about where materials can be taken for recycling and sometimes sending informational materials to callers. The longest

operating hotline, run by the Washington State Department of Ecology, averages 35,000 calls annually, and in 1986 handled a record 52,000 calls. The majority of the telephone hotlines are toll-free.

In-school education. Many states, including Michigan, Minnesota, Ohio, Oregon, and Washington, have recycling education in their school curricula. Michigan recently distributed a new recycling curriculum guide to all 5,000 schools in the state. The state spent \$230,000 for materials designed for four different grade levels including an interactive computer program and videotapes. The Ohio Department of Natural Resources distributed 500 curriculum guides to state grade schools. Forty grade school teachers participated in designing the guide, which was tested and retested before being produced in final form.

Other. A method of focusing media attention on recycling is for the state to select a particular week or month and intensify publicity and education efforts during that time. Sixteen states have such promotional periods.

Solid Waste Management Practices in Hawaii

State government practices. The Hawaii Legislature has adopted policies for the State that encourage recycling. The State's objectives and policies are found in Section 226-15, HRS, which states that the State will:

- promote reuse and recycling to reduce solid and liquid wastes and employ a conservation ethic, and
- promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes.

The State's Environmental Policy Act states that all agencies shall, insofar as practicable, consider the following guideline:

- promote the optimal use of solid wastes through programs of waste prevention, energy resource recovery, and recycling so that all our wastes become utilized.

Other than these policies, the State has not been very active in solid waste management and recycling. The Department of Health (DOH) is responsible for issuing permits for landfills and for developing rules for used motor oil transport, storage, and disposal.

DOH also staffs a litter control office with an annual budget of about \$100,000. The office provides a telephone hotline for litter complaints and develops educational materials. The office also receives calls about recycling (an estimated 10-20 percent of the hotline's calls) and coordinates a statewide promotion of recycling in February (Recycling Month).

Local government practices. Counties have primary responsibility for solid waste management and all municipal solid waste landfills are operated by the counties.

The City and County of Honolulu provides garbage collection to most residents, while private haulers serve commercial customers and some multi-family residences. Small businesses have the option of selecting either county or private hauling. Public waste collection costs were \$80 per ton in 1986-87. The county operates three landfills, an incinerator, two transfer stations, and several convenience stations. Individuals are not charged to dump at the sites, but commercial waste haulers must pay a \$13 per ton tip fee at the landfills and a \$31 per ton tip fee at the transfer stations. Landfill costs in Honolulu County are estimated at \$17 per ton of refuse and the current incineration cost is \$37 per ton.

A major focus of the county's planning effort is the construction of a waste-to-energy facility, called H-POWER. The county sees recycling as complementary to H-POWER. The flow control ordinance that requires waste to be disposed at designated facilities specifically exempts waste materials that are set aside for recycling.

The County of Hawaii does not provide garbage collection; private haulers serve the residential areas of Hilo, Kona, and Kohala. Many people haul their own trash to transfer stations and landfills. The county operates two landfills and 21 transfer stations. No tip fees are collected from either haulers or individuals. The cost for operating the transfer stations and landfills and hauling waste from the transfer stations to landfill is estimated at \$9.25 per ton.

The County of Kauai collects household refuse, and private haulers serve residences on private roads and commercial businesses. The county spends \$312,000 annually on refuse collection. People may haul their own trash to landfills or transfer stations. No fees are charged. The county operates three transfer stations and two landfills, spending \$209,000 annually on waste disposal.

The County of Maui collects all residential waste. Until December 1988, the county also collected some commercial waste, but it has stopped this practice except in areas where no private hauler operates. For FY 1987-88, the county spent approximately \$1.2 million on garbage collection. People may haul their own trash and dump at the landfills for free. Private haulers are charged \$8 per ton. The county operates four landfills on Maui and one each on Lanai and Molokai. Landfill costs are approximately \$4.70 per ton. In addition, DOH operates a small landfill.

Other than the planning efforts for H-POWER in Honolulu, none of the counties has a current solid waste management plan. The most recent plans are a 1983 report for Oahu and a 1982 report for Kauai. The County of Maui has contracted for a study of disposal alternatives including recycling, composting, and waste-to-energy, which is due in April 1989.

Private Sector Waste Management

Approximately 40 waste hauling companies serve commercial accounts in Hawaii. They haul wastes only and do not operate landfills or transfer stations. Regulation of haulers in the four counties is minimal.

A number of companies are involved in processing and shipping recyclables. About 100 people are employed full-time by waste paper and aluminum can processing companies. These firms buy recyclable materials from about 10,000 customers monthly, paying out approximately \$6.3 million annually for the materials they buy.

Chapter 3

WASTE GENERATION AND RECYCLING RATES

This chapter identifies the materials commonly found in the municipal solid waste stream and estimates their contribution to waste on a national basis. An estimate is made of waste composition in Hawaii. The chapter closes with information on recycling activities in Hawaii.

Summary of Findings

We find that Hawaii's estimated waste composition does not differ dramatically from national waste composition. The other major finding is that recycling rates for commonly recycled materials are lower in Hawaii than in the U.S. as a whole.

Waste Materials

The municipal solid waste stream is composed of a variety of materials discarded by residential and commercial "waste generators." Waste from construction, manufacturing, and industrial sources is not considered part of this waste stream. Municipal solid waste contains a variety of components that can be divided into categories by type of material: waste paper, ferrous metals, non-ferrous metals, glass containers, plastics, food waste, yard waste, and other materials. Each of these materials is discussed in more detail below.

Waste paper. Waste paper is the single largest material in municipal solid waste nationally, nearly 36 percent by weight according to a 1988 estimate from the U.S. Environmental Protection Agency (EPA). The waste paper category is composed of several types of paper, many of which are recyclable. These include newspapers, corrugated containers (cardboard boxes), and high grade office papers.

Newspapers comprise more than 6 percent of the waste stream, and nationally are recycled at rates of 27 to 33 percent. Newspaper is easily aggregated by residential waste generators and requires almost no preparation to ready it for recycling.

Nationally, corrugated containers make up more than 8 percent of solid waste. A very high proportion of corrugated containers are recycled, 40 to 45 percent nationally. Well established recycling practices by many large generators, such as supermarkets, are responsible for this rate.

High-grade office papers including computer paper, white ledger, and colored ledger are valuable materials, particularly when separated from each other. The national estimate of "other paper," including high-grade office papers, in solid waste is 21 percent. This "other paper" category also includes such things as waxed coated paper, chipboard cartons, magazines, and other paper packaging. Some are recyclable, and when clean and segregated are considered a recyclable grade called "mixed waste paper."

Scrap metals. Metals of all types make up nearly 9 percent of the waste nationally. The two major categories of metals are ferrous and non-ferrous.

Ferrous metals. Ferrous metals are those containing iron. This material makes up nearly all of the scrap metal in municipal solid waste. It includes such items as small appliances, cooking utensils and furniture parts such as bedsprings and frames. Another component of ferrous metals is tin cans, which make up nearly 2 percent of the national waste stream.

Tin can recycling stands at a fairly low 5 to 10 percent nationally due to relatively low prices paid for the scrap material; preparation requirements which include washing, delabeling, and flattening; and the lack of processors in some areas.

Non-ferrous metals. Non-ferrous metals include lead, zinc, brass, and other metals free from iron. Aluminum in the form of aluminum cans is the only non-ferrous metal occurring with regularity in the municipal waste stream. While not a large part of the waste stream--0.5 percent nationally--aluminum cans are recycled at a high rate. In states with beverage container deposit laws, the recycling rate for aluminum cans is in the 80 to 95 percent range. Even in states without a deposit law, recycling of aluminum cans is common because of aluminum's high value and an infrastructure of aluminum industry recycling programs.

Glass. The glass category of the waste stream is composed primarily of glass containers--green, clear, and amber bottles and jars. Glass accounts for more than 7 percent of the municipal waste stream nationwide. A subset of these glass containers is soft drink and beer containers which, like aluminum cans, carry a deposit in 10 states. In states without deposit laws, glass container recycling is 10 to 15 percent. Deposit laws boost the rate to 80 to 95 percent for the deposit bottles, which are about half of the glass containers used in those states. Overall, glass container recycling nationally is 15 to 20 percent.

Plastics. The plastics category of the waste stream is approximately 7 percent. Recycling of post-consumer plastics (as opposed to manufacturing scrap) is an emerging field. Recycling has been limited by difficulties in distinguishing among different types of plastics, and by the cost and difficulty of collecting and shipping such low density material. Currently, recycling is limited mainly to polyethylene terephthalate (PET) beverage containers. Nationwide plastics recycling is less than 1 percent of plastics waste.

Yard waste. Yard waste is the second largest category in the waste stream, following paper. Yard waste consists of leaves, grass, brush, and branches. The percentage of yard waste in municipal waste is subject to dramatic variation depending on an area's climate and vegetation. If kept out of the waste stream, yard waste can often be composted to produce soil amendments such as compost or mulch.

Food waste. Food waste from residences and restaurants is about 9 percent of municipal waste nationally. Disposal alternatives include composting or feeding the waste to pigs. However, there is no large-scale recovery of this material.

Other. This miscellaneous category can include tires, dirt, grit, ceramics, composite products such as plastic/paper freezer packaging, and small electronic goods.

Waste Composition Estimates

Waste composition estimates provide information about the relative size and actual tonnage of the specific categories of municipal solid waste described above. It is helpful to have an idea of which materials are present and in what quantity before setting recycling goals and designing recycling programs or activities.

It is important to remember that waste composition is not a science. It varies from place to place in relation to cultural, economic, and geographic differences, and the amount of recycling occurring. Research procedures used in conducting studies may affect their outcome. The size of different categories may vary according to who is sorting the waste, how the categories are defined, and what time of year the study is performed. Constant changes in products and packaging also mean that waste composition changes over time.

Because no recent waste composition studies have been performed for the State of Hawaii, the consultant looked at national waste composition data and at studies conducted by numerous municipalities around the country. These studies show that community estimates range widely in relation to the national average. The consultants compared the available information and estimated Hawaii's waste composition.

Particular importance was given to estimates made in the past for Hawaii's waste, and to data from two Florida communities with conditions similar to Hawaii.

These two communities were selected for similarities in:

- Climate, since it affects the amount of yard waste that is produced. Yard waste often comprises such a large portion of the waste stream that it affects the relative percentage of other materials significantly.

- Tourism, since a tourist economy generates higher levels of commercial waste than a more typical residential community.
- Level of legislation, since it would foster increased levels of recycling. A comprehensive state recycling law enacted in 1988 has not taken effect. Florida's municipalities also have little involvement in recycling efforts.

Table 3.1 presents available data for Hawaii's waste stream, compares this with data from the two Florida communities and national data, and presents waste composition estimates for Hawaii. The estimates present a general idea of waste composition, but they should not be relied on where a high degree of accuracy is required.

Hawaii's estimated waste composition appears similar to that of the United States as a whole, although somewhat higher in its percentage of newspaper, other paper, and aluminum cans.

Current Hawaii Recycling Activities

A number of firms collect or process recyclable materials in Hawaii. They handle waste paper, ferrous and non-ferrous scrap metal, and a small amount of glass containers. The major collection of recyclables occurs on Oahu, but some collection of corrugated containers, aluminum cans, and other scrap metals is undertaken on the Neighbor Islands.

Shipping activity. Since few in-state manufacturers use recyclable materials, the amount of Hawaii recycling activity can be gauged fairly accurately by looking at the amount of recyclables shipped from the state to export markets.

Table 3.2 shows 1987 exports of three types of waste paper, ferrous scrap, aluminum cans, and other non-ferrous scrap. It also shows projected 1988 exports based on the first seven months of the year.

In 1987, a total of 32,229 tons of waste paper was shipped abroad, including 21,528 tons of corrugated containers and 5,649 tons of newspapers. Ferrous scrap exports totaled 16,591 tons, aluminum cans were 2,545,803 pounds, and other non-ferrous metals were 16,474,238 pounds.

Unfortunately, information on domestic shipments, compiled by the U.S. Army Corps of Engineers, is not as comprehensive as the export information. The categories of materials are not as refined, with only categories such as "waste paper," not the various grades shown in the export information. The records do show that 11,355 tons of ferrous scrap and 70 tons of waste paper were shipped either inter-island or to the mainland. However, these figures may overstate actual recycling activity because some materials may be counted once when shipped inter-island and a second time when shipped to mainland or export markets.

Table 3.1

WASTE COMPOSITION OF SELECTED COMMUNITIES (%)

	Honolulu County 1964 (1)	Hawaii County 1975 (2)	Kauai County 1980 (3)	Honolulu County 1984 (4)	Palm Beach County, FL 1988 (5)	Broward County, FL 1988 (6)	National 1988 (7)	Estimated Hawaii State 1988 (8)
Newspaper				7.9	14.5	14.1	6.3	7.9
Corrugated			9.7	7.3	9.0	15.5	8.1	8.5
Other paper				24.5	16.0	11.7	25.2	23.1
Total paper	39.40	41.4	30.4	39.7	39.5	41.3	39.6	39.5
Ferrous scrap		9.2		3.6	0.9	5.4	5.7	5.7
Tin cans					3.7		1.8	1.8
Aluminum cans				1.6	1.2	1.1	0.5	1.1
Total metal	6.30			5.2			8.9 (9)	8.9 (9)
Glass	5.90	17.3	10.8	6.6	7.5	5.7	7.6 (10)	7.6 (10)
Yard waste	36.70	4.9	19.8	19.4		13.2	20.1	19.6
Plastics				5.7		8.9	7.3	7.3
Food waste		12.2	6.0		4.0	7.7	8.9	6.6
Other							10.8	10.5
							TOTAL	100.0

(1) City and County of Honolulu, Oahu Solid Waste Management Plan, prepared by GMP Associates, Inc., May 1983, p. 3-27.

(2) County of Kauai, Department of Public Works, Resource Recovery From Solid Wastes - Phase 1, July 1982, p. 4-18.

(3) Ibid., p. 4-15

(4) City and County of Honolulu, Refuse Division, 1984.

(5) Interview with Stan Timmerman, Consultant, Hayden/Wegman, September 29, 1988.

(6) Broward County, Resource Recovery Office, Broward County Resource Recovery Project: Waste Characterization Study, prepared by Cal Recovery Systems, Inc., February 1988, p. 12.

(7) U.S., Environmental Protection Agency, Characterization of Municipal Solid Waste in the United States, 1960 to 2000 (Update 1988) Final Report, prepared by Franklin Associates, Ltd., March 1988.

(8) Estimated by Resource Conservation Consultants.

(9) Total includes other non-ferrous metals which are not itemized.

(10) Glass containers only, not all glass products.

Table 3.2

Comparison of 1987 and 1988 Exports

Secondary Material	1987 Exports	Annualized 1988 Exports	Percent Change
Waste paper (tons)			
Newspaper	5,649	5,820	+ 3
Corrugated	21,528	25,653	+ 19
High grade papers	2,781	7,598	+ 174
Mixed/other	<u>2,271</u>	<u>2,307</u>	+ 2
	32,229	41,378	+ 28
Ferrous scrap (tons)	16,591	8,194	- 51
Non-ferrous scrap (pounds)			
Aluminum cans	2,545,803	411,001	- 84
Other non-ferrous scrap	<u>16,474,238</u>	<u>14,059,882</u>	- 15
	19,020,041	14,470,883	- 24

Source: Resource Conservation Consultants and U.S., Department of Commerce, U.S. Exports of Domestic and Foreign Merchandise by All Methods of Transportation--Commodity, Country and Customs District, 1987 and January-July 1988.

In addition to the domestic shipment information, interviews with Hawaii recycling firms determined that approximately 8,360,000 pounds of aluminum cans and 20 tons of glass containers were shipped to the West Coast in 1987.

Recycling efforts appear to be on the increase in Hawaii, particularly those targeting waste paper. As seen in Table 3.2, if materials are exported for the rest of 1988 at the same level as the first seven months, then waste paper shipments will rise 28 percent, to about 41,400 tons. Corrugated containers and high-grade paper shipments are primarily responsible for this anticipated increase. Corrugated container recycling is projected to rise by 19 percent in one year, to about 25,650 tons shipped in 1988. The recycling of high-grade paper is expected to jump 174 percent, from 2,781 to about 7,600 tons.

Although ferrous metal shipments are currently projected at half of what they were a year ago (as shown in Table 3.2), some caution is needed in interpreting the data. Most of the 16,591 tons shipped in 1987 was contained in one shipment. A similar shipment in 1988 could mean that overall ferrous metal shipments are increasing.

Table 3.2 shows an 84 percent decrease in aluminum can recycling, but many cans are being shipped domestically. The export data for this material should not be taken to reflect the level of recycling.

Recycling rates. A commonly used measure of recycling levels is the recycling rate. The equation is:

$$\text{Recycling Rate} = \frac{\text{Tons Recycled}}{\text{Tons Recycled} + \text{Tons Disposed}}$$

Table 3.3 estimates recycling rates in Hawaii and compares them to national figures. The data on disposed waste and recycling rates for Hawaii are merely *estimates*. First, the consultants calculated the total waste disposed. Then, the estimates of waste composition for Hawaii (shown in Table 3.1) were used to calculate individual material tonnages. The lack of firm data on waste generation and waste composition in Hawaii can create inaccurate projections. This especially applies to the recycling rate for aluminum cans. Small changes in waste quantities or composition for that material can greatly affect the recycling rate.

In Hawaii, recycling of aluminum cans is highest, with 5,453 tons, or an estimated 32 percent of the state's cans, being recycled. Corrugated containers are the next most recycled item, with a recycling rate of 19.4 percent. Newspapers rank third with a 6.4 percent recycling rate.

Hawaii's recycling rates for all cited materials are lower than the estimated national recycling rates, although the state's rate for aluminum cans is comparable to other states without beverage container deposit laws. Table 3.3 does not include data on ferrous scrap metal recycling since that involves primarily industrial wastes that are not included in municipal solid waste estimates.

For comparison, Table 3.4 notes the recycling rates in nine other countries. Hawaii's aluminum can rate falls within the 18 to 40 percent rate shown in the table. Its paper and glass recycling rates fall far short of the 29 to 51 percent rates for paper and the 12 to 53 percent rates for glass.

It appears that large quantities of recyclable materials are being disposed of in Hawaii. The following chapters present information that may help foster increased recycling in the state.

Table 3.3

RECYCLING RATES

Material	Hawaii 1986-87			Estimated U.S. Recycling Rate (percent)
	Estimated Amount Disposed (tons) (1)	Estimated Amount Recycled (tons) (2)	Estimated Recycling Rate (percent)	
Newspaper	83,045	5,649	6.4	27-33
Corrugated	89,352	21,528	19.4	40-45
Other paper	242,827	5,122	2.1	unknown
Tin cans	18,922	0	0	5-10
Aluminum cans	11,563	5,453	32.0	50-54 (3)
Glass containers	79,891	20	<0.1	15-20 (3)
Yard waste	206,035	0	0	unknown
Plastics	76,738	0	0	0-1
Food waste	69,379	0	0	0
Other	110,376	0	0	unknown
TOTAL	1,051,200	37,772	3.5	unknown

(1) Total waste disposed is based on data from the counties of Honolulu and Hawaii, with estimates for Kauai and Maui.

(2) Estimates based on interviews and other data presented throughout the chapter.

(3) The nationwide figure combines the recycling rates in states with beverage deposit laws and those with no deposits. Recycling rates in states without deposits are about 30-35 percent for aluminum cans and 10-15 percent for glass containers.

Source: Resource Conservation Consultants.

Table 3.4

Recycling Rates for Aluminum, Paper,
and Glass in Selected Countries (1985)

Country	Percent		
	Aluminum (1)	Paper (2)	Glass (3)
Austria	22	44	38
France	25	34	26
Italy	36	30 (4)	25
Japan	32	51 (4)	17 (2)
Netherlands	40	46	53
Sweden	18	42	20
Switzerland	21	43	46
United Kingdom	23	29	12
West Germany	34	40	39

(1) Includes industrial recycling.

(2) Data for 1984.

(3) In Europe most of the glass is refillable; recycling rates apply only to nonrefillables.

(4) Data for 1983.

Source: Pollock, Cynthia, Mining Urban Wastes: The Potential for Recycling, Washington, D.C., Worldwatch Institute, 1987, p. 26.

Chapter 4

MARKET CONDITIONS FOR HAWAII

Introduction

Markets are the mills and manufacturing plants that convert recycled materials into new products. This chapter discusses the market conditions for each of the major recyclable materials, current collection and processing practices, and the economics of recycling each material.

Market conditions reflect primarily the relationship between supply and demand. When the supply of recyclable materials exceeds orders placed by the consuming mills, the price paid by mills will fall; when the supply lags behind the demand, the price offered by mills will rise.

Recycling markets are also sensitive to fluctuations in the overall United States economy and to international events. For example, the 1988 Summer Olympics led to a reduction in waste paper exports to South Korea when it banned traffic in many areas during the summer games, leading to the closure of paper recycling mills.

Summary of Findings

The analysis showed that viable markets exist for six secondary materials from Hawaii. Three are waste paper products: newspapers, corrugated containers, and high-grade paper. The others are aluminum cans, tin cans, and glass containers. There are no viable markets for mixed waste paper, plastics, and yard wastes.

Waste Paper

General market conditions. Foreign countries, especially in Asia, play a significant role for the U.S. waste paper industry. As shown in Table 4.1, the Asian export markets, which include the ones used by Hawaii, have nearly doubled their share of total U.S. waste paper exports--from 37.9 percent in 1976 to 66.5 percent in 1986. During this same period, waste paper consumption by Far East and Oceania mills has grown 480 percent, from 482,500 tons to 2.5 million tons per year. This healthy market outlook for waste paper from Hawaii is augmented by the demand from California, Oregon, and Washington, displayed in Table 4.2.

TABLE 4.1

GROWTH IN WASTE PAPER
EXPORT MARKET SERVING HAWAII (1)
(thousand short tons)

<u>Year</u>	<u>Exports</u>	<u>Change from Previous Year (%)</u>	<u>Percent of Total U.S. Exports (2)</u>
1976	482.5	+ 23.6	37.9
1977	653.8	+ 35.5	43.2
1978	770.9	+ 17.9	48.2
1979	970.5	+ 25.9	43.5
1980	1,147.9	+ 18.3	43.1
1981	1,124.3	- 2.1	50.8
1982	1,257.4	+ 11.8	59.1
1983	1,519.9	+ 20.9	59.1
1984	2,051.9	+ 35.0	63.4
1985	2,088.3	+ 1.8	63.6
1986	2,492.4	+ 19.4	66.5

(1) Far East and Oceania countries.

(2) Percent of total U.S. waste paper exports represented by shipments to Far East and Oceania.

Sources: Resource Conservation Consultants and American Paper Institute, 1986 Annual Statistical Summary: Waste Paper Usage, June 1987, p. 44.

Newspapers. Market conditions. The demand for newspapers is good, despite the estimated 15 percent decline in Oregon's consumption between 1986 and 1990 seen in Table 4.2. This lessened demand was due to a company's plan to use magazines in place of newspaper in its newsprint mills. Now, the company's executives report that the plan may not go into effect.

Collection and processing. The principal source of old newspapers is the household. Many newspapers are discarded at other locations, such as at work, on the bus or in a restaurant, but the vast majority of old newspapers is generated from homes.

Collection techniques therefore focus on acquiring old newspapers from residents. Residents may take newspapers to a recycling site, such as a drop-off location for a charitable organization fundraising drive. They may sell their newspapers to a buyer, although this is not very common due to the small amount of material generated by a single household. Groups sponsoring charitable causes, such as soccer teams and school bands, may go door to door to collect newspapers. In hundreds of U.S. cities, newspapers are collected from the curbside as part of municipal recycling programs.

TABLE 4.2

ESTIMATED AND PLANNED WASTE PAPER
CONSUMPTION IN STATES SERVING
HAWAIIAN DEALERS
(thousand short tons)

<u>Grade</u>	<u>Actual 1986</u>	<u>Estimated 1987</u>	<u>Estimated 1988</u>	<u>Planned 1990</u>	<u>Percent Change 1986-1990</u>
Newspaper					
California	305	300	305	311	+ 2
Oregon	314	310	308	266	-15
Washington	<u>22</u>	<u>23</u>	<u>23</u>	<u>23</u>	+ 5
Total	641	633	636	602	- 6
Corrugated					
California	1,141	1,256	1,307	1,337	+17
Oregon	388	395	408	447	+15
Washington	<u>86</u>	<u>96</u>	<u>97</u>	<u>100</u>	+16
Total	1,615	1,747	1,812	1,884	+17
High grade papers(1)					
California	165	170	183	193	+17
Oregon	86	91	88	88	+ 2
Washington	<u>46</u>	<u>32</u>	<u>27</u>	<u>26</u>	-43
Total	297	293	298	307	+ 3
Mixed/other					
California	125	126	134	136	+ 4
Oregon	0	0	0	77	---
Washington	<u>32</u>	<u>29</u>	<u>31</u>	<u>32</u>	0
Total	157	155	165	245	+56

(1) Includes de-ink high grades and pulp substitutes. Pulp substitutes represent about 80 percent of the consumption of this combined grade.

Sources: Resource Conservation Consultants and American Paper Institute Capacity Survey, November 1987, pp. 25-27.

Old newspapers are sold to waste paper dealers who usually bale them for shipment to an end user. The baler compresses the fiber into a compact cube strapped with wire. The bale is then stored until loaded into a shipping container.

Economics of recycling. Table 4.3 shows that the price Hawaii processors paid to the public for old newspapers stayed within a small range during the first three quarters of 1988. Waste paper prices overall were higher in the first two quarters, declining in the second half of the year. As can be seen in the table, shipping is the processor's major cost in getting the material to market, between \$30 and \$100 per ton. Shipping costs can exceed the price paid to the processor by the mill, estimated to be between \$60 and \$100 per ton. If shipping costs are too high, recycling becomes unprofitable.

TABLE 4.3
ECONOMICS OF NEWSPAPER RECYCLING
IN HAWAII, 1988

	<u>Dollars per Ton</u>
Price paid to the public for loose paper (1)	30 - 40
Cost of processing (2)	20 - 35
Typical shipping cost (3)	30 - 100
Price paid to the processor (4)	60 - 100

-
- (1) Survey of buyers by Resource Conservation Consultants.
 - (2) Fibre Market News, December 9, 1988, p. 3.
 - (3) From interviews with shipping lines by Resource Conservation Consultants. Some mills pay the freight to ship waste paper from Oahu to the mill.
 - (4) Waste paper prices for the period as reported in Official Board Market and from results of the interviews by Resource Conservation Consultants.

Corrugated containers. Market conditions. As shown in Table 4.2, there is strong demand for corrugated containers in all three West Coast states. Total corrugated container consumption is expected to increase 17 percent over a four-year period, from 1.6 million tons in 1986 to a projected 1.9 million tons in 1990.

Collection and processing. In contrast to waste newspaper, the vast majority of corrugated containers are generated from wholesale and retail sectors, such as shopping malls, distribution centers, and warehouses.

The recycling of corrugated containers focuses on diverting them from commercial wastes. Locations generating a large number of boxes use a small baler to compact and strap them into

a bundle for easy shipping. Other businesses use a special drop box for old corrugated containers. Often a compactor is attached to the drop box. The drop box is then taken to a waste paper packing operation for unloading and baling. Smaller generators use the recycling services of an individual or a waste hauler.

A growing trend is to sort commercial waste loads that primarily contain corrugated containers by removing the boxes for baling and sending the remaining waste to a landfill. For instance, two Honolulu waste paper processors occasionally sort commercial wastes.

Economics of recycling. Table 4.4 indicates that the processor's cost of baling and shipping the secondary fibers is a major cost element in the recycling of corrugated containers. As in the case of newspapers, shipping costs to some locations can exceed all other costs combined.

TABLE 4.4
ECONOMICS OF CORRUGATED CONTAINER RECYCLING
IN HAWAII, 1988

	<u>Dollars per Ton</u>
Price paid to the public for loose containers (1)	40 - 60
Cost of processing (2)	20 - 35
Shipping cost (3)	30 - 100
Price paid to the processor (4)	80 - 110

-
- (1) Survey of buyers by Resource Conservation Consultants.
 - (2) Fibre Market News, December 9, 1988, p. 3.
 - (3) From interviews with shipping lines by Resource Conservation Consultants. Some mills pay the freight to ship waste paper from Oahu to the mill.
 - (4) Waste paper prices for the period as reported in Official Board Market and from results of the interviews by Resource Conservation Consultants.

High-grade paper. Market conditions. There is an increasing demand for high-grade paper, especially in California where consumption is projected to increase 17 percent, from 165,000 tons in 1986 to 193,000 tons in 1990.

Collection and processing. High-grade waste paper is commonly produced where business machines operate, such as in computing centers and in print shops. A sizable amount of high-grade printing, writing and computing paper is generated by offices. Little is discarded by homeowners.

Collection techniques entail removing the high-grade waste paper from the generator's site and getting it to a processor. Some high volume generators, such as large print shops or major

computer operations, receive collection services from waste paper processors. In other cases, small entrepreneurs provide collection services, and sell the material to established waste paper dealers. Finally, some businesses haul their waste paper directly to the processor for sale.

As with other forms of waste paper, the high-grade paper is processed into a bale which is stored before shipment to a consuming mill.

Economics of recycling. Table 4.5 indicates that the value of white ledger waste paper, which is a major component of high-grade paper, is about double that of old newspapers and corrugated containers. In 1988, it was estimated to be between \$150 and \$190 per ton. (The price paid to the public for colored ledger was about \$40 to \$80 per ton during the same period, and computer printout collectors received about \$150 to \$160 per ton.) With the high price of white ledger, shipping costs are not as much of an obstacle to recycling as in the case of old newspapers and corrugated containers.

TABLE 4.5
ECONOMICS OF WHITE LEDGER PAPER RECYCLING
IN HAWAII, 1988

	<u>Dollars per Ton</u>
Price paid to the public for loose white ledger (1)	80 - 120
Cost of porcessing (2)	20 - 35
Shipping cost (3)	30 - 100
Price paid to the processor (4)	150 - 190

-
- (1) Survey of buyers by Resource Conservation Consultants.
 - (2) Fibre Market News, December 9, 1988, p. 3.
 - (3) From interviews with shipping lines by Resource Conservation Consultants. Some foreign mills pay the freight to ship waste paper from Oahu to the mill.
 - (4) Waste paper prices for the period as reported in Official Board Market and from results of the interviews by Resource Conservation Consultants.

Scrap Metals

The majority of metals recycled in Hawaii are from industrial and other sources, such as old automobiles, that do not generally contribute to municipal solid waste. Several processors collect and ship these metals. In addition, there is a market for non-municipal scrap metals in Hawaii. Hawaiian Western Steel, employing 91 people, is an industrial facility that consumes scrap steel to produce a limited number of products.

Distinct from the non-municipal scrap metals described above, municipal solid waste contains two recyclable metal products--aluminum cans and tin-coated steel cans.

Aluminum cans. Market conditions. Nationally, demand is very strong for aluminum cans which are the most valuable of the residential waste materials. The major buyers of old aluminum cans are aluminum manufacturers, namely Reynolds Metals and Alcoa. Each year, about 1.2 billion pounds of aluminum cans are recycled in the United States. The aluminum can market from Hawaii is strong, with no lessening of demand in sight.

Collection and processing. The principal sources of aluminum cans are residences, recreational areas and roadsides, and commercial establishments--such as cafeterias, hotels, restaurants, and bars--where canned beverages are sold and consumed.

Aluminum cans are collected in a variety of ways. Children pick up and sell cans to raise money. Individuals or families establish collection routes as a means of earning a partial or full income. Youth groups and other organizations needing funds operate can recycling drives.

All these techniques are used in Hawaii. In other parts of the U.S., a growing number of communities also pick up aluminum at the curbside as part of residential collection programs.

The principal buyer and shipper of scrap cans in Hawaii is Reynolds Aluminum Recycling Company, a subsidiary of Reynolds Metals. This firm operates three permanent buying sites and 16 mobile recycling locations where a trailer and employee are placed at a convenient location for the purchase of cans. Fourteen mobile sites are on Oahu, one is on Maui and one is on Kauai.

Many Hawaii firms that purchase and process industrial scrap metals also buy aluminum cans from the public. And, the state's major waste paper packers purchase cans.

Scrap aluminum cans are first processed using a magnetic separator to remove any steel cans. The aluminum cans are then compacted in some manner, such as using a flattener to increase density. Aluminum cans may also be briquetted (formed into a dense brick), shredded (cut into popcorn-like pieces), or baled (compressed into a large block).

Most cans recovered in Hawaii are shipped by Reynolds to California in flattened or baled form. The scrap metal is off-loaded and shipped to a secondary smelter for melting. The ensuing ingot is then formed into coils of can sheet for reuse. Some new can sheet is returned to Oahu, where Reynolds operates a can manufacturing plant.

Economics of recycling. Table 4.6 indicates that the price paid to Hawaii's aluminum can collectors in Fall 1988 was approximately 60 percent of its wholesale value on the mainland. Shipping costs to California were only about 6 percent of the value of the material, because of the high price it commands.

TABLE 4.6

ECONOMICS OF SCRAP ALUMINUM CAN RECYCLING
IN HAWAII, FALL 1988

	<u>Cents per Pound</u>
Price paid by Hawaiian buyers (1)	40 - 50
Cost of processing and inter-island transport	5 - 10
Shipping cost to the mainland (2)	3.5 - 5.5
Wholesale price (3)	65 - 73

-
- (1) Survey of buyers by Resource Conservation Consultants. Some buyers offer price premiums according to the weight of a load.
- (2) Reynolds Aluminum Recycling Company.
- (3) Buying price for processed used aluminum beverage cans in carload lots, American Metal Market.

At about 27 cans per pound, Hawaii's recycling collectors received approximately 1.5 cents per can in 1988, although prices have declined in the last several months. The relatively high value of scrap aluminum makes aluminum can recycling the most potentially successful of the targeted secondary materials.

Tin cans. Market conditions. There is a steady and growing demand for scrap tin cans. The nation's two largest detinners are building new plants, one in New Jersey and one in Texas. A detinning plant strips the tin from the steel and both materials are then recycled.

In Hawaii, tin cans from commercial and residential sources are not being recycled. Hawaiian Western Steel uses a small amount of post-industrial tin can scrap to make tin ingots, but the company does not want or need commercial and residential tin cans.

However, MRI Corporation is interested in buying residentially and commercially generated tin cans from Hawaii. MRI operates plants in Seattle, Washington and Coolidge, Arizona. It estimates that demand for tin cans from Hawaii would be approximately 60,000 tons per year. These tin cans could be processed at MRI's Arizona plant.

Collection and processing. Tin cans are generated wherever food is prepared, including homes, restaurants and school kitchens. The recycling methods are very basic: the generator of the tin cans takes them to a recycling location, such as a drop-off recycling center, or a collector comes to the home or business to collect the cans.

Because most tin cans must be detinned, they cannot be packed into a very dense form before shipping; the caustic solution used to strip the tin from the steel would not be able to reach all tin surfaces. The tin is removed from the solution using an electrolytic process and formed into an ingot for sale. The steel is baled and sold to a steel mill as a top grade of scrap.

Economics of recycling. An interview with MRI's West Coast recycling executive indicated that a price of \$31 per ton could be offered for loads ready to ship from the Honolulu dock. Cans would need to be delabeled, cleaned, and loosely baled. This processing would cost about \$20 per ton. The cans would have to be in 20-ton minimum shipments.

Glass containers. Market conditions. Nationwide market conditions for glass containers have improved. According to the Glass Packaging Institute, a trade group, more than 90 glass container plants buy old bottles and jars and demand exceeds supply by more than 200 percent.

Few glass containers are currently collected for recycling in the islands, although markets are available for the material, as shown in Table 4.7. Seventeen glass container plants operate on the West Coast, consuming 595,000 tons per year, with a potential demand as large as 1.6 million tons per year.

TABLE 4.7

GLASS CONTAINER DEMAND ON WEST COAST

	<u>No. of Mills</u>	<u>Present Use (tons)</u>	<u>Total Demand</u>
California	15	514,000	1,488,000 (1)
Oregon	1	44,580	67,200 (2)
Washington	1	36,000	72,000 (2)
TOTAL	17	594,580	1,627,200

(1) California's total annual output of new glass containers is 2,480,000 tons. One major manufacturer has stated that 70 to 75 percent cullet could be used in their batch mix. Other manufacturers may have constraints that limit them to a lower percentage of cullet in the batch mix. At 60 percent of cullet use, California cullet demand would be 1,488,000 tons annually.

(2) Based on manufacturer's stated ability to use 60 percent cullet in the production process.

Collection and processing. Glass bottles and jars are generated wherever food is prepared and beverages consumed, including homes, restaurants, bars, and recreation sites.

In Hawaii, the principal recycling technique is the collection of glass containers from commercial establishments by individuals and families.

Many other states have additional recycling techniques. Drop-off recycling centers often accept glass containers from the public. Buy-back recycling centers purchase glass bottles from the public. Hundreds of curbside recycling collection programs pick up glass containers.

Typically, the glass containers must be kept separate by color and then crushed. Broken containers--called cullet--are shipped by a variety of methods. From Hawaii, the common methods are loading of cullet into open-topped overseas containers or placement of cullet into large, pallet-size boxes for loading into closed-van overseas containers.

At glass container manufacturing plants, cullet is often processed to remove metals. The material is then fed along with virgin materials into a glassmaking furnace.

Economics of recycling. Until recently, the economics of glass container recycling from Hawaii were poor. As shown in Table 4.8, glass container collectors were paid only \$10 to \$20 per ton (or about one-half cent to one cent per bottle). In comparison to some of the other secondary materials, the value of cullet is low. For instance, a U.S. Department of Commerce study estimated the value of pure glassmaking raw materials at \$90 to \$100 per ton, delivered to the glass container plant.

TABLE 4.8

ECONOMICS OF GLASS CONTAINER RECYCLING
IN HAWAII, FALL 1988

	<u>Dollars per Ton</u>
Price paid by Hawaiian buyers (1)	10 - 20
Shipping cost to Portland, Oregon (2)	25 - 30
Value at the glass container plant (3)	40 - 60

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- (1) Survey of buyers by Resource Conservation Consultants. Price paid for clean, color-sorted glass containers.
 - (2) Results of consultant survey.
 - (3) Owens-Illinois, Portland, Oregon. For cullet containing rings and lids.

The low level of glass container recycling in the state may soon change. Owens-Brockway, the world's largest user of scrap glass containers and operator of four West Coast recycling plants, wants to increase its efforts in Hawaii. The firm intends to pay \$88 per ton for containers shipped to its Vernon, California plant. The firm has negotiated a new rate (\$20 per ton) with a shipping line. Company officials feel that Hawaii scrap processors can offer about \$40 per ton to the public under this new pricing and shipping system. The company is establishing a recycling network on Oahu, working with existing recycling processors.

Owens-Brockway contends that much of the new glass container volume from Hawaii will come from the commercial sector, including bottles and jars picked up by collectors from hotels, restaurants, and bars.

Materials Presently Lacking Viable Markets

Market research was also undertaken for mixed waste paper, scrap plastics, and yard waste compost.

Mixed waste paper. Though increasing, the demand for mixed waste paper is poor. Mills pay little for this grade of waste paper, often just \$20 to \$30 per ton. Consumption by mills in California, Oregon, and Washington was 157,000 tons in 1986 and is projected to reach 245,000 tons in 1990. Supply in the region far exceeds demand for this grade of paper.

Plastics. Plastics are a growing element of solid waste, and many states are interested in developing the recycling of plastic materials. Historically, industrial plastic scrap has been recycled, and in recent years the focus has been on recycling commercial and residential waste plastics. The only consistent recycling of commercial and residential plastics has been the recycling of plastic soft drink bottles in states with beverage container deposit laws. Markets for other commercial and residential waste plastics are very limited, especially for Hawaii.

Yard wastes. The recycling of yard wastes is underway in some U.S. communities and is being studied in many others. However, this material does not fall into the traditional definition of recycling. The material most often is composted for use as a soil amendment or mulch to be sold to local markets. National and international markets for this product are not accessible. As such, the material does not rely on manufacturing processes and markets associated with materials recycling.

Chapter 5

RECYCLING CONSTRAINTS IN HAWAII

This chapter examines some general constraints to recycling which affect all recyclable materials in Hawaii, and those constraints specific to each recyclable material.

Summary of Findings

The major general constraints to recycling in Hawaii are shipping costs, lack of population density, the cost of doing business, the lack of collection and recovery systems, and the low cost of disposing of garbage.

There are also specific barriers that impede the recycling of selected materials. For waste newspapers and corrugated containers, the volatility in mill prices and shipping rates are significant hurdles. The inability to operate baling plants cost-effectively on the Neighbor Islands limits recycling of corrugated containers to Oahu. The recycling of additional quantities of high-grade waste paper is impeded by the dispersed nature of the supply.

The principal barrier to recycling aluminum and tin cans and glass containers is the problem of increasing recycling levels among the tourist population. Glass containers and tin cans have a relatively low value and may not be perceived as recyclable.

General Recycling Constraints

Shipping factors. The cost of shipping secondary materials to end users from Hawaii is the most significant impediment to growth in recycling business. Recycling in the state would be substantially higher if shipping costs were closer to transportation costs on the mainland. Shipping rates between Hawaii and Asia are comparable to those between the West Coast and Asia. However, unlike recycling businesses on the mainland, recycling operations in Hawaii will always incur shipping costs. For example, a California waste paper dealer has the option of hauling old newspaper to a paper mill within the state or shipping it overseas. With no in-state end users, Hawaii recycling operators are at the mercy of the shipping rates. Tables 5.1 and 5.2 portray the rates for shipping various waste paper and aluminum materials to foreign markets. Depending on destination, these range from \$925 to \$2,729 per container of waste paper and \$970 to \$2,336 per container of aluminum cans. These rates are not regulated by the State.

TABLE 5.1

SHIPPING COSTS FOR WASTE PAPER FROM THE PORT OF HONOLULU
(40-foot container)

<u>Destination</u>	<u>Shipping Rate (1)</u> <u>(\$ per container)</u>	<u>Currency</u> <u>Adjustment (%)</u>	<u>Total</u> <u>(\$ per container)</u>
Hong Kong	925	0	925
Japan	785 - 1,310	32	1,036 - 1,792
S. Korea	925	7	990 - 2,729 (2)
Philippines	1,175	0	1,175
Taiwan	925 - 950	8	999 - 1,026
Bangkok, Thailand	1,675 - 2,075	0	1,175 - 2,075
Los Angeles, CA	928	0	1,048 (3)

(1) The ranges reflect different destinations within the same country and different companies' rates as of October 1988.

(2) The higher price includes a \$1,739 transshipment charge.

(3) Includes \$21.20 wharfage fee in Honolulu and \$99.99 wharfage fee in Los Angeles.

Sources: Matson Navigation Co.
Sea Land Service

TABLE 5.2

SHIPPING COSTS FOR ALUMINUM CANS FROM THE PORT OF HONOLULU
(40-foot container)

<u>Destination</u>	<u>Shipping Rate (1)</u> <u>(\$ per container)</u>	<u>Currency</u> <u>Adjustment (%)</u>	<u>Total</u> <u>(\$ per container)</u>
Hong Kong	1,300	0	1,300
Japan	1,060 - 1,770	32	1,339 - 2,336
S. Korea	1,200	7	1,284
Taiwan	970	0	970
Los Angeles, CA	1,066	0	1,360 (2)

- (1) The ranges reflect different destinations within the same country and different companies' rates as of October 1988.
- (2) Includes \$21.20 wharfage fee in Honolulu and \$273 wharfage fee in Los Angeles.

Sources: Matson Navigation Co.
Sea Land Service

These costs are compounded by the cost of shipping materials from the Neighbor Islands to Honolulu for reloading onto Asia- or mainland-bound ships. This cost limits recycling efforts on the Neighbor Islands. Matson uses its own barges for inter-island shipping and charges an additional \$1,030 for exports originating from Hawaii and an extra \$950 for exports originating from Kauai or Maui, in addition to the rates shown in Tables 5.1 and 5.2. Another company, Sea Land Service, uses Young Brothers Barge Co. for inter-island transport prior to ocean trips. Young Brothers is the only barge company operating in Hawaii. Its rates are shown in Table 5.3.

TABLE 5.3

BARGE RATES TO HONOLULU

<u>Point of Origin</u>	<u>40 ft. Container</u>	<u>20 ft. Container</u>
Hawaii (Hilo)	\$ 747.94	\$ 373.97
Hawaii (Kona)	827.14	413.57
Kauai	678.05	339.02
Maui	678.05	339.02

Source: Sea Land Service, as of October 1988.

The State Public Utilities Commission has jurisdiction over intrastate motor carrier and barge traffic, including rate setting. Approval of the rates is based on the rate of return, which for inter-island shipping is now 13 percent.

Lack of population density. The state's relatively small and dispersed population is also an impediment to increased recycling. The ability to efficiently and effectively acquire and move recyclable waste materials to market is hindered by population size and location. This is particularly true for the Neighbor Islands. In certain resort areas, there may be sufficient quantities of recyclables to warrant recycling, but overall economics are reduced when, for instance, those areas are as distant as Hilo and Kona.

The relatively small population also affects the demand for recycled materials. Glass container plants around the country, for example, are sited where there is a large nearby outlet for their finished product--glass bottles and jars. Hawaii's demand for finished products is not sufficiently large to sustain manufacturing industries that would use recyclable materials. Thus, for the foreseeable future, Hawaii recycling efforts will rely on out-of-state end users to recycle their waste materials.

Overall operating costs. Interviews with recycling processors indicate that the cost of doing business in Hawaii is relatively high. Land and facility costs exceed comparable mainland costs

and the State's high employment rate reduces the ability to secure workers. Workers compensation rates are also a major cost of doing business. One waste paper processor noted that the firm's compensation rate was \$35 per \$100 of payroll.

Although similar conditions exist for many other Hawaii businesses compared to their mainland counterparts, the difficulty in recycling is that the Hawaii operators must compete in the same markets with other recycling operators whose costs are lower. Hawaii recycling companies have to operate on a smaller margin. As an example, a waste paper dealer in Oregon may use some of the revenues from the sale of high-grade paper to establish a collection route to pick up the material from office buildings. In Hawaii, revenues may be used entirely to process and ship the material. Collection of paper from offices may be left to individuals who deliver it to the waste paper dealer for the door price.

Lack of collection and processing systems. In Hawaii, there is generally a lack of collection systems to gather recyclable materials, whether residentially or commercially generated. Recycling drop-off and buy-back facilities for residential materials are not readily available, and collection programs are not offered to increase the convenience of recycling to residents. This is partially a result of other constraints, such as overall operating costs, dispersed population, and lack of municipal programs. Nearly all residential recycling collection systems in the U.S. are a result of municipal action (either in operating the collection service directly or aiding its development). This type of action has not occurred in Hawaii.

Organized collection activities are few even in the commercial sector. Commercial recycling systems are constrained by the density of buildings, lack of storage space, and high cost of land. Traffic congestion in Honolulu also limits efficient commercial recycling collection.

In many states, recycling processors depend on industrial customers for large volumes of clean, segregated scrap material. This industrial recycling activity forms an infrastructure upon which residential and commercial recycling can be established. But while Hawaii's dominant economic sectors--agriculture and tourism--generate some opportunities for recycling from industry and business, the lack of a more sizable manufacturing sector reduces opportunities for scrap processors.

Low solid waste management costs. Overall, Hawaii's solid waste management costs are low. Disposal costs in Honolulu are comparable to such costs in other metropolitan areas, but may be low when cost-of-living is factored in. Disposal costs on the Neighbor Islands are substantially lower than in Honolulu. These low costs, even when collection costs are factored in, make garbage costs a small part of any business's or household's operating costs. Thus, there is little motivation for waste generators to recycle in order to reduce their garbage costs.

The same conditions are true in other U.S. cities. However, increased attention to the environmental costs of improper solid waste disposal is changing the scene. Regulations that require landfill operations to mitigate environmental problems by installation of liners, collection and treatment of leachate (polluted water that comes out of landfills), and monitoring of groundwater increase the cost of solid waste disposal. Some states require that money be set aside during the life of a landfill to ensure its proper closure and maintenance after closure. And, the planning of replacement facilities, be they landfills, composting operations or other alternative waste management techniques, adds to solid waste management costs. As solid waste issues receive increasing attention in Hawaii, activities such as the above will likely increase local disposal costs.

Low public awareness. A final constraint that affects all recycling efforts in Hawaii is the lack of public awareness about recycling. Hawaii residents are not exposed to regular advertising or education about the benefits of recycling. The lack of available recycling collection systems also limits public awareness about recycling opportunities.

Material-Specific Constraints

Newspaper. The waste newspaper market is extremely volatile. For example, the price paid for newspapers fell in October and November. Demand softened in several countries and a supply glut was generated by new recycling efforts on the East Coast.

Waste paper shipments from Honolulu to Asian ports previously cost more than shipments from West Coast ports, but this is no longer the case. However, Hawaii waste paper firms report that shipping lines and conferences change rates frequently. Too, the currency adjustments employed by some foreign countries add a surcharge onto waste paper shipments to those countries.

Corrugated containers. The market for old corrugated containers rises and falls rapidly. This limits the ability of collectors and processors to establish and maintain reliable service levels.

In addition, a major problem on the Neighbor Islands is the need to densely compact corrugated containers. The least expensive baler produces bales at half the density desired by shipping lines. There is insufficient volume to warrant installing more sophisticated processing equipment. Therefore, much of the grocery store corrugated waste collected outside of Oahu must be shipped to high-volume horizontal balers in Honolulu. (See earlier section on inter-island shipping costs.)

High-grade paper. In addition to the waste paper market's volatility, high-grade waste paper recycling is impeded by the dispersed way it is generated. Many offices are housed in multi-tenant

structures. There is little incentive to collect the small amount of waste paper from one office. Service might be feasible if all offices in the building took part, but organizing such a joint project is difficult and time consuming.

Some forms of high-grade waste paper are becoming less recyclable. The advent of laser printing has required significant changes in waste paper collection, sorting, and marketing.

Aluminum. The recycling of tourist-generated used aluminum beverage cans is difficult. Some visitors might want to prepare secondary materials for recycling but few efforts have been targeted at these generators.

Tin cans. The principal limitation to increased tin can recycling from Hawaii is its low price. The costs of collection, storage, container loading, and trucking to the dock exceed the scrap metal's value.

Glass containers. The historic low price offered for glass containers in Hawaii limits recycling opportunities. According to the Glass Packaging Institute, a price of about \$40 per ton paid to the public is needed to attract glass recycling collectors. This estimate is supported by the recent Hawaii marketing effort of Owens-Brockway.

Because of the low level of glass container recycling in the state, the public's awareness of glass container recycling, as well as tin can recycling, is limited in comparison to newspaper and aluminum can recycling. In addition to an improved recycling market, increased glass container and tin can recycling will require stepped up promotion activities.

Chapter 6

REPRESENTATIVE STATE RECYCLING PROGRAMS

This chapter presents case studies of state recycling programs in Florida, Iowa, Minnesota, New Jersey, Oregon, and Rhode Island to highlight activities which may be useful or applicable to Hawaii.

Florida is portrayed because of its recent comprehensive recycling legislation and because of its similarities to Hawaii in its tourist economy and groundwater contamination concerns. Iowa, like Hawaii, has a sparse population, very few urban centers, and concerns about groundwater contamination. Minnesota was selected because of its unique dual strategy for urban and rural counties. New Jersey was chosen as an example of mandatory recycling. Oregon has a multifaceted program including special transportation regulations which can mitigate high shipping costs in areas distant from recycling markets. Rhode Island shows what direct state action can accomplish.

Florida

Florida has a land area of about 54,000 square miles and a population of approximately 12 million, concentrated mostly in urban areas. Roughly 90 percent of Florida's drinking water comes from the groundwater supply and contamination is a serious concern. Though state and local governments previously were not active in recycling, Florida became a major player with the passage of Senate Bill 1192 in June 1988.

Regulation. The new Florida law sets a 30 percent recycling goal for the state and prescribes the same goal for county waste management plans. Counties must have a recycling program in place by July 1989 with newspapers, aluminum cans, glass containers, and plastic bottles included. Composting is encouraged and yard waste will be banned from landfills by December 1991. Other materials will be banned sooner: used motor oil by September 1988, lead-acid batteries by December 1988, tires by June 1989, and appliances by December 1989. (See details about used oil recycling in Chapter 8.)

The beverage container industry is pushed toward recycling with the threat of a disposal fee to be placed in advance on the sale of packaging if a packaging material (e.g., glass, paper, plastic) does not achieve a 50 percent recycling rate by October 1989.

Numerous other provisions of the law address environmental, health, or aesthetic concerns--such as pull tabs on aluminum beverage cans and polystyrene foam made with chlorofluorocarbons--but do not bear directly on recycling.

Financial support. The state has appropriated \$26 million in grant funds to help local governments cover the capital and temporary operating costs of the new recycling and education programs. In addition, counties with less than 30,000 population will each receive \$25,000 annually for solid waste and recycling activities, and \$750,000 will be reserved in FY 1988-89 for awards to local governments that have instituted recycling programs meeting certain guidelines.

Processors and manufacturers will be eligible for a sales tax exemption on purchases of recycling equipment.

Recycled product procurement. State agencies are required to substitute recycled content products for virgin content products when reasonably priced.

The Department of Commerce will provide state businesses and industries with information on the benefits of using recycled materials.

Technical assistance and education. The Department of Commerce will help the recycling industry by identifying domestic and export markets and by preparing an annual report assessing the state recycling industry and state recycling markets.

The Department of Agriculture will look at potential markets for compost.

The Florida law instructs school boards to provide elementary and secondary schools with a recycling curriculum. The Department of Education must develop curriculum materials and resource guides for a recycling awareness program in elementary, middle, and high schools.

Iowa

Iowa is a state of 2.9 million people with a land area of 56,000 square miles and no significant landfill capacity problem. The impetus for recycling is related in large part to concerns with groundwater protection. In 1987, Iowa passed the Groundwater Protection Act which established waste management priorities: waste reduction, recycling and reuse, energy recovery, combustion, and landfilling. The act also contains a unique approach to waste abatement and recycling described below. Part of the act's intent is to encourage development of new, non-polluting solid waste disposal technologies. The act is being held up by some as model legislation.

Regulation. Because of groundwater concerns, all cities, counties, and private agencies applying for landfill permits in Iowa must submit a solid waste management plan that includes discussion of the extent to which solid waste is or could be recycled.

The waste abatement section of the Groundwater Protection Act gives the state power to review packaging to determine whether it is compatible with alternative methods of solid waste management and with solid waste management policy. Though the law is vaguely worded, it appears that recycling qualifies as an alternative method and the law could apply to packaging that is not recyclable.

The law sets up a procedure whereby complaints about products or packaging are directed to the Department of Natural Resources (DNR). The director of the department can order the manufacturer to prepare an abatement plan within a specific time period.

Financial support. The Groundwater Protection Act appropriates \$7.5 million for demonstration projects focusing on landfill alternatives, including recycling programs. This program and other state recycling activities are funded primarily through a \$.25 per ton surcharge at the landfill.

Iowa recently disbursed almost \$1 million in recycling grants: \$120,000 for a landfill-based recycling center, \$15,000 to educate citizens in two towns about composting methods, \$375,000 for a mixed waste recovery facility, \$394,000 for two composting facilities, and \$92,000 for a plastic recycling program.

Used oil collection projects are authorized, and funds are appropriated for research and education projects on alternative oil disposal methods.

Technical assistance and education. A recycling directory is being prepared for distribution to municipalities and others that want to start municipal recycling programs.

Through the Groundwater Protection Act, a small business assistance center has been set up at the state university to help businesses deal with their hazardous wastes and to help them follow the waste management priorities established in the legislation. This program has been enthusiastically received, according to a DNR official.

The state is just beginning educational efforts. In January 1989, DNR will hold the first of several workshops focusing on recycling and other aspects of solid waste management. The first workshop is aimed primarily at local government officials and solid waste professionals. Subsequent workshops will be tailored more to the general public.

Minnesota

Minnesota, a state of approximately 4.3 million people with a land area of 80,000 square miles, has been active in recycling. State recycling goals are 25 percent recycling of municipal solid waste, 12 percent composting, and 10 percent source reduction. Two state agencies, the

Minnesota Waste Management Board and the Minnesota Pollution Control Agency (MPCA) have been active in recycling. (The governor recently announced that the Waste Management Board will be merged into the MPCA.)

Regulation. Minnesota counties requesting landfill permits are required to have a solid waste plan that includes recycling, resource recovery, composting, and waste reduction. Minnesota is unique by treating its urban and rural counties differently in terms of recycling. Seven metropolitan counties, overseen by the Metropolitan Council, are required to achieve 16 percent waste abatement through recycling and composting. The seven counties have been given the power to mandate recycling programs in cities and to require citizen participation.

Recent amendments to the state's Solid Waste Management Act of 1980 prohibit the sale of plastic cans and ban yard waste from landfills. In addition, the Waste Management Board is required to adopt rules for coding plastic containers by resin type, so that they can be more easily identified for recycling. The amendments also require state offices to provide space for recyclable materials.

Financial support. Minnesota has a wide variety of grant and loan programs. Bond funding is the usual funding mechanism. The Waste Management Board's Solid Waste Reduction and Separation Program provides funds to recycling, yard waste collection, and public education projects which have 50 percent matching funds. A Demonstration Program gives grants and loans to counties, cities, and solid waste management districts for recycling, composting, or special waste stream facilities. The program was initiated in 1987 with \$4.4 million. Composting and recycling projects also are eligible for a Capital Assistance Program, funded at \$10.5 million in 1987.

Market development. The Waste Management Board also has been active in market development funding. Its largest project has been a tire disposal and recycling facility. Minnesota was the first state to develop a comprehensive program to deal with the problem of tire disposal. Rubber Research Elastomerics (RRE) in Babbitt, Minnesota got its start with joint support from St. Louis County and several state agencies. The county owns the land, building and equipment, and contracts with RRE for operation and maintenance of the plant. One of the advantages of the project is that it aids a rural, economically disadvantaged area.

The project had three sources of financing: the Waste Management Board and another state agency gave the county a combined \$786,412 in grants; the county issued \$1.2 million in general obligation bonds; and the Iron Range Resources and Rehabilitation Board and the Minnesota Energy and Economic Development Authority loaned the county \$750,000. The Waste Management Board also gave the firm a \$580,000 low-interest loan for equipment purchases, and the City of Babbitt gave the firm a \$500,000 line of credit.

RRE began operating in March 1987. The firm grinds and shreds whole scrap tires and manufacturing scrap into one-inch pieces, removes metal and other unwanted materials, and blends the raw rubber product with polymers and curatives to produce a product called Tirecycle. The product is sold in sheet or crumb form to manufacturers of rubber products.

The plant, designed to handle 4 million tires annually, has not yet reached its potential. Currently only 750,000 tires are processed annually. Because RRE's tire recycling technology is new, the long term capability of the plant is not yet known.

The board also has allocated \$200,000 for feasibility studies for market development for designated materials. Thus far, the board has issued requests for proposals for a feasibility study for a plastics processing or recycling plant and a waste oil management facility.

Technical assistance and education. The Waste Management Board has produced a recyclable materials market directory for use by recycling programs and is assembling information to aid state and local governments in locating and procuring recycled content products.

The board coordinates educational activities concerning solid and hazardous waste and is organizing a clearinghouse of waste education materials.

New Jersey

New Jersey, a state of 7,500 square miles, has a population of about 7.5 million with most residents living in municipalities of less than 70,000 population. The state is nationally recognized for its far reaching, pioneering recycling efforts. Impetus for recycling is New Jersey's severe disposal space shortage driving tipping fees in some areas to over \$100 a ton.

Implementation has been two-phased. During the first phase, a financial and institutional support structure was created to help local governments start recycling programs. The second phase of the program, now in effect, requires county and municipal governments, residents, and businesses to undertake specified recycling activities.

Key elements of New Jersey's program are:

- creation of a recycling office,
- the New Jersey Recycling Act,
- the Mandatory Statewide Source Separation and Recycling Act, and
- a recycling equipment loan program.

Institutional support. The New Jersey Office of Recycling administers the state's recycling efforts. It administers recycling programs, drafts legislation, offers technical assistance, undertakes promotion activities, and acts as a clearinghouse for recycling information. It works

with and provides organizational support for the New Jersey Recycling Forum, a non-profit group of recycling interests in the state. This arrangement is credited with facilitating enactment of recycling legislation and with strengthening the state's recycling infrastructure. This group has worked to provide a balance between private and public provision of recycling services.

In 1984, Governor Kean instituted a requirement that all state offices, including colleges and universities, implement a high-grade paper recycling program.

Regulation. *The New Jersey Recycling Act.* This act, effective January 1, 1981, made recycling an integral part of the state's waste management policy. The act levied a recycling tax, about \$.40 per ton of waste accepted, on the owner or operator of every sanitary landfill facility in the state. Money raised through the surcharge is distributed in the following manner:

- 45 percent in tonnage grants to cities,
- 20 percent for low-interest loans to recycling operators,
- 15 percent for publicity and education activities, and
- 10 percent for state administrative expenses.

During the first year, tonnage grants were awarded to cities for each ton of material recycled from their solid waste streams, up to \$25 per ton. The base grant amount was \$7.12 per ton. Since then, awards have been based on tonnage recycled over and above the previous year's totals.

Tonnage grants provide an incentive for cities to expand their recycling programs, with the state Office of Recycling providing technical assistance to design effective programs. A useful by-product of the tonnage grant system is that it creates a database for the state to calculate waste generation and recycling rates. This database is useful in planning and designing waste disposal facilities.

The Mandatory Statewide Source Separation and Recycling Act. Enactment of this 1987 law illustrates the pattern of government pursuing an aggressive voluntary recycling effort followed by mandatory legislation. Once recycling opportunities were made available in many New Jersey communities, the state chose to make recycling a requirement for residents, businesses, and local governments. Enforcement and operation of recycling programs are the responsibility of counties and municipalities. The act also triples the landfill surcharge on solid waste from about \$.40 per ton to \$1.50 per ton. A total of \$7.8 million was immediately appropriated to help local governments start or improve their recycling programs. Noteworthy features of the legislation are:

1. Each county must:
 - adopt a recycling plan,
 - target three materials in its waste stream for source separation,

- develop a strategy for collection, marketing, and disposition of targeted recyclables, and
 - recycle 15 percent of its waste stream during the first year and 25 percent during the second year of the act's effective date.
2. Each municipality must:
- appoint a recycling coordinator,
 - pass an ordinance to compel residents and businesses to recycle targeted materials,
 - provide a recycling collection system, and
 - reject all permits and approvals for new residential, commercial, and industrial developments of a certain size that do not incorporate district recycling goals.

Financial support. New Jersey's mandatory recycling act puts responsibility for collection and marketing of materials on local governments. The act allocates 35 percent of recycling moneys to low-interest loans and loan guarantees to businesses, market development studies, and basic research aimed at increasing the demand for recyclables. The act also provides a tax credit to businesses worth 50 percent of the purchase price of recycling equipment. In addition, recycling equipment purchased by processors and end users has been exempt from the state's sales tax since 1981. The following sections examine New Jersey's recycling loan program and its funding of market development studies.

The New Jersey Recycling Loan Program. Since 1985, the state has made about \$5 million available each year to recycling businesses for fixed assets such as recycling equipment, professional engineering and architectural services, and research and development on new products or technologies. Businesses are eligible if they collect, process, or convert: paper, metals, glass, plastics, textiles, tires, food waste, motor oil, leaves, grass clippings, wood cuttings, asphalt, brick, or concrete. Awards range between \$50,000 and \$500,000 each. A loan may not exceed 90 percent of the eligible project cost nor more than 20 percent of a year's annual loan fund. Loans are repaid over a maximum 10-year period at three percentage points below the prime interest rate. By July 1988, 13 loans totalling \$2.8 million had been awarded.

Thus far, waste paper processors are the most frequent recipients of loans, using the money to buy \$150,000 to \$250,000 balers. The program is new so that generalizations are premature and data on effectiveness are limited. Still, a program administrator reports that most firms receiving loans had increased their capacity to process recyclables by 50 to 100 percent. Four of five recipients contacted stated that they would not have expanded operations or would have delayed expansion without the loans.

Successful loan applicants must meet a variety of criteria, including location and need for the project. Thus, the loan program can be used to bolster recycling in outlying areas that are underserved.

Market development studies. The mandatory recycling act made \$200,000 available for market development studies. The Office of Recycling has contracted for a study that, among other things, will examine the present and future supply and demand for specified recyclables. Results will help determine the list of materials that should be targeted for recycling and highlight areas where market development activities are needed. For example, the feasibility of marketing bi-metal or plastic beverage containers is under study. The results of the study may lead the state to fund research aimed at improving their recyclability or may lead to bans on these containers.

Technical assistance and education. Activities undertaken by the Office of Recycling include technical assistance to Atlantic City to examine the potential for recycling glass bottles and food waste generated by this resort city's many casinos, bars, and restaurants. The office undertakes many promotion activities which feature the "Recycling Makes \$ense" and "Give Your Trash a Second Chance" logos. To help municipal recycling coordinators, the state office holds recycling courses and works with area universities to provide recycling in their curricula.

Oregon

Three-quarters of Oregon's 2.5 million people are concentrated in a 100-mile long strip of land between its coastal and Cascade mountain ranges. The rest of the population is dispersed over the state's 96,000 square miles. The state has engaged in vigorous recycling activities, in part due to favorable market conditions for secondary materials. Local, regional, and Pacific Rim outlets are readily available.

The state government has played an active role in enhancing private sector recycling by supporting recycling markets with financial incentives and then strengthening and finally requiring a statewide recycling collection network. The result is that Oregon leads the nation in newspaper recycling (65 percent) and has high recycling rates for corrugated boxes, aluminum cans, and glass beverage containers.

Oregon has committed itself to enhancing recycling since the early 1970s. This commitment has been demonstrated in these ways:

- Dedication of personnel to the recycling program,
- Enactment of legislation aimed at providing most residents with the opportunity to recycle,
- Establishment of tax incentives to increase recycling,
- Implementation of promotion and education activities, and
- Use of transportation rate incentives.

Institutional support. The state has maintained a recycling office in its Department of Environmental Quality (DEQ) since the early 1970s. In 1973, it assumed the responsibility for providing statewide recycling information to residents. A telephone hotline was established so that individuals or businesses could obtain “where, when and how” recycling information. This has been augmented by a regional hotline that serves the state’s major metropolitan area.

DEQ’s recycling section (usually about six staff) has served as an idea center for recycling: generating legislation, coordinating the various actors involved in the state’s recycling network, providing technical assistance to recycling service providers and advocates, and undertaking promotion and education. The recycling section also reviews the required recycling plans submitted by local governments.

Regulation. The Oregon legislature has addressed recycling in a variety of ways, including planning requirements and a beverage container deposit system. This section will examine the legislation that requires local governments to establish recycling collection services.

The Opportunity to Recycle Act. Oregon is nationally known for the comprehensive recycling program established by its Opportunity to Recycle Act. This legislation was passed in 1983 and became effective on July 1, 1986. The act establishes priority methods for managing solid waste, putting the “three Rs”--reduce, reuse, and recycle--ahead of energy recovery and waste disposal. Its major requirement is that the “opportunity to recycle” be provided in three ways:

- Collection of recyclable materials at every waste disposal site or at an alternative more convenient location,
- On-route collection of recyclables at least once a month in cities of 4,000 or more, and
- Public education and promotion.

The law puts the onus on local governments and recycling service providers to make the recycling opportunity available. The law contains a provision for requiring citizen participation if the current program is not effective.

Key provisions of the rules for implementing the act include:

- A requirement that “wastesheds,” which are areas sharing solid waste disposal facilities, offer recycling programs that include plans for education and promotion. Wastesheds also are required to report program results to the state.
- A requirement that each wasteshed identify recyclable materials which can be collected and sold for recycling at a net cost equal to or less than the cost of refuse collection and disposal.
- Recognition that local governments retain primary authority for solid waste management.

It is generally agreed that the act has increased recycling activity and awareness in the state. The process of formulating the legislation and its rules served to strengthen the state's recycling infrastructure by drawing together diverse interests, focusing waste haulers attention, and providing a forum for information sharing.

Since the act was passed, the number of curbside programs in the state has increased from about five to over 100.

Financial support. Oregon has three investment tax credit programs that can be used by recycling businesses: one associated with energy savings, another with pollution control, and a third with the reclaiming of plastics. This discussion focuses on the energy savings tax credit administered by the state's Department of Energy, because it is the state's largest tax credit program.

The department's tax credit program, in effect since 1981, allows companies a tax credit of 35 percent of the cost of any equipment used solely for recycling. The credit is claimed against the state corporation tax over five years. Key rules for the program are: (1) equipment that qualifies can be purchased, leased, or modified and can be used to manufacture products from secondary materials or to process and collect recyclables; (2) The Department of Energy can approve a total of \$40 million in project costs each year for projects that recycle waste materials, conserve energy, or develop renewable resources; (3) of this, \$5 million is reserved for projects costing \$100,000 or less; (4) land and building purchase does not qualify for the credit; and (5) equipment may not be used for waste collection, handling scrap produced by the manufacturing process, or burning waste.

A variety of projects have been approved ranging from purchase of a recycling bin for a garbage truck costing \$660 to a \$14.3 million waste paper processing system. Other projects funded include a newspaper de-inking facility, a compost producing plant, and a plastic pelletizing operation. The most frequent investments are for crushing, storing, and transporting equipment.

In a survey conducted in 1988, at least half of tax credit recipients indicated that they would not have invested in new equipment without the credit. They also reported that purchase of the equipment directly increased the amount of material recycled by their companies. Most companies consider tonnage information proprietary, but 15 processors estimated that they recycled 216,000 more tons of material in 1987 than they would have without the tax credit. The program was recently renewed by the legislature for five more years. Applications have steadily increased since the program's inception.

Transportation rate incentives. Oregon has allowed approved "conservation programs" to ship materials at whatever rate they can negotiate with a trucker, rather than at the posted tariffs. This allows recycling collectors to make use of cheap backhaul arrangements.

Since this started in the late 1970s, 10 certificates have been issued. Several of these have been awarded to major end users of secondary materials. Since anyone shipping to a certified company can make use of the favorable rate, awards to end users have spread the benefits to many recycling companies.

Technical assistance and education. The DEQ has set education and promotion as one of its major recycling goals. It has:

1. Developed an in-school recycling curriculum. A contractor developed the curriculum which has been tested in selected school districts and explained to teachers through in-service training workshops.
2. Conducted an attitude survey of Oregonians to determine the major local motivations for recycling. This knowledge is used to devise effective promotion strategies.
3. Published a waste management newsletter which contains recycling information. *Beyond Waste* explains recycling legislation; publicizes recycling efforts by local governments, businesses, and others; and provides contact information.
4. Offered skill-building seminars to recycling operators on effective promotion techniques.
5. Undertaken periodic media campaigns in cooperation with local governments.

Rhode Island

Rhode Island, with 1,000 square miles, is the smallest state in the nation. The population of about 1 million is densely distributed in 39 municipalities. The state does not have county or regional governments. As a result, state government is more directly involved with operation of waste management services than is the norm in other areas. For example, the state controls about 90 percent of disposal space with one state-controlled landfill receiving 85 percent of Rhode Island's waste.

The state has enacted far-reaching recycling policies. Because of the small population and area, program oversight by state government is manageable.

Rhode Island shows the evolution from support to regulation found in other states, although in Rhode Island the time lag between these two approaches has been short. Rhode Island's formal recycling efforts are only four years old. Its mandatory recycling legislation is effective in 1989.

Institutional support. OSCAR, an acronym for Ocean State Cleanup and Recycling, was established in 1984 as a statewide program to enhance recycling and litter cleanup efforts in the state. A grants program was developed that awarded about \$250,000 to several municipalities,

non-profit firms, and a few private recycling companies. OSCAR also was charged with developing the state's mandatory recycling legislation. It worked with a university environmental studies program to develop policies.

Materials recovery facility. The state has established a materials recovery facility at its major landfill, contracting its operation to a private company. This facility provides processing capacity and a marketing center for recycling collection programs established by municipalities.

Regulation. The Litter Control and Recycling Act, passed in 1984, created OSCAR and provides a funding mechanism for its programs, placing a five-cent litter tax on each case of beer and soda sold for distribution in the state.

The Mandatory Recycling Act, passed in 1985, sets a goal that 15 percent of Rhode Island's solid waste be diverted by recycling. The heart of the act is a provision that requires every city and town to separate solid waste into recyclable and non-recyclable components before disposal at a state-controlled facility. Other key provisions are:

- Municipalities must collect newspaper, glass containers, scrap metal, and some plastics from residents,
- The state will pay for initial purchase of collection equipment,
- Municipalities may unload commingled recyclables free at any state-operated materials recovery facility, and
- Recycling facilities are exempt from sales or property tax.

In addition, the act requires commercial establishments and institutions to separate all grades of office paper and corrugated containers by January 1, 1989. Restaurants and bars must separate glass and aluminum containers. All businesses must submit a recycling plan to the state by mid-1990. To help businesses comply with the law, the state is sponsoring workshops, cooperating with chambers of commerce, and providing technical assistance.

Financial support. The state has established three funding mechanisms for its recycling program. The litter tax on beer and soda is used to fund OSCAR's promotion and technical assistance activities. A surcharge imposed on landfill fees is projected to generate \$30 million over a six year period. It provides a funding base for residential recycling programs. (Businesses must fund their own programs.) If necessary, the state will issue bonds to support its recycling program.

Technical assistance and education. In addition, OSCAR provides ongoing recycling promotion that includes a school curriculum program and technical assistance to towns, recycling service providers, and businesses.

Chapter 7

RECOMMENDED STRATEGIES FOR HAWAII

Recycling efforts could be enhanced in Hawaii by state involvement. This section recommends actions the State could undertake to overcome some of the constraints identified in Chapter 5.

Some recycling firms operate successfully in Hawaii. They know the markets for materials and deal regularly with the high costs of their processing operations and shipping requirements. Over the years, their businesses have expanded. However, large quantities of recyclable materials are being disposed of daily in Hawaii landfills.

Hawaii shares the same conditions as many other states: there is a basic infrastructure for recycling but it is not sufficiently developed to achieve its full potential in reducing solid waste.

The state could follow the lead of states such as Rhode Island and New Jersey by mandating recycling services and the use of those services by their citizens. However, major developments in recycling could be accomplished by aggressive state actions to enhance the existing recycling infrastructure. These actions include institutional and financial support, technical assistance, education, the provision of government facilities, strengthening solid waste management programs, providing funding, lowering shipping rates, and setting goals.

Institutional Support

The State should establish a recycling office. The actions described below need coordination to be successful. An office reflects the State's commitment to recycling and becomes a focal point for activities.

It is recommended that the recycling office be established in the solid waste section of the Department of Health. The major benefits of recycling derive to the State in the area of solid waste, and recycling should be an integral element of the State's solid waste management program.

Financial Support

A major factor limiting the expansion of recycling by the existing firms is economics. The high operating and shipping costs relative to the revenue received leave little money for companies to expand. State support could have a direct and significant impact here.

Financial assistance from the State can take the form of loans, grants, and tax credits for collection equipment, including storage containers and trucks; processing equipment, such as balers and crushers; and land or facilities.

In general, capital funding, in contrast to ongoing operational support, may be sufficient. However, for certain materials whose economics are especially troublesome, ongoing operational financing may be desirable. For example, the State (or local governments) might consider paying recycling operators on a per-ton basis for the recycling of glass containers or tin cans. In effect, the recycling operators would receive a credit for diverting the material from disposal. The funds would offset recycling collection and processing costs.

Technical Assistance

A major activity of the proposed recycling office should be technical assistance in developing recycling services. Experienced personnel could help owners and managers of offices, restaurants, hotels, and apartment/condominium complexes set up recycling programs. The assistance could include analyzing the waste materials generated by an establishment, advising the manager about how to collect and store recyclables, and providing a list of recycling companies or individuals that could collect the materials. Workshops could train managers and maintenance personnel in recycling techniques.

The recycling office could monitor market changes; for instance, if a feasible market for Hawaii plastics emerged, the office could alert collectors.

The State could also conduct research and development. For example, the collection constraints posed by dense commercial developments in parts of the State, especially Honolulu, require creative solutions. The State could direct some resources (personnel or financial) to designing storage and handling techniques for these problem areas.

Research is also needed on the packaging of crushed glass for shipment. The recent development of glass container recycling in Hawaii has not yet addressed the problems in loading and unloading the material. The palletized Gaylord containers (large cardboard boxes on wooden pallets) now require a great deal of handling. Bulk loading has its own problems.

Education

The State should provide a telephone hotline to be the central recycling information source for the public like the litter hotline. The hotline would be responsible for maintaining data on all recycling firms in the State and disseminating that information to the public.

The State should aggressively promote recycling through advertising and in-school education. The State should inform residents and businesses of the need to recycle and the opportunities to do so. Such activities must be ongoing to change disposal practices.

Hawaii's educational structure lends itself to adoption and easy implementation of a curriculum about recycling. The Department of Education should develop requirements for recycling education and prepare and/or distribute materials to accomplish this.

Provide Government Facilities

To address the shortage of recycling facilities convenient to the public, the State should encourage the development of drop-off centers on public land, such as at waste transfer stations. Both the State and counties could provide space, at low or no cost, to civic organizations to receive recycling materials from the public.

Strengthened Solid Waste Management Program

Progressive management of solid waste, which places a priority on recycling and provides for strong environmental regulation of waste disposal practices, has been a catalyst to increased recycling in many states. When the true costs of waste management are realized (including planning, current operations, replacement facility costs, and environmental protection), recycling becomes a more cost-effective solid waste management function.

Hawaii should examine its regulations on the issuance of permits, monitoring, and enforcement of disposal facilities to ensure that they are adequate. For example, the Department of Health could require recycling services at new waste disposal operations as a condition of granting a permit. The State should take an active role in requiring counties to plan their future waste management practices.

Funding

Funding for these activities could come from a number of sources. Certain sources are more directly tied to solid waste and can reinforce the policy of internalizing the true cost of waste management. For example, the State could raise its permit fees on disposal sites. The State could impose a per-ton (or cubic yard) landfill surcharge, as in Iowa and New Jersey. If the counties were to charge residents and businesses for the use of disposal sites, the state-imposed fees could be reflected in the user charges. Charging citizens directly for waste disposal could also provide an incentive for people to recycle.

Another source would be Florida's method of taxing certain products (e.g., packaging) if a stipulated recycling rate is not achieved. This method--called advance disposal fee--provides a direct stimulus for industry development of recycling efforts and provides a means of funding state activities if private programs are insufficient.

Shipping Rates

The State does not have jurisdiction over interstate commerce or foreign shipments. However, state officials can join with recycling firms in seeking cooperation from shipping lines to moderate rates on recyclable commodities.

For intrastate shipments, the State can and should take a much more active role. The Public Utilities Commission should develop a discounted rate for inter-island shipment of recyclables as a way to improve the economics of recycling on the Neighbor Islands. Young Brothers was granted a lower rate for shipping island-grown agricultural products between the islands. The reasoning was that a lower rate would, in the long run, result in more shipments by stimulating the industry. The same rationale is applicable to recycling.

Goals

The State should establish recycling goals and commit the resources necessary to attain them. Hawaii should aim to achieve the national average recycling rates (see Table 3.3 in Chapter 3). This would mean a significant increase in current recycling (from about a one-third increase for aluminum cans to a 15-fold improvement for glass containers). Overall, the State should adopt the U.S. EPA-recommended target of 25 percent recycling.

The programs outlined above are recommended first steps towards those goals. They will require an aggressive, concerted effort by the State, counties, recycling industry, businesses, and citizens to recycle waste materials.

Chapter 8

USED OIL RECYCLING

Introduction

The improper disposal of used motor oil and problems in developing collection systems for recycling is of concern to the Hawaii Legislature, particularly the question of what liability is assumed by collectors of used motor oil generated by do-it-yourself oil changers. Federal regulation of used oil as a hazardous waste has created uncertainty for handlers of used oil and the issue is not yet resolved.

This chapter describes used motor oil practices in Hawaii and the efforts to address problems with disposal and recycling of the material. Programs developed in other states are discussed and the programs most suited to Hawaii are presented.

Summary of Findings

Most of the used oil generated by those who change their own oil is not recycled, thereby causing a threat to the environment and wasting a valuable resource.

Liability concerns, scarcity of collection facilities, lack of knowledge about recycling, and recycling costs pose barriers to increased recycling. However, markets do exist for used motor oil, so the aim of state action should be to reduce the constraints.

Background Information

Used motor oil is lubricating oil from motor vehicle crankcases that has become dirty through use and is no longer desirable as a lubricant.

The improper disposal of used motor oil--such as pouring it on the ground or into a storm sewer, stream, or drain--threatens public health, damages the environment, and wastes a valuable resource. Improper used oil disposal may expose humans to lead and other toxic or carcinogenic substances. Skin contact with used oil may also cause cancer. A less dangerous but nonetheless unpleasant result of improperly disposed oil is bad tasting drinking water. The U.S. Environmental Protection Agency (EPA) has determined that one quart of oil will foul the taste of 250,000 gallons of water.

Improperly disposed oil pollutes the environment. Oil causes oxygen depleting organisms to proliferate in surface water, eventually killing fish and other aquatic lifeforms. When used oil is spread on the ground, the productivity of soil declines.

Improperly disposed oil is wasted, since used oil can be processed for reuse as a lubricant or burned as fuel oil. Rerefining oil is also more energy efficient than producing new refined oil from crude oil.

Hawaii's used oil management structure. Hawaii currently has a used oil recycling program that has had limited success in mitigating the state's used oil problem.

Legislation. The Used Oil Transport, Recycling, and Disposal Act became law in 1987 and was amended in 1988. This law prohibits improper disposal of used oil into sewers, drainage systems, surface or ground water, water courses, and the ocean. Disposal on the ground is only allowed with the approval of the State and landowners. The law requires vehicles transporting used oil to have identification and a permit, and gives the Department of Health (DOH) the right to recordkeeping, sampling, and testing of used oil and used oil products. A permit is required to transport, market, or recycle used oil, and transporters are required to give a signed voucher to both the person collected from and the person accepting the oil. The department is creating administrative rules to implement this law.

Used oil advisory committee. A Used Oil Advisory Committee was formed in 1986 by DOH, the Department of Planning and Economic Development, and the Office of Environmental Quality Control. It includes representatives from these agencies and organizations and businesses. The committee seeks long-term solutions to the problem of used oil management and the proper handling and recycling of used oil. The Hawaii Automotive and Retail Gasoline Dealers Association (HARGDA) has been the most active member of the committee.

Voluntary used oil recycling program. A voluntary used oil recycling program for oil changers includes a used oil hotline and the coordination of collection centers at service stations. The hotline is operated by HARGDA under contract to the State. It handles five to ten calls a day, mostly asking for the closest place to take used oil.

HARGDA also coordinates collection centers. The organization recruits service stations to become used oil collection points. On the island of Oahu, approximately 30 service stations collect used oil from oil changers. Neighbor Island service stations are not involved in the program due to liability concerns and costs. Since the program is voluntary, the service varies by station. Some service stations charge oil changers between \$.25 and \$1.00 per deposit, while others do not.

Used oil that is collected from individual oil changers and generated by service stations is collected by used oil transporters. The material is processed by less than half a dozen companies on Oahu which sell used oil as a fuel to industrial clients. There is no rerefining (treatment of oil to be used again for lubrication purposes) of used motor oil in Hawaii.

The current system for collecting used oil from oil changers serves those who are sufficiently motivated to recycle the material. It has created a basic infrastructure and beginning level of awareness about the importance of used oil recycling. However, it is not used by the majority of oil changers who generate used oil. The system would need to be greatly expanded and further developed if it is to reach more oil changers.

Methods of used oil management in other states. Programs have developed around the country to address used oil disposal issues. Historical events, such as the oil crisis of the late 1970s, and technological and legislative factors have all contributed to used oil recycling programs. Due to the lack of effective federal legislation, states have developed varying regulations, collection programs, and end-use policies for used motor oil.

A major debate is whether used motor oil should be declared a hazardous waste by the EPA. Initially, this agency exempted used motor oil from hazardous waste regulations since liability issues relating to hazardous wastes were viewed as a barrier to recycling. However, a federal court has ruled that the EPA must reevaluate its decision to exempt used oil.

Program design options. Used oil recycling programs in the U.S. include components common to all recycling programs, such as public education. They vary most dramatically by legislation and collection system design.

Legislation. Used oil recycling programs are either mandated by state law or are voluntary. Both approaches have examples which have proved effective in the past. States that mandate used oil recycling often declare the material to be a hazardous waste, and their programs are structured to deal with the implications of hazardous waste storage, treatment, transportation, and liability.

Some voluntary programs have been relatively successful. However, they face increasing difficulty in dealing with the issue of liability. Service stations and recycling centers are unlikely to want to assume the liability for hazardous waste generated by others.

Collection system design. Four basic types of used oil collection methods are used in state programs:

- Drop-off at service stations or other businesses,
- Drop-off at a dedicated recycling or collection site,
- Curbside collection, and
- Designated drop-off days at specific locations.

These methods are common to voluntary as well as mandatory programs, and a used oil recycling program for oil changers often uses more than one method.

The first method, collection at service stations or retail stores selling motor oil, is used frequently. These collection centers accept small quantities of used oil, usually no more than five gallons, and store it for removal by a used oil collection service. Depending on local market forces and applicable state laws, the collection center may or may not charge for accepting used oil from oil changers.

Drop-off at dedicated recycling or collection sites requires used oil storage containers to be deposited at appropriate locations such as community recycling centers and municipal facilities. Containers are clearly marked and often are monitored by municipal personnel to prevent contamination of collected oil.

The third method for used oil collection is curbside collection. Containers (usually plastic jugs) are often provided for oil changers to store used oil until collection. The vehicles used for curbside collection vary. Generally, small tanks are attached to the vehicles and used oil is poured into the tank at the curbside. A rack may also be installed on a vehicle to carry used oil in containers until it is transferred to a storage tank.

The fourth collection method is for used oil to be dropped off on certain days at a specified location. Used oil drop-off is often included in "Household Hazardous Waste Days," when special collection centers accept hazardous and hard-to-dispose wastes.

State recycling programs. Regulatory requirements and the status of used oil recycling programs vary from state to state. As is shown in Table 8.1, nearly all states regulate used oil. Fourteen states have regulations stricter than those set by EPA, and only seven states have no regulation at all. Nine states regulate used oil as a hazardous waste, independent from EPA policies. Twenty-eight states have used oil recycling programs for oil changers at the state level, and an additional 14 states have programs at the local level without state assistance. Only 12 of the state level programs are active.

As seen in Table 8.1, state programs vary greatly. Many states have addressed the management of used oil with legislation and have created used oil recycling programs for oil changers. Often the programs do not operate as designed and do not adequately address the problem of improper used oil disposal. Many of the state programs are not actually in operation. Overall, few states have successfully implemented their used oil recycling program.

TABLE 8.1: STATE USED OIL RECYCLING PROGRAMS

STATE	PROGRAM DESCRIPTION									
	REGULATIONS EQUIVALENT TO EPA ON USED OIL	REGULATIONS STRICTER THAN EPA ON USED OIL	NO REGULATIONS ON USED OIL	USED OIL REGULATED AS HAZ. WASTE	STATE-WIDE DIY USED OIL RECYCLING PROGRAM		LOCAL DIY USED OIL RECYCLING PROGRAMS		REQUIRED PARTICIPATION	
					P*	A*	P*	A*	S*	L*
Alabama		
Alaska	.						.	.		
Arizona	.									
Arkansas	.									
California		
Colorado	.									
Connecticut		
Delaware			.		.		.			
Florida	.				.		.			
Georgia				
Hawaii		
Idaho			.				.			
Illinois			
Indiana	.						.	.		
Iowa		
Kansas	.						.			
Kentucky	.				.		.			
Louisiana	.						.			
Maine			
Maryland		
Massachusetts			
Michigan			

* P means there is a program present; A means the program is active; S = State; L = Local.

SOURCE: Adapted from draft US EPA document, "State Regulation/Program for Used Oil", October 1988, prepared by Versar, Inc.

TABLE 8.1 CONTINUED: STATE USED OIL RECYCLING PROGRAMS

STATE	PROGRAM DESCRIPTION									
	REGULATIONS EQUIVALENT TO EPA ON USED OIL	REGULATIONS STRICTER THAN EPA ON USED OIL	NO REGULATIONS ON USED OIL	USED OIL REGULATED AS HAZ. WASTE	STATE-WIDE DIY USED OIL RECYCLING PROGRAM		LOCAL DIY USED OIL RECYCLING PROGRAMS		REQUIRED PARTICIPATION	
					P *	A *	P *	A *	S *	L *
Minnesota		
Mississippi	.				.					
Missouri			
Montana	.									
Nebraska	.				.		.			
Nevada		
New Hampshire			.				.			
New Jersey		
New Mexico	.						.			
New York				
North Carolina	.				.		.			
North Dakota	.				.		.			
Ohio	.									
Oklahoma	.									
Oregon		
Pennsylvania		
Rhode Island				
South Carolina		.		.						
South Dakota	.									
Tennessee			.				.			
Texas	.						.			
Utah	.						.			
Vermont			
Virginia				
Washington		
Washington DC			.				.			
West Virginia	.				.		.			
Wisconsin		.					.			
Wyoming		.					.			

* P means program present, A means active program, S=State, L =Local.

Hawaii Used Oil Generation and Recycling Rates¹

Based upon 1986 estimates, Hawaii imports 5 million gallons of lubricating oil annually. Commercial uses--such as agriculture, construction, transportation, manufacturing, aviation, and government--accounted for 3 million gallons. The remaining 2 million gallons were sold to the general public through retail and automotive outlets.

Over half of the 2 million gallons sold to the general public was drained from automobile crankcases by individual oil changers, and an additional 500,000 gallons was changed by service stations. The remainder of the oil sold to the public was assumed lost in the operation of the vehicle (i.e., burned in or leaked from the engine) or is unused and in storage.

Disposal of used oil. Used oil generated by oil changers is disposed in various ways. The methods include appropriate means such as recycling and inappropriate means such as ground disposal or discharge into water.

Most of the approximately 1 million gallons of used motor oil generated annually by individual oil changers is not being recycled. Several different methods are used to dispose of the material:

- Appropriate methods, which include taking the used oil to a gas station, leaving it at a military base for recycling, and reusing it as a lubricant;
- Inappropriate methods, which include dumping used oil on the ground, throwing it in a sewer, and burning; and
- Other methods, which include putting used oil in the garbage and reusing it for purposes other than lubrication.

Disposal of an estimated 1,121,000 gallons per year of used oil generated by oil changers is broken down as:

- Appropriate methods--331,000 gallons (30%),
- Inappropriate methods--359,000 gallons (32%), and
- Other methods--431,000 gallons (38%).

“Other methods” may be legal means of used oil disposal, but they are not necessarily environmentally or economically acceptable. These figures indicate that nearly 800,000 gallons of used oil from individual oil changers may be improperly disposed each year.

Market Conditions for Hawaii Used Oil Recycling

Markets for used oil in Hawaii appear to be sufficient and expanding. A possible economic constraint to used oil recycling is the relative price of virgin oil. Markets want to pay less for used oil than for virgin oil. If the price of used oil increases relative to virgin oil, it becomes less desirable.

The major economic disincentive for service stations to accept oil from oil changers is the \$.20 to \$.75 per gallon they must pay to have the oil removed from the station. The further the used oil must be hauled, the higher the charge. In addition, accepting used oil contributes to normal business operating expenses in terms of the time spent dealing with the matter.

For the oil transporter/processor, the economics are brighter. These companies are paid by service stations and also sell used oil to end markets for \$.25 to \$.30 a gallon after cleaning it.

Constraints on Used Oil Recycling in Hawaii

Liability. As in other states, the hazardous waste status of used oil is in question until the EPA's final decision. Until this issue is decided, it is unlikely that additional collection centers will assume the potential liability for used oil. If the EPA decides that the material is hazardous, existing centers will be jeopardized unless the State acts to minimize liability.

Lack of collection centers. There are only 30 used oil collection centers in the State, and they are all on Oahu. This means that at least 25 percent of the state's population does not even have the opportunity to recycle used oil. Lack of convenient sites to deposit used motor oil reduces any incentive for residents to recycle their oil.

Lack of education. The public lacks awareness about the problem of used oil disposal and the availability of recycling. The majority of those interviewed in a survey of 600 did not know what service stations did with used oil or what the potential uses were. Most did not know where to take used oil for recycling.²

Costs and lack of funding. The cost of disposing of used oil may pose a barrier to recycling. A recent survey revealed that less than half of do-it-yourself oil changers would definitely be willing to pay an oil disposal fee of \$1.³ The \$.20 to \$.75 disposal cost may also dissuade some service stations from accepting used oil.

Review of Selected State Programs

Several states have developed programs to address the constraints Hawaii faces. There are two basic approaches: legislative action--as in Florida, California and Rhode Island; and voluntary program development--as in Alabama, Michigan and Virginia. In addition, programs may regulate used oil as a hazardous waste or as a non-hazardous waste.

Florida. The State of Florida has adopted legislation concerning used oil recycling as part of its 1988 Solid Waste Act. This act prohibits the following activities: (1) handling of used oil which endangers public health or welfare, (2) discharge of used oil into specific environmental media, (3) landfill disposal of used oil, (4) mixing used oil with hazardous substances, and (5) using

used oil for road oiling, dust control or weed abatement. It requires used oil transporters, collection facilities and recyclers to register annually with the Department of Environmental Regulation. And it authorizes the department to regulate used oil as a hazardous waste.

The law includes enforcement measures and penalties for noncompliance. All fees, fines and penalties assessed will be deposited into a Solid Waste Management Trust Fund.

Liability. The law is original in its approach to liability for the generation, transportation, and disposal of used oil. It states that: "No person may recover from the owner or operator of a used oil collection center any costs of response action resulting from a release of either used oil or a hazardous substance...."⁴ If certain conditions are met, collection center operators are not held liable for the release or disposal of hazardous waste due to their used oil collection activities.

Collection. The law requires the establishment of public used oil collection centers, technical assistance for the creation of these centers, and annual reporting by each center. There are incentive programs for oil changers to return their used oil to a collection center, including discount or prize coupons, prize drawings, promotional giveaways, and other activities.

Other programs. The law requires other programs to be developed, including public education and procurement of recycled oil products by government agencies.

Funding. The law establishes a grant program for local government projects. Possible projects include curbside used oil collection services, retrofitting of existing equipment to promote disposal of used oil, publicly operated collection centers at municipal facilities, and the provision of containers to the public for storage of used oil.

California. California also has comprehensive legislation. In addition to some common prohibitions on the disposal of used oil (e.g., by discharge into sewers and drainage systems), the law prohibits incineration, burning, and the use of used oil as a dust suppressant or weed control agent.

Liability. In California, used oil is considered a hazardous waste. Existing laws define the methods for handling, storing, and using such wastes. The used oil recycling act also has requirements for the collection, storage, recycling, use, and disposal of used oil. The act requires transporters of used oil to register as hazardous waste haulers and to complete annual reports. It also prohibits persons who generate, collect, or transport used oil from contaminating or accepting contaminated used oil. Penalties include revocation of permits and denial of employment by a permitted recycler or hauler for one year.

The law exempts persons who receive used oil in small quantities (less than 20 gallons per shipment and five gallons per container) and who do not transport the oil from being required

to have a hazardous waste facility permit. Small quantity generators and operators of curbside collection vehicles are also exempted. This is an attempt to deal with used oil as a hazardous waste yet exempt individual oil changers and collection agents from strict regulatory requirements.

Collection. The California used oil program has been relatively successful. Currently, the program is capturing approximately 40 percent of the available used oil for recycling. The program includes drop-off centers as well as curbside collection services.

Another factor of special interest is the presence of an oil rerefiner. In addition to processing used oil to be used as fuel, one company rerefines used oil for use as an engine lubricant.

Education and promotion. The California Waste Management Board promotes used oil recycling through public awareness programs. It is active in market development, maintains a hotline, and compiles an annual used oil recycling report.

Rhode Island. Like Florida and California, Rhode Island has a state law concerning used oil recycling. The Rhode Island Used Oil Recycling Act states that it is the policy of the state to encourage the collection and recycling of used oil to the maximum extent possible, by means which are economically feasible and environmentally sound.

Collection. The most interesting part of the law concerns collection facilities. Rhode Island's motor vehicle inspection facilities, and any other facilities the Rhode Island Department of Environmental Management deems appropriate, are designated as collection centers for free used oil drop-offs.

The state and local communities cooperate to encourage service station participation in used oil collection programs. The state will provide each community with an oil "igloo" which is designed for low maintenance. This program requires the monitoring of used oil deposits, notification of spills, container security, oil removal, and sampling.

The law also covers the sale and state procurement of recycled oil products.

Education. The law defines prohibited means of disposal and requires a public education program. The education program includes signs to be posted at businesses selling oil which inform the public of prohibitions on the disposal of used oil. The education program also encourages the labeling of oil containers to inform users of proper collection and disposal practices.

Alabama. Alabama's voluntary program, Project ROSE (Recycled Oil Saves Energy), is a cooperative effort between the University of Alabama and the state which began in 1977. The program seeks to increase public awareness of the hazards of dumping used oil, and to organize

a convenient used oil recycling network for individual communities. The greatest strengths of Project ROSE are its public education efforts and the use of volunteer community organizations.

Project ROSE has elements that may be applicable to Hawaii. The program is free and easy for oil changers. It is an excellent example of public education that effectively reaches the mostly rural population of Alabama. Project ROSE also demonstrates the successful use of academic resources, and cooperation between the University of Alabama and the state.

Liability. The possibility of EPA designation of used oil as a hazardous waste threatens Project ROSE. Used oil collection centers, drop-off drums, and curbside collection programs will be threatened if liability becomes a more dominant issue. Voluntary participants are likely to withdraw from the program if used oil becomes a federally regulated hazardous waste.

Collection. Project ROSE coordinates several types of used oil collection programs. In rural areas, collection centers are at service stations, and in several cities there are curbside collection programs.

Education. The success of these collection programs is largely due to eight program centers that help coordinate publicity and education. State grants allow for brochures, flyers, information packets, and a slide show. The Project ROSE message also is communicated through the media, schools, special events, and civic organizations. These efforts include public service announcements on television and radio, and in newspapers and magazines. Collection centers receive posters showing their participation in the program. Project ROSE involves industries in its efforts, and it has targeted the government and the military for participation in the program.

Although the project is successful overall, problems do exist. Since there is no required reporting or documentation of used oil processed, no accurate figures are available on the quantity of used oil being recycled. Project ROSE tracks the amount of used oil collected by asking recyclers about their volume, but this provides only a general idea of the level of participation.

Michigan and Virginia. Two similar voluntary state programs operate in Michigan and Virginia. Like Alabama's program, their used oil collection activities depend largely on voluntary collection programs, community participation, effective publicity, and public education. These programs also suffer from the same uncertainties concerning used oil listing by EPA as a hazardous waste, market fluctuations affecting collection costs, and program evaluation. The major concern of both these programs is that they will be drastically affected or discontinued by an EPA hazardous waste ruling for used oil.

Michigan has one of the few programs in the country where used oil is rerefined for use as an engine lubricant.

Recommended State Strategies

The goals for Hawaii should be to reduce the improper disposal of used oil and to increase the recovery of used oil, especially from those who change their own oil. The recommendations outlined here assume that the EPA will declare oil a non-hazardous waste. Though some of these recommendations may hold even if used oil is declared hazardous, it is unknown at this time what the requirements and ramifications of such a decision would be. There also remains the possibility that Congress could introduce a legislative resolution to override a declaration of used oil as hazardous.

Liability. The State of Hawaii could follow the lead of Florida to release used oil collection center operators from potential liability. Alternatively, the California approach could be employed by exempting those who handle small quantities of used oil. Or, the State and local governments could assume liability and establish public used oil collection centers at transfer stations, public works yards, and fire stations.

Collection. To encourage oil recycling, collection centers must be convenient for the public. This means increasing the number of sites in Honolulu and throughout the islands. Government could provide:

- Grants to help fund storage tanks, “igloo” containers, and other collection facilities (as in Florida),
- Outreach to service station operators, local governments, and others to encourage the development of collection sites (as in Alabama), and
- Facilities (e.g., requiring used oil collection by stores that sell more than a certain amount of motor oil, service stations, and/or public facilities--as in Rhode Island).

Education. A cornerstone of all the successful oil recycling programs is an aggressive education and promotion program. A starting place is to require sellers of motor oil to post notices of the location of the nearest recycling facility and to inform customers about recycling. The hotline operated by the Used Oil Advisory Committee should be expanded. As in Alabama, state funding could be used for the development and distribution of promotional materials such as public service announcements, brochures, and advertisements.

Funding. A viable collection network in Hawaii will need initial funding, and depending upon market conditions for the sale of used oil, may need ongoing financial support. In addition to or in lieu of General Fund support, Hawaii could consider dedicated funds, such as that developed by Florida from fees, fines, and penalties on the regulation of used oil disposal. These funds could help to pay for education efforts and used oil collection tanks or igloos.

Summary. Several aspects of an expanded used oil recycling program could be initiated without passage of a new law in Hawaii. For example, education and encouragement of expanded collection facilities could be accomplished by budget and administrative allocations of funds and staff. However, legislation would be required to address the liability issue and for other actions such as mandatory signage or the siting of collection facilities.

NOTES

Chapter 8

1. This discussion is drawn from the following report: SMS Research & Marketing Services, *Disposal of Used Motor Oil in Hawaii: A Study of the Consumer Sector*, Honolulu, Hawaii, Automotive & Retail Gasoline Dealers Association, 1987.
2. *Ibid.*, p. 23.
3. *Ibid.*, pp. 22-23.
4. Florida, Senate Bill 1192-88, Section 33(5).

RESPONSE OF THE AFFECTED AGENCY

ATTACHMENT 1

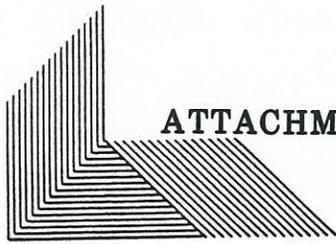
THE OFFICE OF THE ATTORNEY GENERAL
STATE OF HAWAII
150 SOUTH KING STREET, SUITE 2000
HONOLULU, HAWAII 96813

AGENCY RESPONSE

We transmitted a preliminary draft of this report to the Department of Health on January 27, 1989. A copy of the transmittal letter to the department is included as Attachment 1. The response from the department is included as Attachment 2.

In its response, the Department of Health notes that the consultants prepared an excellent report which will be useful in evaluating proposed programs related to recycling. It takes issue with the estimates for aluminum can recycling and cites the need for more information on various recyclable waste categories.

THE OFFICE OF THE AUDITOR
STATE OF HAWAII
465 S. KING STREET, RM. 500
HONOLULU, HAWAII 96813



ATTACHMENT 1

January 27, 1989

COPY

John C. Lewin, M.D.
Director
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Dear Dr. Lewin:

Enclosed are three copies, Nos. 4 to 6 of our preliminary report on **A Study of Recycling for the State of Hawaii**. This report was prepared pursuant to Act 248, SLH 1988.

Should you wish to comment on the recommendations in the study, please telephone us by Tuesday, January 31, 1989. If you decide to submit written comments, we ask that you submit them by February 8, 1989 so that they can be included in the published report.

Since the report is not in final form and there could be changes to the report, access to it should be restricted to those persons whom you might wish to call upon to assist you in reviewing the report. Public release of the report will be made solely by our office and only after the report is published in its final form and submitted to the Legislature.

We appreciate the assistance and cooperation extended to us during the course of the report.

Sincerely,


Newton Sue
Acting Legislative Auditor

Enclosures

ATTACHMENT 2



JOHN WAIHEE
GOVERNOR OF HAWAII

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII DEPARTMENT OF HEALTH

P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EPHSD

February 7, 1989

Mr. Newton Sue
Acting Legislative Auditor
The Office of the Auditor
465 S. King Street, Room 500
Honolulu, Hawaii 96813

RECEIVED
FEB 7 4 23 PM '89
OFFICE OF THE AUDITOR
STATE OF HAWAII

Dear Mr. Sue:

Pursuant to your request of January 27, 1989, we have reviewed the preliminary report entitled "A Study of Recycling for the State of Hawaii" prepared by Resource Conservation Consultants, Inc. Following are our comments:

The consultants have prepared an excellent report summarizing the status of recycling in Hawaii, available markets, other state programs, and in particular, the recommendations for needed actions in Hawaii. Much of the data gathered will be useful to the Legislature, affected agencies, and concerned citizens in evaluating proposed programs related to recycling.

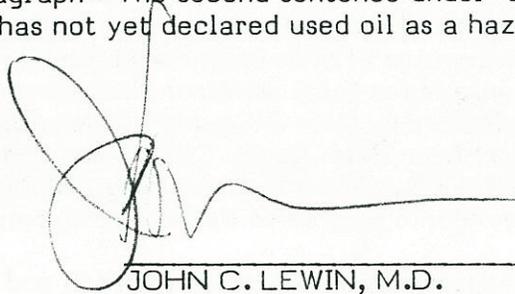
The following are specific comments:

- a. Chapter 2, page 11, last paragraph - Revise the Litter Control Office's budget from "\$100,000" to "\$190,000."
- b. Chapter 3, page 19, Table 3.1 - The heading "Hawaii County 1975(2)" should be corrected to read "Kauai County 1975(2)."
- c. Chapter 3, page 19, Table 3.1 - Add a footnote to the figure listed for percentage of aluminum cans based on Honolulu County's 1984 data - "this figure is for total aluminum including scrap, cans, and other items" (as indicated by City & County of Honolulu Refuse Division). In addition, if data used from Palm Beach County and Broward County were also for total aluminum, please footnote also. NOTE - this is important for the following comments related to the recycling rate of aluminum cans in Hawaii.
- d. Chapter 3, page 21, 3rd paragraph and page 22, Table 3.3 - The 32% recycling rate for aluminum cans is questionable. Please delete references to the recycling rate or provide footnotes to indicate discrepancies in this estimate and other estimates. This comment is based on the following:
 1. The figures used for estimated amount disposed are too high because the figure used is for total aluminum. Possibly a better figure to use would be the 0.5% national figure.

2. The 5,453 tons of aluminum recycled may be slightly low. Industry sources have informed us that their best estimate is 11.4 million pounds or 5,700 tons for 1986.
3. Our same industry sources' best estimate is a recycling rate of 70 - 75% in Hawaii. This is based on 11.4 million pounds recycled (1986) out of about 16 million pounds of cans available (estimate for 1986 based on 15 million cans available in 1984 with a 2-3% increase per year).

NOTE: With these figures, the amount of cans available per year in 1986 would have been 18 cases per capita per year. Using the consultant's figure of 11,563 tons of aluminum cans per capita would result in a per capita consumption of 26 cases per year. Actually, both figures seem high; however, it appears that 18 cases per capita per year would be more in the ballpark than 26 cases per year.

- e. Chapter 4, page 30 - The item on scrap metals should be expanded to include market conditions and economics of recycling. There are lots of junk cars stockpiled on the islands of Hawaii, Maui and Kauai waiting for someone to recycle them. What are the options available?
- f. Chapter 7 - We recommend that a table be included which lists the various categories of recyclable wastes along with the specific types of recyclable wastes. It should be indicated for each recyclable waste whether it is viable and profitable; whether it is marginal and may require some form of aid or subsidy from the state or local government; or whether it is not viable and would require subsidy or grants to make it viable. Any present or future constraints should also be indicated.
- g. Chapter 8, page 61, 1st paragraph - The second sentence under "Introduction" needs to be clarified. EPA has not yet declared used oil as a hazardous waste.



JOHN C. LEWIN, M.D.

APPENDIX

APPENDIX A

SUMMARY OF STATE BEVERAGE CONTAINER DEPOSIT LAWS

<u>State Law Effective Date</u>	<u>Features</u>
Connecticut 1/80	<ul style="list-style-type: none"> ● Minimum \$.05 deposit ● Container handling fee: soft drink=\$.02; beer=\$.01 ● Bans sale of detachable pull-tabs on beverage containers ● Provides for the establishment of redemption centers ● Mandates photo-, chemical-, or bio-degradable secondary packaging
Delaware 7/82	<ul style="list-style-type: none"> ● Minimum \$.05 deposit ● Minimum 20 percent handling fee ● Bans detachable pull-tabs on beverage containers ● Provides for the establishment of redemption centers ● Exempts aluminum cans from minimum deposit until 1992 ● Exempts containers 64-ounces and larger from minimum deposit ● Establishes a committee to study aluminum can recycling
Iowa 7/79	<ul style="list-style-type: none"> ● Minimum \$.05 deposit ● Minimum \$.01 handling fee ● Bans detachable pull-tabs on beverage containers ● Provides for the establishment of redemption centers ● Requires that the first \$100,000 annually in unredeemed liquor deposits be directed to the Iowa State Substance Abuse Fund for alcoholism treatment ● Requires that bottlers collect empties from retailers weekly and pay refund/handling fee within one week after pick-up
Maine 1/79	<ul style="list-style-type: none"> ● Minimum \$.05 deposit ● Minimum \$.02 handling fee ● Bans detachable pull-tabs on beverage containers ● Bans non-biodegradable plastic containers
Massachusetts 1/83	<ul style="list-style-type: none"> ● Minimum \$.05 deposit ● \$.02 soft drink container handling fee ● Pull-tabs on beverage containers banned 1/1/79 ● Bans non-biodegradable plastic carriers ● Provides for the establishment of redemption centers ● Permanently labeled refillables exempt from "refund value labeling" requirements ● Requires bottlers to report unclaimed deposits to the state every 60 days ● Provides for "unemployment dislocation allowance" and job retraining for workers when jobs are lost due to deposit law
Michigan 12/78	<ul style="list-style-type: none"> ● Minimum \$.05 deposit on "certified" containers; \$.10 deposit on all others ● Bans detachable pull-tabs on beverage containers ● Provides "container certification" standards ● Provides for the establishment of redemption centers
New York 9/83	<ul style="list-style-type: none"> ● Minimum \$.05 deposit ● Minimum one-and-a-half cent handling fee ● Bans detachable pull-tabs on beverage containers ● Bans plastic secondary packaging that is not photodegradable or biodegradable ● Negates any local deposit law ● Created a temporary state commission which reviewed the law and reported its findings to the Governor and Legislature on 4/1/85 ● Provides for the establishment of redemption centers ● Requires that bottlers pick up empty containers from retailers and pay handling fee within the same credit arrangement as the sale of full goods ● Requires bottlers to report amount of unclaimed deposits to the state as the Commissioner deems necessary
Oregon 10/72	<ul style="list-style-type: none"> ● Minimum \$.02 deposit on "certified" containers; \$.05 on all others ● Bans detachable pull-tabs on beverage containers ● Bans "connecting devices" which will not decompose within 120 days ● Provides for the establishment of redemption centers, subject to the approval of the Oregon Liquor Control Commission
Vermont 1/75	<ul style="list-style-type: none"> ● Minimum \$.05 deposit ● Minimum 40 percent handling fee ● Bans detachable pull-tabs on beverage containers ● Provides for the establishment of redemption centers ● Bans plastic or nonbiodegradable "connecting devices"

Source: National Soft Drink Association as published in "Beverage World," June 1987.