



RHODE ISLAND SOLID WASTE MANAGEMENT CORPORATION

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Solid Waste Source Reduction and Recycling Programs in Rhode Island

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I'm not associated with the plastics manufacturing industry, so please forgive me for making projections here; but my basic understanding of a manufacturing industry is that it works something like this:

Manufacturers take a feedstock and convert it into a marketable product in an efficient manner. To stay in business, your products must be competitive and your operation must comply with all applicable standards and regulations.

Many of you work with polyvinyl chloride and other plastics resins as feedstock, converting them into a broad range of durable products and packaging.

I work in a manufacturing industry of sorts which utilizes a much different material for feedstock: it's non-homogeneous and multi-propertyed, but far less valuable than plastic resin. It's garbage, and the problem facing the solid waste industry is one of raw feedstock oversupply with no storage capabilities and limited market potential. Literally, many areas of the country are in the situation where they've got tons of garbage and no place to put it.

The traditional "market" for solid waste, the landfill, is rapidly disappearing. Like any prudent business we are working to develop new markets and new marketing approaches. In the waste business, we call the process the practice of "integrated solid waste management". My particular employer also happens to be a quasi-private, not-for-profit state agency.

Rhode Island recognized its impending solid waste management

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Rhode Island recognized its impending solid waste management problem early on and has since taken significant steps to address it. Recognizing that solid waste management is a matter of important public interest and concern with important impacts on public welfare, the state General Assembly established the Solid Waste Management Corporation in 1974. The Corporation is a non-profit, quasi-private agent of the state of Rhode Island. In 1980, the Corporation purchased the Central Landfill in Johnston Rhode Island. In 1986, the state legislature gave the Corporation flow control over the municipal wastestream and made solid waste recycling mandatory statewide. "Flow control" essentially provides us with a monopoly over the supply of municipal solid waste generated in the state. State law prohibits any facility owned by the state from accepting non-source separated solid waste. The state has never passed a "bottle bill" deposit law.

Rhode Island state legislation requires the "Corporation" to pursue an integrated approach to solid waste management, and outlines a scale of priorities for systems implementation:

According to legislation, Rhode Island's growing waste problem should first be addressed through reductions at the source of generation. Second, waste materials should be source separated and recycled. The third tier of waste management is processing in waste-to-energy facilities, in order to reduce the volume of waste necessary for land disposal. These three options should each be pursued to the greatest extent feasible. The final option is to landfill that which remains. This four-pronged approach constitutes the framework for integrated solid waste management in Rhode Island. RISWMC, together with its regulatory sister state agency - the Department of Environmental Management - has worked closely with the State General Assembly to set-up an strong legislative package for effective solid waste management programs.

Where are we in the implementation stage? RISWMC manages 4000 tons per day of municipal and commercial solid waste for the state of Rhode Island. We have owned and operated the Central Landfill in Johnston Rhode Island since 1980, but it has grown to handle 90% of the waste generated within the state and to become the largest operating landfill in New England. Two 750 ton-per-day waste-to-energy facilities are in the permitting phase. One 140 ton-per-day, single-shift, recycling facility is scheduled for completion in late summer. Statewide residential solid waste recycling programs are being implemented, and regulations for statewide commercial waste recycling are currently being promulgated.

Typically the waste management industry doesn't talk in terms of monomers and resin properties - we typically talk in terms of tons, and tons only. In the areas of source reduction and

recycling, the physical and chemical properties of a waste material are most important. Energy recovery and landfilling treat waste products somewhat more "impersonally" since all the waste is disposed of in an intermingled fashion. We've found in Rhode Island that source reduction and recycling programs, are "softer" approaches to solid waste management and are much more readily implemented. As recently as 1970, there were 44 landfills operating in Rhode Island. Today, 1 landfill handles 90% of the waste generated in the state. No other major landfills have been permitted. It has taken 11 years to develop a resource recovery facility. Ground has not yet been broken on the project. In waste management, political and social problems are very real problems. Mandatory recycling was conceived and developed within a two year period, with a major facility approaching completion.

SOURCE REDUCTION

In the fall of 1986, Rhode Island established a Source Reduction Task Force, consisting of representatives of state government, state legislature, private industry, and environmental organizations. The Task Force researched program options and outlined a state plan for source reduction. The objectives of the organization are to establish education, economic incentive, and legislative programs to:

1. minimize the environmental and financial impacts of processing and/or disposing of solid waste;
2. increase product lifespan;
3. increase reusability;
4. increase recyclability and incentives to recycle;
5. increase the use of post-industrial and post-consumer recycled material in products, containers and packages.

In 1988, the Task Force has introduced four bills into the state legislature to promote these objectives in the areas of beverage containers, retail merchandise bags, single-service "fast-food" containers, "flushable" products, and energy recovery ash residue. None of the legislative pieces are outright bans on particular products or product materials; Rhode Island has offered industry the opportunity to meet the State's source reduction objectives. Industry has responded in some significant ways, which I'll discuss later.

Effective tools of source reduction are education, economic incentives, and legislation. But to be effective, 2 fundamental questions must be considered: What characteristics constitute "good" products and what characteristics constitute "good" garbage?

For consideration, I have some examples of new products which will eventually become new garbage feedstock for the Rhode Island

Solid Waste Management Corporation. The examples happen to be plastic products, only because the newest product developments all seem to be made from plastic.

From Techpak: Bi-weekly Intelligence on Advanced Consumer Packaging Materials and Markets (3/14/88)

A major brewer will begin test marketing its beer in a two-gallon throw-away PET minikeg dispensing system. The key is in the proprietary tap, or valve, which controls the flow rate to protect carbonation and head formation, and to prevent carbonation and flavor loss once the keg is opened. You can drink a glass a day until the mini-keg is empty with no noticeable loss of carbonation or taste. The aim was to produce a throwaway minikeg that would be nearly as inexpensive to produce as aluminum cans with cardboard carriers.

Other product groups: According to plastics industry experts, the fastest-growing segments of plastic food packaging will be coextruded, high-barrier multilayer bottles, jars and cans and thermoplastic dual-ovenable entree trays. Shelf-stable packaging has been hailed as "probably the greatest thing in the future of food packaging industry". Barrier resins are the specialty polymers that provide plastic packages with properties similar to glass and metal, while remaining light weight and unbreakable.

A third new product example: a New York plastics designer has developed an interlocking packaging system which handles up to 24 containers at a time, without six-pack rings or shrink wrap. The design utilizes a tongue-and-groove system of longitudinally ridges and slots that holds the containers together.

On the other hand, mineral spring bottlers in Germany employ a nationwide return system for glass bottles. The use a standard bottle type that allows producers to swap containers by switching labels.

Good or Bad Products?

Product design is not a black and white issue. Realizing the complexity of the issue, I as a representative of the Rhode Island government and solid waste management industry merely ask that the vinyl industry consider both the qualities of the consumer product and the waste product when considering expansion from traditional durable PVC products to more PVC-based packaging and disposable products.

Following the waste management priority system established in Rhode Island legislature some characteristics of a quality waste product might include some of the following:

product lifespan, durability, reusability

package to product ratio: by weight, by volume

stand-alone packaging: ability to stand alone as a product with little or no need for secondary and tertiary packaging support systems;

design complexity: number of chemically and/or physically different materials combined to create the end product

post-industrial and post-consumer recycled material content,

recyclability: efficiency of collection, processing, shipping, and marketing

closed-loop: capability of being recycled back into the same basic product for the same basic application (e.g. ability to be cleaned and sterilized for food-contact packaging)

uniformity in application: chemical complexity or non-substantive chemical differential from materials used in similar applications.

intrinsic materials recovery value of waste product materials: savings in energy and raw-materials obtained from use of secondary materials rather than virgin resources

intrinsic energy recovery value of waste product materials

ability to identify or distinguish the product material from other chemically or physically incompatible materials

compactability, ability to densify/reduce volume of commodity once it becomes waste product

impact when combusted: organic, metals, acid gas pre-cursor chemical content; impact upon the environment, when combusted

impact when buried: bio-degradability, photo-degradability, susceptibility to leaching in a landfill environment

The solid waste management industry is simply asking that the manufacturing industry give consideration to post-consumer "life" of a product and to internalize as many quality waste product characteristics as practical into the design of each product. If a product can't last forever, make it reusable. If it can't be reused, design it such that it is readily recycled for the intrinsic value of the material. If it can't be recycled in a cost-effective manner, design it so that its energy value can be extracted in an environmentally acceptable manner. If a product can't meet any of the above attributes of a quality waste product, and there are substitute products readily available

which can, then as a representative of the agency responsible for that products disposal, I ask you not to introduce that product into the Rhode Island wastestream.

THE STATEWIDE - CURBSIDE, RESIDENTIAL RECYCLING PROGRAM

Rhode Island adopted mandatory recycling in 1986, the first state in the nation. I'd like to take you all on a trip through the life of a recyclable material in the municipal wastestream in Rhode Island - from separation at the source, through collection, processing, and marketing. But why go back East now that we're here in Arizona - so I'll just briefly describe our program arrangements.

Residents separate their wastestream into two recyclable components, newspaper and co-mingled recyclables, and place them each at curbside in a 12 gallon recycling "blue-box", provided by the State. The commingled recyclables which are currently source separated include glass, tin cans, aluminum, PET plastic beverage bottles, and HDPE plastic "milk jug"-type containers. The state is considering expansion of the program to include all rigid plastics. Approximately 10 pounds of recyclables are collected from each household each week. The recycling effort required on the part of the resident is minimal, and eighty to ninety percent of the residents have actively participated in our pilot programs (calculated on a monthly average basis).

A single-operator, dual, RH/LH drive recycling vehicle picks up the recyclables at the curbside on the same day as garbage pick-up. The truck is divided into 2 adjustable, enclosed compartments: one for newspaper and one the mixed recyclables. The truck capacity is approximately 25 cubic yards, large enough for the materials of roughly 450 households. Some of these specialized recycling trucks are manually side loaded; others are hydraulically loaded over the top, into the storage bins. Since the driver needs to do very little separation of materials, he or she is able to service 120 to 200 houses per hour, depending upon housing density and the actual number of houses which set out their container that week. The Solid Waste Management Corporation pays all reasonable collection costs of the recycling program for the first 3 years of the program, a highly favorable situation enjoyed by no cities in any other state in the nation.

The recyclables will be tipped at no charge and processed at a highly automated, 140 ton per day materials recovery facility (or MRF). The facility is owned by the Solid Waste Management Corporation; operations and marketing are contracted to New England Crinc, the deposit beverage container recycler, for a 3 year period. The newspapers are dumped and conveyor fed into an export-grade, horizontal baler. The commingled containers pass along a series of conveyors, through separators and processing equipment. Ferrous containers are separated from the container

mix magnetically and shredded. Glass is separated from the lighter materials by means of a brush screens, manually color-separated and crushed into cullet. Aluminum is separated from plastics by an eddy-current magnet, crushed, and blown into a storage container. PET and HDPE are manually separated from one another and perforated and granulated, respectively.

With the exception of the state of Rhode Island paying for all associated costs, we feel that the curbside/centralized separation and processing approach will be the preferred recycling method of most urban areas in the country. Household processing efforts are minimized, ensuring a high program participation and high materials diversion rate. Collection costs are contained by minimizing separation at the curbside by the driver, and marketing advantages are captured by producing high quality, processed secondary materials in bulk. The Corporation has developed a Lotus-based computer model to monitor and project the costs of the recycling program, and our results indicate that recycling is indeed a least-cost solid waste management option for the materials included in the curbside program.

PROGRAM CHALLENGES

Some of the problems we've encountered in our source reduction and recycling programs are sure to be faced in other programs throughout the country. I've presented you with 4 program areas: source reduction, collection of recyclables, processing of recyclables, and marketing of recyclables. I'll get into some problems we've encountered with particular emphasis on plastics and joint projects to address some of these problems. I'll present 4 problems - one from each program area.

1. SOURCE REDUCTION. Source reduction is a form of pro-active "quality control" or "preventative maintenance" on the waste supply system. The Source Reduction Task Force has outlined 14 design categories which constitute a quality product from a waste management standpoint, promoting the principles of source reduction. In a Source Reduction Forum in January, the Corporation invited representatives of the plastics industry to address the Task Force regarding the properties of plastics which make it a good material for consumer products. Properties mentioned included: light weight, rigid, moldable, insulation, non-reactive, non-absorption, non-shattering, sterile.

The government agencies who bear responsibility for cost-effective, environmentally sound waste management systems strongly believe that responsible industries should consider BOTH waste product qualities AND consumer product qualities in the product design process. PROBLEM: Besides outright legislative bans, what effective, substantive, ongoing channels of communication can be developed between waste management officials

and industry officials to ensure proper consideration in product design?

2. COLLECTION OF RECYCLABLES. When the curbside recycling program was originally planned, it was projected that the collection rate and not the truck-size would be the limiting factor of the collection costs i.e. the collection day would end long before the truck had been filled. Program participants have source-separated more recyclables than anticipated, filling up the vehicle in 2 to 3 hours of collection. PET and HDPE together have occupied over forty-five percent of the volume of recycled containers in the collection vehicle, although they account for less than 6% of the materials by weight. Had all those PET bottles been glass, they would still occupy the same amount of space and had all those HDPE milk jugs been waxed-paper cartons they would be heading to the landfill. The plastics industry can't be faulted for this problem. PROBLEM: How can the plastics industry help in reducing the "on-truck" storage space occupied by recycled containers, thereby improving collection efficiency?

Together, the state of Rhode Island, a private sector truck manufacturer, and NAPCOR (National Association for Plastic Container Recycling - a consortium of bottlers and resin manufacturers) plan to undertake an on-truck plastics densification program. Although the additional separation of plastics by the collection vehicle driver would slow collection rates, successful densification of plastics might enable Rhode Island to cost-effectively recycle all rigid plastic containers.

The preferred option would be for homeowners to densify their recyclable plastics, allowing them to place more material by weight in their recycling box and saving driver separation time. Although strange sounding, my question is serious: can rigid plastic containers be designed with "loss of memory" so that the household resident can easily flatten them without them popping back?

In a separate area, a major expanded polystyrene single-service container manufacturer is considering undertaking a pilot collection program in a school and/or hospital in cooperation with the Corporation.

3. PROCESSING OF RECYCLABLES. Plastic containers are manually sorted by the homeowner and by sorters along the conveyors of the materials recovery facility. No technology has yet been developed to mechanically separate HDPE, LDPE, PET, and PVC from one another, and not everyone has the education level or interest to become plastics experts or to read the SPI code to be placed on the base of the container. Homeowners and sorters chiefly separate plastics according to shape and product use. Imported PVC mineral water bottles are currently contaminating our recycled PET to an unknown degree.

My 3rd problem is one of market targeting by resin suppliers. PROBLEM: If PVC is approved for and applied to rigid packaging

products, how aggressively will the industry move from its predominant production of durable goods into the disposable packaging market? What steps can be taken to distinguish the resin type so that it won't have a negative impact upon the other plastics which Rhode Island is trying to recycle? Will PVC product manufacturers limit their use to specific, readily identifiable packaging types so as not to overlap chemically incompatible resins in identical product types?

4. MARKETING OF RECYCLED MATERIALS AND PRODUCTS MADE FROM RECYCLED MATERIALS. The Vinyl Institute has contributed funding to PRARI, the Plastic Recycling Applied Research Institute. As you know, PRARI is an industry, government, and university consortium created to foster pragmatic plastic recycling systems by means of technology evaluation, research & development, collection and processing evaluation, and market tests. The Vinyl Institute, New England Crinc, University of Lowell Plastics Engineering, and the states of Massachusetts and Rhode Island are contributors to the project. The first year undertaking of the group is experimentation of mixed plastics recycling with an industrial scale application Advanced Recycling ET/1 technology.

In the ET/1 process, mixed plastics are extrusion molded into rigid plastic building products up to 12 feet in length and 4 inches in diameter. All impurities in the finished product are concentrated in the center of the shape. The final product can be nailed, screwed, sawed, planed, drilled and painted just like wood. Dyes can also be added to the plastic to produce any fairly dark color. The method produces items that are quite long in comparison to their cross sections, making it ideal for products like lumber, fence posts and sign posts.

The ET/1 facility is scheduled for a formal opening at its Billerica Massachusetts site at the end of May. RISWMC will fund the collection of mixed plastic post-consumer feedstock, and may serve as an end-user for some end-products. New England CRINC will operate the facility and the University of Lowell will conduct research and development projects.

My last problem to propose is one of market potential. PROBLEM: There is a limit to the number of mixed-plastic constructed park benches that the U.S. economy can absorb. Given the vast experience of the vinyl industry in the manufacture of essential, durable construction products how can the Vinyl Institute further work with Rhode Island and PRARI to evaluate and test potential applications of ET/1 mixed-plastic or combination PVC/mixed-plastic end-products in basic construction applications?

Sure we've got problems; but we're actively seeking solutions, effective and efficient solutions. I hope that industry, the State of Rhode Island, and government in-general can continue to work together with increased effectiveness. I wish to commend the member of the Vinyl Institute and plastics industry for aggressively addressing waste management issues.