

# **Waste Reduction in the Department Store Sector**

## **Case Study Report: Hudson's Department Stores**

prepared by the:

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# **PREFACE**

## **PROJECT DESCRIPTION**

### **Overall Project Objectives**

This study of solid waste reduction practices at the 17 Hudson's department stores in Michigan is part of a project comprising five case studies. The objective of the project is to analyze and document successful waste reduction programs implemented by commercial and industrial firms in the state of Michigan so the identified waste reduction practices can be transferred effectively to other firms. The information presented in these reports may also serve to suggest ideas for waste reduction which could be implemented in other industries beyond those selected for the five case studies.

The primary focus of each case study is a change or innovation in a product or process that resulted in source reduction of nonhazardous solid waste. Process, economic, and organizational/motivational analyses are performed in each study. The process analysis includes a description of the product and process changes and the amount of waste reduction achieved. The economic analysis evaluates the costs and revenues to the firm that result from the waste reduction activity. Baseline economic data, including fixed and variable costs and revenues before the intervention, are compared with the after-intervention data. An organizational/behavioral study then examines the decision-making process, incentives and organizational support, company policy, and employee attitudes related to the initiation of the waste reduction activity.

The overall benefits of waste reduction measures also depend on the reduction of societal and environmental impacts associated with the life cycle of the goods provided or services rendered. External social and environmental factors relating to each program are identified and discussed where possible.

Some of the waste reduction programs documented in this report can be implemented relatively easily, whereas others may require significant capital investment, employee training, or operational changes. Each case study attempts to identify key elements of the model waste reduction program that are necessary for its successful implementation.

### **Case Study Firms**

The case study firms were selected according to the following criteria: a priority of source reduction over recycling and other waste management strategies; the transferability of the waste reduction practices to other firms; information availability and accessibility; the potential amount of solid waste reduction achieved if other firms adopt the model waste reduction practices; and a diversity of businesses in terms of their SIC Code, size, organizational structure, and geographic location.

The five firms studied were:

1. Hudson's department stores in Michigan; retail department stores
2. Gretchen's House III in Ann Arbor; child day care facility
3. McPherson Hospital in Howell; cafeteria, patient food service
4. Packard People's Food Cooperative in Ann Arbor; grocery store
5. Steelcase in Grand Rapids and Kentwood; office furniture manufacturer

## **Project Publications**

The following documents are available through the Office of Waste Reduction Services:

- Fact Sheets - two page document summarizing waste reduction efforts of each case study firm.
- Detailed Case Study Report - a comprehensive guide to assist firms with the actual implementation of waste reduction efforts.
- Final Project Report - description of the methodology, major findings, and recommendations covering all five case studies.

A Fact Sheet and Detailed Case Study Report are published for each of the five case studies. Documents can be obtained from:

Office of Waste Reduction Services  
Michigan Departments of Natural Resources and Commerce  
PO Box 30004  
Lansing, MI 48909  
Phone: (517)-335-1178

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A 1989/1990 Solid Waste Alternatives Program Grant under the Waste Reduction Research and Demonstration category supported this project. Funds for the grant were provided by the Quality of Life Bond and administered by the State of Michigan Department of Natural Resources.

## **ACKNOWLEDGEMENTS**

### **Solid Waste Research Group, School of Natural Resources, University of Michigan**

The Solid Waste Research Group was responsible for selecting the case study firms, conducting the on-site data collection and analysis, documenting the waste reduction activities, evaluating the potential impacts of these activities on the waste stream if they are adopted by other firms throughout Michigan, and preparing the case study reports. The following members of the Solid Waste Research Group participated in this project:

Jonathan Bulkley, Project Director, Professor of Civil Engineering and Natural Resources  
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### **State of Michigan Departments of Commerce and Natural Resources**

The Office of Waste Reduction Services of the State of Michigan Departments of Commerce and Natural Resources provided assistance in the selection of case study firms and in reviewing the final report. Ms. Myra Grant served as project manager and administered the grant for the Resource Recovery Section, Waste Management Division, State of Michigan Department of Natural Resources.

The information presented in this report is the sole responsibility of the Solid Waste Research Group, School of Natural Resources, University of Michigan.

### **Hudson's Department Stores**

The staff at Hudson's Southland, Ann Arbor, and Northland operations made substantial contributions to this project by providing economic data on their paper shredding operation and being accessible for interviews. Special appreciation is given to the following individuals for sharing information on waste reduction activities and helping the research team gather data: Rod Davies, Operations Manager and Environmental Coordinator, Southland; Shi Coury, Operations Manager/Environmental Coordinator, Briarwood; David J. Penrod, Hudson's Group Operations Manager; and Susan L. Kelly, Director of Public Affairs.

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# 1. SUMMARY

This case study documents waste reduction at Hudson's department stores in Michigan. Process and economic analyses are done to compare Hudson's shredded paper packing operation with the firm's previous use of purchased packing. A range of other waste reduction practices at Hudson's are also identified and discussed. Major findings of the packing study are:

- By shredding used office paper for packing, the 17 Hudson's stores in Michigan discard 21 tons less waste per year. Hudson's plans to capture about 20% of their total office paper waste every year for shredding.
- Additional labor, equipment, and electricity are needed for the shredding program, but the process changes resulting from shredding were easily accommodated within the Southland Mall store where paper is shredded.
- The cost of purchased packing substantially outweighed additional labor, equipment, and utility costs for shredding. Hudson's can save \$17,500 per year, or 43% of purchased packing costs, by shredding their own material. If excess packing can be sold at price similar to the previously purchased packing material, Hudson's shredding operation could generate \$10,900 in new revenues each year.
- An organizational structure that provides formal avenues for implementing waste reduction plans made a major contribution to the success of Hudson's program. Employee participation at all levels produced a greater commitment to waste reduction.
- Hudson's has an effective network for communicating ideas and information between individual stores. Multi-store operations can implement successful local programs much more quickly when such networks exist.

Hudson's paper shredding program is transferable to other department stores and general retailers who use packing material for customer shipments. Multi-store operations may find the methods detailed in this report more applicable to their situation, but all stores could adopt the shredded packing program and other waste reduction methods practiced at Hudson's with minimal difficulty. Adoption of paper shredding throughout the department store sector could reduce waste discarded in state landfills by as much as 175 tons per year. Waste reduction could be much greater if general retailers and manufacturers who use packing material followed the Hudson's model.

Many Hudson's stores practice other source reduction activities, which include the substitution of washable dishware for disposable dishware at meetings and staff gatherings, double sided copying, reduction of paper weight in some reports and documents, and reuse and reduction of some packaging received from vendors.

Hudson's recycles beverage containers and mixed papers at most stores. The 17 Hudson's stores in Michigan recycle approximately 75% of the old corrugated containers resulting from their operations. One type of plastic garment bag is now being sent to the Southland store from all Hudson's in the state for baling and recycling. These programs alone divert 700 tons of corrugated and 7.8 tons of plastic from state landfills annually. Adoption of corrugated and plastic recycling by all businesses in the department store sector could reduce waste generation in Michigan by 5900 tons per year.

## 2. INTRODUCTION

### THE PROBLEM OF NONHAZARDOUS SOLID WASTE IN THE DEPARTMENT STORE SECTOR

In 1987 there were 339 department stores in the state of Michigan, employing 70,663 people.<sup>1</sup> Sales for 1989 in Michigan's the department store sector were 8.4 billion dollars.<sup>2</sup> Retailers generate solid waste from on-site activities and act as conduits for products and packaging that will eventually be added to the municipal solid waste stream.

Types of waste generated by the department store and general retail sector include: ledger paper, computer paper, and other types of office paper; packaging material, such as corrugated boxes, plastic bags, plastic wraps, and plastic hangers; packing material (i.e., expanded polystyrene or shredded paper); and wooden pallets.

Department stores and general retailers offering cafeteria or restaurant services dispose of food waste; napkins; straws; corrugated cardboard and plastic packaging waste; and containers made from glass, steel, aluminum, and plastic. Food services using disposable tableware also add polystyrene dishes and utensils to the solid waste stream.

### WASTE REDUCTION IN THE DEPARTMENT STORE SECTOR

Department stores and general retailers can reduce solid waste production through source reduction, which includes:

- Reuse of primary and secondary packaging: return or reuse pallets and corrugated boxes, receive reusable plastic bags or crates from vendors, reuse packing received from vendors, receive clothes on reusable rather than disposable hangers.
- Reduce paper waste by using double-sided photocopies and require less frequent, more efficiently targeted reports.
- Reuse fine paper waste by shredding it for packing filler.
- Ask vendors to reduce packaging and packing in shipments.
- Replace disposable dishware with washable items in food service.
- Establish buying guidelines to select merchandise that is minimally packaged or unpackaged.

Waste reduction may also be achieved by recycling, and composting or donation of surplus food from restaurant operations. The following items can typically be recycled by department stores:

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<sup>1</sup> 1987 County Business Patterns- Michigan; U.S. Dept. of Commerce, Bureau of the Census, Dec. 1990.

<sup>2</sup> Monthly Retail Trade, Sales & Inventories, February 1990; U.S. Dept. of Commerce, Bureau of Census; Draft, April 1990.



- Corrugated cardboard
- High grade ledger paper
- Mixed papers from computers and other office activities
- Paper and plastic bags received from vendors in shipping
- Glass, steel, aluminum, and plastic containers produced by staff or in-store food service

Comprehensive waste reduction plans may also include using material with the highest possible recycled content. Although buying or offering products with some recycled content is not formally considered waste reduction, no recycling program is viable unless a market exists for collected material. Retailers can help assure sufficient demand for recycled material by providing corrugated and paperboard boxes that contain recycled material for customer purchases. In addition, the following products containing recycled material can also be selected: computer and other grades of office paper, envelopes, napkins, coated paper for advertising inserts, plastic and paper bags for customer purchases, and plastic shipping crates.

Waste reduction practices that require small capital investments and low operating costs are likely to attract more interest and be more readily transferable to other department stores and general retailers than reduction methods that increase costs. Reduction programs that require minimal adaptation of existing systems are also likely to be implemented by a greater number of businesses in the state of Michigan.

The model waste reduction activity studied in this report meets process, economic, and organization criteria for transferability, but it can be expected that some general retailers interested in adopting a similar program will have to modify the Hudson's model.

## **SELECTION OF HUDSON'S**

The Department Store Division of Dayton Hudson Corporation has recently implemented an Environmental Action Policy that specifically addresses pollution, solid waste disposal, and the depletion of natural resources. The new environmental policy, published June 15, 1990, sets the following guidelines for Central Headquarters operations and individual stores:

- Reduce consumption of materials and energy and encourage vendors to do the same.
- Achieve waste reduction through recycling.
- Use recycled or recyclable material and encourage vendors to follow suit.
- Set up Environmental Action Committees at each store to increase employee awareness of environmental issues and solicit their participation in local projects resulting from the company's environmental policy.
- Initiate a review process to assess and improve environmental practices.

The specific waste reduction activity documented in this report is the substitution of shredded office paper for purchased packing filler. The process of shredding internally generated office paper waste for packing is transferable to others in the department store sector and can also be implemented by a wide variety of manufacturers and general retailers. Impact on the state's waste stream could be substantial if all suitable businesses shredded waste paper for packing material.

## **DESCRIPTION OF HUDSON'S DEPARTMENT STORES**

Hudson's department stores are part of the Department Store Division of the Dayton Hudson Corporation. The Dayton Hudson Corporation is a large general retailer comprised of a Department Store Division (Dayton's, Hudson's, and Marshall Field's), and Mervyn's and Target stores. Hudson's sells a full range of general merchandise, with an emphasis on apparel and related items.

Total revenue for the 37 Dayton's and Hudson's stores was 1.8 billion dollars in 1989. Profits were 179 million dollars, and operating profits as a percentage of revenue were 10%. In 1989, Dayton's and Hudson's stores combined operated 7.7 million square feet of retail floor space in seven states and generated \$233 revenue per square foot of floor area. Hudson's department stores are located in Michigan, Indiana, and Ohio. There are 17 Hudson's in Michigan with 4.2 million square feet of retail floor space.

This study of paper shredding concentrates on the 17 Hudson's stores in the state of Michigan. A processing facility located in the Southland Mall store in Taylor shreds office paper collected from all stores into packing material that is then sent to a central warehouse in Warren and redistributed to individual locations.

## **CONTENT AND ORGANIZATION**

The Michigan Hudson's stores replacement of purchased packing material with shredded office paper waste generated by their own operations is the focus of a detailed case study. Other waste reduction activities at Hudson's are described more qualitatively.

The report is organized into the following main sections:

- A detailed case study containing process and cost analyses of Hudson's paper shredding operation
- A brief description of other successful waste reduction activities
- Discussion of organizational and motivational factors related to waste reduction practices
- Discussion of the transferability of documented waste reduction activities and the potential impact on the waste stream if they are adopted by other firms throughout Michigan
- Conclusions and recommendations

Although this case study report presents several successful waste reduction practices, it is not intended as a comprehensive guide to waste reduction for the general retail sector. In addition to this report, there are several other resources at the state (Office of Waste Reduction Services - Michigan Departments of Commerce and Natural Resources ) and federal (U.S. Environmental Protection Agency) levels that are available to assist firms in identifying opportunities and strategies for waste reduction.<sup>3</sup>

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<sup>3</sup> Manual for Waste Minimization Opportunity Assessments; U.S. EPA Hazardous Waste Emergency Research Lab, April 1988 (EPA/600/2-88-025); and Waste Minimization Manual; Developed by University of Michigan School of Natural Resources for U.S. EPA ; Draft, July 1990.

### **3. DETAILED CASE STUDY: REPLACING PURCHASED PACKING MATERIAL WITH INTERNALLY GENERATED SHREDDED OFFICE PAPER**

Hudson's uses packing material as protection when shipping items to customers and returning merchandise to vendors. Before 1990, many Hudson's stores in Michigan used polystyrene "peanuts" for packing. Beginning in 1987, the Briarwood Mall store in Ann Arbor experimented with shredding its own office paper waste for packing. Paper shredders used for this pilot program wore out quickly, causing supply problems for the store; but when available, shredded paper proved to be an effective packing material. While this trial was in progress, many other Hudson's stores continued to use expanded polystyrene "peanuts" for packing shipments.

All Michigan stores replaced plastic packing with paper early in 1990. The first paper packing material selected performed well and was popular with employees but was too expensive. It was replaced with a shredded, baled product apparently treated chemically to reduce dust. This packing caused mild dermatitis in some employees and also settled more than previous packing materials. As a result of experience gained in the Briarwood shredding program and the less than ideal performance and cost of purchased material, Michigan Hudson's stores recently replaced purchased paper packing with shredded office paper waste generated from internal operations.

Before the inception of a shredding program, waste office paper generated at most Hudson's locations was disposed in landfills. High grade office paper of the type that Hudson's shreds is recyclable in some areas, but shredding for reuse is a more desirable waste management practice even in those cases where paper can be recycled. Paper recycling requires additional energy inputs for gathering, remanufacturing, and distribution compared to direct reuse for packing. Manufacturing processes also produce waste and pollution, regardless of whether they use virgin or recycled materials. If vendors or customers reuse or recycle shredded paper packing material, additional waste reduction can be realized from the Hudson's system.

## **PROCESS**

### **Methodology**

The process analysis quantifies material and energy flows through the packing material system for both the purchased packing case and the shredded packing operation. As part of this analysis, equipment, labor, utility use, and solid waste generation are described and evaluated.

Information about both packing systems was gathered from on-site observations, interviews at Hudson's Southland Mall store, interviews with manufacturers, and an internal report describing the newly instituted paper shredding operation. Data concerning packing material use before and after conversion to the new shredding system were gathered in sufficient detail for a comparative analysis. Most data are therefore incremental and are provided only when the two packing systems vary. Information about equipment specifications and energy requirements was obtained from the manufacturer of the shredder used by Hudson's. A complete collection of the process data is in Appendix A.

### **Results**

A flow diagram outlining the shredded paper packing process is provided in Figure 1. Before converting to the use of packing material produced from internally generated office paper waste, the 17 Hudson's stores in Michigan purchased approximately 33,000 pounds of paper

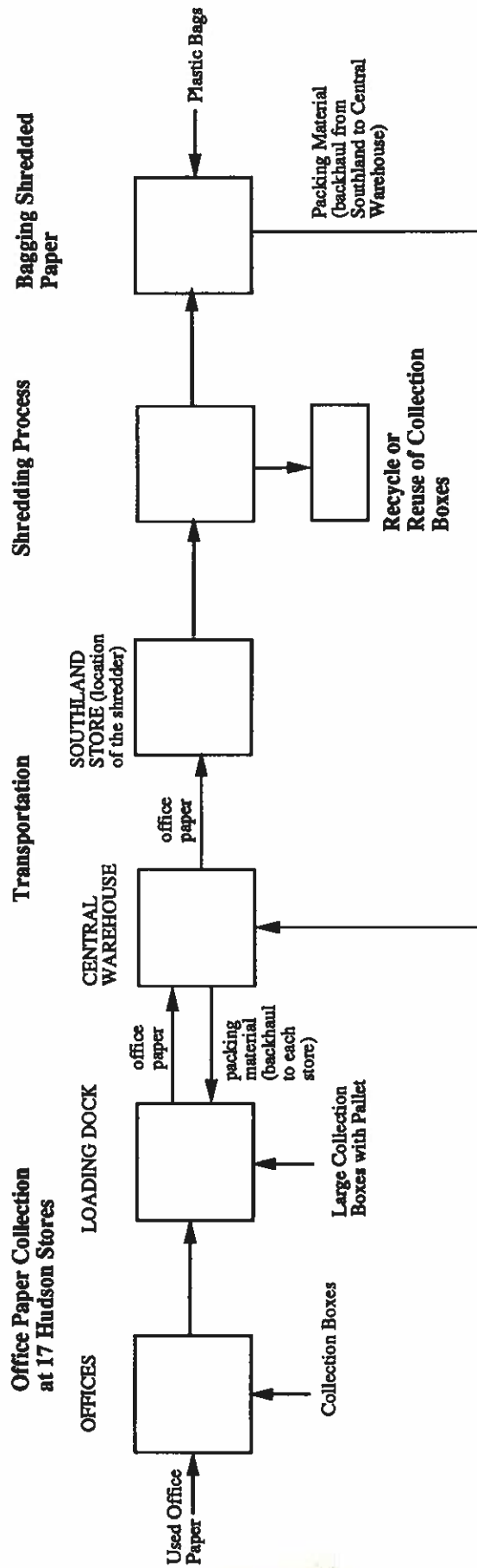


Figure 1. Material Flow Diagram of Office Paper Shredding Operation

packing annually. Paper packing use after conversion is projected to remain the same, adjusted for sales, with the excess shred available for sale to other retailers.

While Hudson's was purchasing paper packing, bales of packing material were shipped from the Distribution Center in Warren to individual stores, then transported within stores to the wrapping and packing area. Each bale was packaged in a medium weight plastic bag which was discarded after the bale had been depleted.

Process steps after the shredded material arrives at the Distribution Center in Warren are identical to the purchased packing system; the packing is shipped to each store, then transported to the wrapping and packing area for use. The systems differ in the following areas:

#### *Office Paper Collection*

When purchased packing was used, office paper waste was not separated from other waste. Office waste was collected periodically and discarded at each store.

In the new system, paper suitable for shredding is collected in each office and placed in original delivery boxes. Staff at each store gather paper when the boxes are full and place material for shredding on the same carts used for general waste collection. In some small stores, people deliver collected paper to the loading dock themselves. To simplify the collection process in larger stores, several stores are planning to concentrate used paper in a central area on each floor for pick-up on designated days. At present, approximately 3.5 extra hours per month are required at each store to collect office paper and deposit it in containers for shipment to the Distribution Center.

Hudson's estimates that 20% of their annual ledger paper purchase of 210,000 pounds will be recovered for shredding. Some stores project a recovery rate as high as 50%, but at a conservative 20% rate, the paper shredding operation will yield 42,000 pounds of packing annually.

#### *Containers*

Paper collected at each store's loading dock is transported to the Distribution Center in large corrugated boxes placed on a pallet. Boxes and pallets are reused materials obtained from vendor shipments to the stores. Boxes are used several times before they require replacement, and pallets can make many trips without being significantly damaged. Office paper is sometimes received at Southland in the original collection boxes rather than in a large container. In these cases, the boxes are recycled with the store's other corrugated containers.

#### *Shredding*

The Southland Mall store purchased a large shredder capable of handling the expected load of gathered paper. The shredder is located adjacent to the loading dock, minimizing the time and effort required to transfer paper and shredded packing between trucks. One full-time employee was hired at Southland to shred incoming paper and bag it for distribution to other stores. The shredder operator devotes 5 hours per week to tasks not directly related to packing production. Shredded paper packing is placed in securely tied plastic bags for shipping. Each bag of packing weighs approximately 20 pounds.

#### *Waste Generation*

Despite the availability of recycling programs in many areas, office paper waste at Hudson's was usually discarded prior to the inception of a shredded packing program. All of the paper collected for shredding is assumed to have been disposed of in the before case.

Table 1 shows the results of the process analysis.

**Table 1. Results of Process Analysis**

<b>Unit Being Measured</b>	<b>Before Case Purchased Packing</b>	<b>After Case Shredded Packing</b>	<b>Difference</b>
<b>Packing Purchased/Produced per month</b>	2,750 lbs.	3,500 lbs.	
<b>Solid Waste</b>			
Waste Generation per month	3,500 lbs.	36 lbs.	3,464 lbs.
<b>Utilities</b>			
Electricity Use per month	0	333 kwh	-333 kwh
<b>Labor</b>			
Gathering Labor per month	0	59.5 hrs	-59.5 hrs
Shredding and Bagging Labor per month	0	145.8 hrs	-145.8 hrs

## Discussion

Transportation needs were not analyzed because there was no difference in this category between the two systems. Used paper gathered from all stores is transported to the Distribution Center in Warren on return trips after shipments have been received. Such backhauling concentrates collected waste paper in Warren without additional transportation inputs. Paper is forwarded to Southland when there is room on a truck making normal deliveries. Shredded packing produced at Southland is backhauled to the Distribution Center for subsequent shipment to individual stores, again avoiding transportation inputs.

Waste generation is dramatically reduced by the new system. All material now being shredded was previously discarded, and the only wastes generated by the new system are the plastic bags used for shipment and some shredding litter. Weight of the bags used to package purchased packing was not calculated.

After the inception of shredding, labor and utility needs increased compared to the purchased packing case. Table 1 quantifies only those data necessary for a comparative analysis; labor and utility use required for both systems were not analyzed. A new 220 volt line was installed at the shredding station to provide proper power for the shredder. Reorganization of the space now used by the shredder was accomplished with minimal effort, although the rewiring required hiring an outside contractor.

## COST ANALYSIS

### Methodology

Factors contributing to Hudson's cost of using packing material are identified and discussed before and after the conversion to internally shredded paper packing. The analysis is limited to those items required for comparison of the two cases and does not evaluate costs that remain constant in both cases such as transportation, packing labor, and overhead expenses. Labor, equipment, utilities, and purchased packing material costs were obtained from Hudson's. The

equipment manufacturer provided information on the life expectancy of the shredder used for Hudson's packing program.

Costs included in this analysis are restricted to Hudson's internal business costs. No external costs, such as those incurred by the customer or manufacturer, are considered. The external life cycle costs associated with both packing systems were not studied in detail, because they were outside the scope of this study.

A life cycle analysis accounts for environmental impacts throughout the life of a product, beginning with raw materials extraction and proceeding through manufacturing, use, resource recovery, and disposal. Ideally, total environmental and social costs of each system should be evaluated and compared so that hidden costs, which are commonly borne by society and thus not reflected in production or retail costs, can be identified and compared.

## Results

Results of the economic analysis are summarized in Table 2.

**Table 2. Results of Economic Analysis**

<b>Unit Being Measured</b>	<b>Before Case <i>Purchased Packing</i></b>	<b>After Case <i>Shredded Packing</i></b>	<b>Difference</b>
<i>Purchased Packing Material per month</i>	\$3,339.92	\$0.00	\$3,339.92
<b>Equipment and Supplies</b>			
Shredder Depreciation per month	\$0.00	\$60.00	-\$60.00
Shredder Maintenance per month	\$0.00	\$83.33	-\$83.33
Plastic Bags for Shipping per month	\$0.00	\$36.17	-\$36.17
<i>Total Equipment and Supplies Cost</i>	\$0.00	\$179.50	-\$179.50
<b>Labor</b>			
Cost of Gathering per month	\$0.00	\$490.88	-\$490.88
Cost of Shredding per month	\$0.00	\$1,203.13	-\$1,203.13
<i>Total Labor Cost per month</i>	\$0.00	\$1,694.00	-\$1,694.00
<b>Utilities</b>			
Cost of Electricity per month	\$0.00	\$27.13	-\$27.13
Waste Disposal Cost per month	\$22.62	\$0.23	\$22.39
<i>Total Utilities Cost per month</i>	\$22.62	\$27.36	-\$4.75
<b>Total Costs per month</b>	<b>\$3,362.53</b>	<b>\$1,900.86</b>	<b>\$1,461.67</b>
<b>Total Costs per year</b>	<b>\$40,350.39</b>	<b>\$22,810.35</b>	<b>\$17,540.04</b>

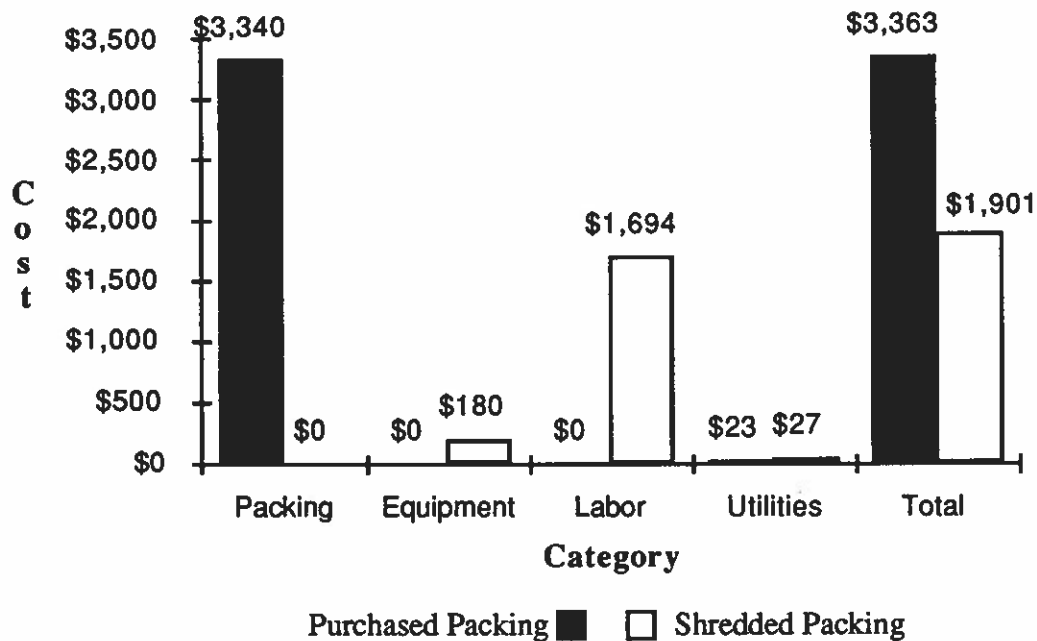
Costs in the purchased packing case are confined to packing material and disposal costs for the office paper waste now collected for shredding. Disposal costs for the plastic packaging used for purchased packing are not calculated. In addition, no estimate of the cost of extra plastic trash bags used for waste collection in the before case is provided. Fewer bags are now needed because paper is separated and collected in corrugated boxes that are subsequently recycled.

The shredding program required a greater variety of costs but yielded significant overall savings. The shredder depreciation figure in Table 2 includes the cost of installing appropriate wiring for the shredder and purchasing a new machine. Maintenance is an average figure, based on a yearly cost equal to 12.5% of the original equipment purchase price.

One employee was hired at the Southland store to operate the shredder and bag packing material. The operator spends approximately 5 hours per week on other tasks, and the cost of shredding labor was adjusted accordingly. Paper gathering costs at all seventeen stores were derived from labor estimates provided in the process analysis, multiplied by the appropriate wage provided by Hudson's. The wage rate includes all benefits and paid vacation time.

## Discussion

The labor cost required to gather and shred paper, along with equipment and supply costs associated with the shredding system, are significantly less than the cost of purchasing packing material from a vendor. The cost of discarding paper now recovered for shredding did not significantly contribute to the overall cost of the purchased system. Figure 2 compares monthly costs of the two packing material systems.



**Figure 2. Monthly Cost Comparison Of The Two Packing Systems**

Hudson's dramatically lowers packing costs by shredding paper rather than purchasing material from a vendor. As this graph demonstrates, Hudson's will save 43% of costs incurred in the old system by shredding its own paper. This analysis does not evaluate further savings that could result from selling excess shredded paper.

Hudson's plans to shred approximately 27% more collected office paper than it had been purchasing. If this product can be sold at a price equivalent to the price Hudson's was recently paying for packing material, the shredding system could be much more economically advantageous than the above figures suggest. Purchased packing material costs Hudson's about \$1.21 per pound. An excess shred of 9,000 pounds would therefore produce as much as \$10,900 per year



in additional revenue. When yearly savings are combined with expected revenues from sale of excess packing, the shredding program could yield as much as \$28,400 per year.

## **4. ADDITIONAL WASTE REDUCTION ACTIVITIES**

### **DESCRIPTION OF ACTIVITIES**

The Department Store Division of the Dayton Hudson Corporation recently adopted an Environmental Action Policy that addresses three categories of waste reduction: source reduction, recycling, and the use of recycled materials. Some stores had already implemented waste reduction measures before the policy became effective.

#### **Source Reduction**

##### *Washable Dishware*

At the Southland Mall store, and some other locations in Michigan, meals for committee meetings, staff gatherings, and luncheons previously served on disposable dishware are now served on reusable dishware from the in-store restaurant. Individual employees are also urged to use glass or ceramic mugs rather than disposable cups for their beverages. Some stores have purchased ceramic mugs for all their office employees. The conversion from disposable to washable dishware at meetings was greeted with some skepticism from restaurants required to stock and wash extra dishes, but the new system was smoothly implemented without significant reorganization of the food service operations. Restaurants at Hudson's serve all meals for the public on washable dishware.

##### *Packaging & Packing*

Vendors have been urged to reduce the amount of packing and packaging in their shipments. At Southland and most other Hudson's in Michigan, expanded polystyrene "peanuts" used for packing have been targeted for elimination. Hudson's own shredded paper packing performs as well as EPS. Hudson's has an additional incentive to use its own packing, because EPS is not well received by some customers. However, as long as some incoming shipments are packed in EPS, Hudson's is committed to recovering this material and reusing it for packing customer shipments.

##### *Clothing Hangers*

Some men's apparel that previously arrived on disposable hangers is now shipped on wooden hangers that are returned to vendors for continued reuse. Hudson's own plastic display hangers are reused within the store many times.

##### *Batteries*

At the Southland Mall store, disposable batteries used for displays and staff equipment have been replaced with rechargeable batteries. This rechargeable battery program reduces waste and saves the company money.

## *Paper*

The weight of some paper used in the credit department has been reduced, avoiding unnecessary material use.

## *Reports*

Some Hudson's stores use double-sided copying for reports. The Briarwood store also reduces text and tables 50% before copying, so reports require only 25% of the paper previously used for this purpose.

## **Recycling**

### *Corrugated Cardboard*

Hudson's recycles about 75% of all waste corrugated cardboard produced by its operations; the Southland store recycles nearly 100% of all its corrugated cardboard waste. A baler is used to compress and securely bundle recycled corrugated for shipment to buyers. Bales of corrugated are tied with steel wire, which is also recyclable.

The Southland Mall store, an average-sized Hudson's, recycles approximately four 400 pound bales of corrugated per week. If all Hudson's stores recycle a similar amount of material, 700 tons of material is diverted from state landfills annually.

### *Plastic*

A variety of plastic waste is produced by Hudson's operations. At present, clear low density polyethylene (LDPE) garment bags are collected in all Michigan stores and sent to the Southland Mall store for baling. Shipping procedures are identical to those used for office paper. No additional transportation costs or energy are required to collect the bags from Michigan stores and concentrate them at Southland, because bags are sent back to the Warren Distribution Center on return trips after warehouse shipments, then forwarded to Southland as part of regular shipments when there is room on the trucks.

Plastic is baled at Southland in the same baler used for corrugated board. Problems resulting from the physical properties of plastic required immediate modification of baling procedures when plastic recycling was initiated. The first bales of recycled plastic relaxed so dramatically after binding that they became too loosely confined for effective handling. This defect was solved when the plastic was compressed less vigorously and all sides of the baler were lined with old corrugated boxes to provide a structural frame for the bales.

Constructing frames of custom fitted old boxes is labor intensive. In the future, Hudson's will purchase new corrugated board specially sized to fit its baler. After compressing plastic bags within a corrugated frame, flaps can be closed over the top of the bale before the binding is applied. A one-piece frame will provide greater stability and substantially increase the speed and ease with which plastic is baled. The corrugated board used for framing and the steel wire binding are both recyclable. Bales of plastic are stored at the distribution center in Warren until a 45 foot trailer load is accumulated. Full trailer loads of plastic are shipped to a local buyer of recycled plastics. Approximately one and a half 200 pound bales of plastic are collected each week. At this rate, the Hudson's plastic recycling program diverts about 8 tons of material from Michigan landfills each year.

Plans are underway to collect and bale clear garment bags made of a related plastic resin. Vendor hangers, which are not sturdy enough to be used for display and are consequently discarded, are also being considered for recycling if a buyer can be found.

### *Mixed Paper*

Computer paper, newspapers, and other lower grade office papers are collected and recycled at the Southland Mall store and at other locations in Michigan. The success of local mixed paper recycling efforts at Hudson's depends on the availability of buyers for this material. Many areas of the state are served by recycling companies which will accept mixed paper without charging for pickup or providing payment for the material. Fees for collecting mixed paper in other areas of the state are lower than prevailing charges for hauling municipal solid waste.

### *Beverage Containers*

Glass, aluminum, steel, and plastic beverage containers are returned for deposit at most Hudson's. Containers not returned for deposit are recycled.

### *Use of Recycled Material*

Comprehensive waste reduction may also include buying products with the highest possible recycled content to assure that a market exists for material collected by recycling programs. Without such markets, recycling programs could merely be another form of waste collection. Although purchasing or selling products with some recycled content does not qualify as a waste reduction activity, it helps insure the present and future viability of recycling programs, thus keeping this waste reducing option open.

Paper Hudson's Department Stores purchases the following varieties of paper with some recycled content:

- Fine office paper, including all white stock in the Graphics Department, and paper for various employee publications. Plans are being made to use recycled paper in all copiers.
- Envelopes and statement paper used in the credit department (15% postconsumer, 35% preconsumer, 50% virgin).
- Some register rolls contain recycled material. If trials prove successful, all register rolls could have some recycled content in the future.
- Computer-generated reports are printed on 100% preconsumer recycled paper.

*Headlines*, an internal newsletter, is printed on recycled paper. When Hudson's first expressed a desire to use recycled paper for newsletters, the printer claimed that recycled paper was either unavailable or not suitable for their needs. The printer agreed to provide recycled stock for the company newsletter after being informed that the Hudson's account would move to a printer who supplied recycled paper.

Hudson's wishes to use recycled paper for its advertising inserts. Supplies of magazine weight, recycled coated paper are currently very limited, but Hudson's plans to use recycled paper for advertising inserts as soon as possible.

### Packaging

- Gift boxes are made of recycled paperboard (generally a 100% recycled product consisting of old newspapers).

- White paper bags contain some recycled content. Hudson's is in the process of changing from shiny, clay coated paper bags that are not usually accepted by recycling programs to kraft paper bags that can be recycled. Approximately 75% of Hudson's paper bags are uncoated, and 25% are still coated. Hudson's intends to offer customers only recyclable kraft paper bags in the near future.
- Polyethylene bags provided to customers by Hudson's contain 50-60% recycled material.

## 5. ORGANIZATIONAL AND MOTIVATIONAL ANALYSIS

The Dayton Hudson Corporation (DHC), parent corporation of Hudson's department stores, is located in Minneapolis, Minnesota. The Minneapolis City Council has debated strict environmental ordinances for the past several years and has recently attempted to pass legislation banning the use of any packaging material that is not recyclable. Believing that similar ordinances will be increasingly common in the future, and wishing to position themselves in the forefront of this process rather than react to a variety of proposals after the fact, DHC Central Headquarters began formulating an appropriate environmental policy for the future. Individual stores had implemented a variety of waste reduction procedures on their own in the past, but Central Headquarters decided that a formal program was the most effective strategy for insuring waste reduction throughout the company.

As a result, Hudson's instituted Environmental Action Committees early in 1990 and also distributed an Environmental Action Policy later in the year. Committees are responsible for ensuring that the entire division follows the environmentally sound business practices outlined in the formal policy by keeping operations at local stores in compliance with company standards. Any employee can volunteer for a store's Environmental Action Committee. The committees both solicit ideas from and communicate ideas to other employees. Ideas generated by the staff of local stores can thus be explored and implemented if they prove feasible. Each Hudson's has the freedom to propose new waste reduction plans, and locally generated ideas are frequently supported by Central Headquarters.

Individual involvement in programs created by local committees and supported by Central Headquarters is one of the most important elements in Hudson's successful waste reduction efforts. A structure now exists for encouraging the whole organization to demonstrate a commitment to waste reduction, so program ideas generated by Environmental Action Committees can be implemented and supported in an efficient manner.

Operations Managers of individual stores also serve as Environmental Coordinators, thus integrating environmental concerns into management policies. Coordinators meet monthly to discuss operational issues, which include environmental policy matters. Strategies to reduce waste are presented at the meetings and innovative ideas are exchanged.

The paper shredding operation documented in this report is an example of how Hudson's formal organization for implementing environmentally responsible practices functions. Reacting to local concerns and substantial employee input, the Operations Manager/Environmental Coordinator of the Ann Arbor Briarwood Hudson's acted in 1987 to replace expanded polystyrene packing with shredded, internally generated office paper. Shredding machines used for packing production quickly failed, forcing reliance on purchased packing. The undersized shredder also resulted in higher costs than anticipated. Initial reports to other stores about the project were well received, but due to questions about economic feasibility and lack of strong customer interest in eliminating plastic packing in some areas, no action was taken statewide.

Growing environmental concern among customers, along with increased community support for waste reduction efforts at some individual stores, led to renewed interest in shredded paper packing at monthly meetings of Operations Managers. After some consideration, Michigan Hudson's stores decided to implement paper shredding on a statewide basis.

Several modifications, including the purchase of a much higher capacity shredder, were made to the procedures used in the Briarwood pilot project. After testing the new shredder with the Southland Mall store's paper, shredding was then scaled up to process collected material from all 17 stores.

Motivation for waste reduction was provided by the communities in which Hudson's operates and by concerned customers and Hudson's employees. The paper shredding operation was facilitated by the interest in waste reduction present at all levels of Hudson's and an organizational structure that creates an effective network for sharing information within the company. Such networks allow promising ideas implemented in one location to be quickly adopted throughout an organization.

## **6. IMPACT AND TRANSFERABILITY**

### **IMPACT**

The impact of Hudson's waste reduction programs on state solid waste generation can be roughly estimated by assuming that waste production in the department store sector is proportional to sales. The 17 Michigan Hudson's stores contain 55% of Dayton's and Hudson's total square feet of retail area. Assuming sales are proportional to the amount of retail floor space within the department store division, Michigan Hudson's generate sales of approximately \$990 million annually. This represents about 12% of the \$8.4 billion annual sales in Michigan's department store sector.

Assuming all department stores in the state are now discarding at least 20% of their recoverable office paper waste, adoption of the Hudson's shredding program throughout the sector could divert as much as 175 tons of material from Michigan landfills annually.

If the preceding assumptions are applied to recycling, adoption of Hudson's recycling practices by all businesses in the department store sector could reduce waste sent to Michigan landfills by as much as 5900 tons per year.

Statewide impact of the waste reduction methods practiced at Hudson's would be much greater if projected to the entire general retail sector. Other retailers or manufacturers who require packing material for shipping could also adopt the Hudson's system, substantially magnifying waste reduction in the state. In addition, customers or vendors receiving shredded paper packing can reuse or recycle this material, increasing the waste reducing impact of the Hudson's program even further.

### **TRANSFERABILITY**

One key to the transferability of Hudson's paper shredding operation may be the size and nature of interested companies' retail operations. Companies operating a chain of stores supplied by a central warehouse will find no substantial process or economic impediments prevent them from adopting the Hudson's system.

Retailers operating a single department store may not have the economies of scale available to Hudson's. On the other hand, problems that developed in the pilot program at the Briarwood store could be avoided by studying this report, then assessing the feasibility of similar programs tailored to individual situations.

Organizational and motivational factors must also be included when considering the transferability of Hudson's waste reduction activities. Environmental Action Committees provide a formal structure for encouraging waste reduction at all levels of the company. Motivation for waste reduction is evidenced by employee involvement and management support. Both factors played an important role in pushing the paper shredding operation forward and in implementing other waste reduction practices at Hudson's.

Retailers lacking such an integrated, participative structure for waste reduction may encounter problems successfully transferring specific programs studied in this report to their operations. However, most retailers can recycle suitable waste materials resulting from their operations. Although not a formal element of waste reduction, retailers may also assist in the viability of recycling programs by purchasing paper and packaging with as much recycled content as possible. Use of recycled material can be publicized and in those cases where recycled materials cost more, viewed as an effective method of advertising.

### **Factors Enhancing Transferability**

- Waste paper is produced by all retailers, and the Hudson's process for reusing this waste can easily be adopted by any retailer requiring packing materials for customer purchases.
- Significant waste reduction can be achieved by reusing office paper as a packing material.
- Shredding internally generated office paper for use as a packing material saves money, particularly in multi-store operations
- Other waste reduction practices at Hudson's can be readily adopted without significant additional cost. These include:
  - receiving goods in reusable packaging
  - asking vendors to reduce packing and packaging material
  - using washable rather than disposable cups and dishware
  - recycling corrugated cardboard and plastic, where feasible
  - recycling mixed paper waste and aluminum, glass, steel, and plastic containers

### **Impediments to Transferability**

- Retail operations smaller than Hudson's may find shredding paper for packing material provides no cost advantage over purchased paper packing.
- Retailers without a formal organizational focus on waste reduction, or stores lacking staff participation, may have less success implementing a full range of reduction programs.
- Adoption of some waste reduction practices followed by Hudson's, such as recycling, is dependent on availability of local programs for small retailers.

## 7. CONCLUSIONS AND RECOMMENDATIONS

### CONCLUSIONS

- Producing packing material from shredded paper reduces waste. The reuse of paper, even where it could be recycled, is a more environmentally desirable option for waste reduction than recycling when all the transportation, distribution, and remanufacturing inputs involved in recycling are considered.
- The use of internally generated shredded paper reduces Hudson's packing material costs by 43%. Sale of excess material could result in the shredding program producing \$10,900 in revenue each year.
- An organizational structure that provides formal avenues for waste reduction implementation made a major contribution to the success of Hudson's program. Employee participation at all levels produced a greater commitment to waste reduction.
- Hudson's has an effective network for communicating ideas and information between individual stores. Multi-store operations can implement successful local programs much more quickly when such networks exist.
- The process used to shred office paper for packing material is easily transferable to other multi-store retail operations in the state of Michigan.
- Single store retailers may also find the paper shredding process documented in this report is transferable to their operations, but it may not be as cost effective as the larger Hudson's model.
- Adaptation of some waste reduction practices discussed in this report will be necessary for many general retailers. If the proper level of motivation exists, the entire range of waste reduction methods practiced by Hudson's could be adopted across the general retailing sector.

## **RECOMMENDATIONS**

Based on the Hudson's case study, department stores, general retailers, and other businesses interested in waste reduction should consider the following recommendations to facilitate the implementation of individually designed waste reduction programs:

- As waste reduction becomes an increasingly important issue for department stores and general retailers in the state of Michigan, familiarity with successful programs in the sector can help retailers decide to begin a program of their own.
- Retailers who decide to implement comprehensive waste reduction programs now can reduce costs and gain a competitive advantage over others who delay.
- Perform process and cost analyses of proposed waste reduction strategies at your company to assess their feasibility.
- Begin with a single program. Confidence and expertise gained in one program can be an advantage in implementing others. Many waste reduction strategies seem complicated until experience demonstrates how easily they can be adopted.
- An organization that encourages participation at all levels will be more successful in realizing waste reduction.
- Many waste reduction strategies can be implemented without lengthy study, and retailers should inform customers of their efforts in this area. The advantages of reusable packing material made from office paper waste and any in-store reuse or recycling should be emphasized in advertising, informative inserts, and displays.



## APPENDIX A

<b>Unit Being Measured</b>	<b>Before Case Purchased Packing</b>	<b>After Case Shredded Packing</b>	<b>Difference</b>
<b>PROCESS ANALYSIS</b>			
Packing Purchased/Produced per month	2,750 lbs.	3,500 lbs.	
<b>Solid Waste</b>			
Waste Generation per month	3,500 lbs.	36 lbs.	3,464 lbs.
<b>Utilities</b>			
Electricity Use per month	0	333 kwh	-333 kwh
<b>Labor</b>			
Gathering Labor per month	0	59.5 hrs	-59.5 hrs
Shredding and Bagging Labor per month	0	145.8 hrs	-145.8 hrs
<b>ECONOMIC ANALYSIS</b>			
Purchased Packing Material per month	<b>\$3,339.92</b>	<b>\$0.00</b>	<b>\$3,339.92</b>
<b>Equipment and Supplies</b>			
Shredder Depreciation per month	\$0.00	\$60.00	-\$60.00
Shredder Maintenance per month	\$0.00	\$83.33	-\$83.33
Plastic Bags for Shipping per month	\$0.00	\$36.17	-\$36.17
<i>Total Equipment and Supplies Cost</i>	<b>\$0.00</b>	<b>\$179.50</b>	<b>-\$179.50</b>
<b>Labor</b>			
Cost of Gathering per month	\$0.00	\$490.88	-\$490.88
Cost of Shredding per month	\$0.00	\$1,203.13	-\$1,203.13
<i>Total Labor Cost per month</i>	<b>\$0.00</b>	<b>\$1,694.00</b>	<b>-\$1,694.00</b>
<b>Utilities</b>			
Cost of Electricity per month	\$0.00	\$27.13	-\$27.13
Waste Disposal Cost per month	\$22.62	\$0.23	\$22.39
<i>Total Utilities Cost per month</i>	<b>\$22.62</b>	<b>\$27.36</b>	<b>-\$4.75</b>
<b>Total Costs per month</b>	<b>\$3,362.53</b>	<b>\$1,900.86</b>	<b>\$1,461.67</b>
<b>Total Costs per year</b>	<b>\$40,350.39</b>	<b>\$22,810.35</b>	<b>\$17,540.04</b>

	A	B	C	D
1		Before Case	After Case	
2	Unit Being Measured	<i>Purchased Packing</i>	<i>Shredded Packing</i>	Difference
3				
4	PROCESS ANALYSIS			
5	Packing Purchased/Produced per month	=33000/12	=42000/12	
6	Solid Waste			
7	Waste Generation per month	=42000/12	=4*(50/12)+((3500/20)*0.11)	=B7-C7
8	Utilities			
9	Electricity Use per month	=0	=4*4*((50*5)/12)	=B9-C9
10	Labor			
11	Gathering Labor per month	=0	=3.5*17	=B11-C11
12	Shredding and Bagging Labor per month	=0	=35*50/12	=B12-C12
13				
14	ECONOMIC ANALYSIS			
15	Purchased Packing Material per month	=40079/12	=0	=B15-C15
16	Equipment and Supplies			
17	Shredder Depreciation per month	=0	=(8000+1000)/12.5/12	=B17-C17
18	Shredder Maintenance per month	=0	=(0.125*8000)/12	=B18-C18
19	Plastic Bags for Shipping per month	=0	=(C5/20/150)*31	=B19-C19
20	Total Equipment and Supplies Cost	=B17+B18	=C17+C18+C19	=B20-C20
21	Labor			
22	Cost of Gathering per month	=0	=C11*8.25	=B22-C22
23	Cost of Shredding per month	=0	=C12*8.25	=B23-C23
24	Total Labor Cost per month	=B22+B23	=C22+C23	=B24-C24
25	Utilities			
26	Cost of Electricity per month	=0	=C9*0.0814	=B26-C26
27	Waste Disposal Cost per month	=(B7/1566)*(425/42)	=(16.666/1566)+(19.25/1600))*(425/42)	=B27-C27
28	Total Utilities Cost per month	=B26+B27	=C26+C27	=B28-C28
29				
30	Total Costs per month	=B15+B20+B24+B28	=C15+C20+C24+C28	=B30-C30
31	Total Costs per year	=B30*12	=C30*12	=B31-C31