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## RECYCLING: YOU ARE THE SOLUTION

For the past few months, recycling has been the topic of sit-coms, magazine and newspaper articles, how-to classes, cartoon and comic strips, and editorials. In spite of all this attention to the subject, we, nationwide, are not doing that well with recycling.

Since World War II, the United States has become increasingly a "throw-away" country. Before that time, we reused everything possible. Seed and flour sacks were used for clothing and dish towels; milk was delivered in glass bottles which were returned to the dairy to be used again; paper was saved to start fires in furnaces and fireplaces and, sometimes, to wallpaper rooms; cloth handkerchiefs were used, washed, and used again. Flour, sugar and seeds no longer are packaged in cotton sacks; milk no longer comes in glass bottles. But, there are things we use only once that could be reused or recycled.

We give little thought to what we toss aside or to where it goes. The time has come when all of us have to take responsibility for our "use it once; discard it" attitudes and actions. Landfills are decreasing in number each year and the NIMBY (not in my backyard) outlook prevails. Replacement sites are not being constructed to take the place of those which are filled to capacity.

Solid waste can be dumped (as in landfills), burned (as in incinerators), or recycled. No one seems to want to live next to, behind, or in front of a landfill, so that restricts possible landfill sites to replace those facilities which are overloaded. Environmentalists are concerned about pollutants in the air as a result of burning solid wastes, which makes incineration next to impossible. That leaves recycling.

Recycling will work when a) people commit to a recycling program (either voluntary or compulsory) and b) when recycled goods are demanded by the public. The supply and demand rule is at work — if we demand, loudly and legally, more recycled products, industry will supply them. For instance, if enough people stop purchasing paper products that do not use recycled paper, more recycled paper will be used. When shopping for greeting cards, how many of us check to see if they are made from recycled material? If we remain complacent about the use of recycled goods, the supply will dwindle or be non-existent.

The three "R's" of the 90's will be REDUCE, REUSE, RECYCLE.

"Recycling is better than disposal,  
reuse is better than recycling,  
but reduction is best of all."

Donnella H. Meadows  
Dartmouth College (1989)

We can reduce the amount of solid waste by not buying any "disposable" products and by refusing to accept over-packaging. Many of our throwaways can be reused, maybe not in the same capacity, but reused. Some items which we personally might not want to reuse can be reused by others. If we reduce and reuse, there will not be as much to recycle.

Recycling is not the cure-all for all solid waste problems. There will still be a need for land-fills and/or incinerators. But, recycling can make a difference. It is up to each of us to see that it does.

We hope that the exhibit "Recycling: You are the Solution" will make students more aware of the need for recycling and conservation of our natural resources.

## RECYCLING: YOU ARE THE SOLUTION

### RECYCLING TAKES SOMETHING WHICH WOULD HAVE BEEN THROWN AWAY AND PUTS IT TO USE AGAIN.

Americans produce nearly 150 million tons of residential and commercial solid waste each year, or slightly less than 1,400 pounds for each one of us.

Recycling saves valuable landfill space which is getting harder to find. Current landfills are quickly filling up and less land is now available for this use. Also, few people want to live near a landfill. Others fear ground-water contamination by landfills. Recycling helps our fragile planet because we use its natural resources in wiser ways than when we throw away our waste.

Recycling also has economic benefits. Some of these are:

- Tax savings because less money has to be spent on solid waste disposal.
- More efficient use of commercial incinerators.
- Less money paid to foreign nations for imported raw materials.
- Consumer demand encourages manufacturers to develop new products using recycled materials.

YOU CAN RECYCLE: newsprint . . . aluminum cans . . . steel cans . . . glass . . . plastic bottles . . . yard waste.

## ALUMINUM CANS

It is easy to recycle aluminum cans. Fifty percent of the cans we use today have been recycled.

Aluminum comes from bauxite.

It costs 10 times as much to make a new aluminum can as it does to make a reprocessed can.

### ALSO, RECYCLING ALUMINUM USES ONLY 5% OF THE ENERGY USED TO MAKE NEW CANS.

## STEEL CANS

Recycled steel cans are used to make new steel for manufacturing. Tin is removed from the outer coating and is used to make new tin products. Tin is also an expensive and imported metal.

We produce nearly three million tons of cans per year.

## INDUSTRIAL METAL WASTE

Many industries have recycled metal waste for decades. Steel, copper, iron and tin are examples of commonly recycled metals.

## GLASS

Glass is 100% recyclable and can be recycled again and again.

Before glass is recycled, it is crushed. Crushed glass is called "cullet." Cullet melts at a lower temperature than the raw materials of glass, so energy is saved during this manufacturing process.

Glass recycling requires two major steps — collecting and processing.

COLLECTION: Drop-off centers, buy-back centers and curbside collection are some of the ways glass is recovered. Local organizations such as churches, Scouts, garden clubs, and others support the glass recycling program by collecting glass to raise funds.

PROCESSING: In processing recycled glass, cullet is mixed with sand, soda ash, and limestone which are heated and formed into new glass.

RECYCLING ONE GLASS JAR SAVES ENOUGH ENERGY TO LIGHT  
A 100 WATT BULB FOR FOUR HOURS.

## PAPER

Paper, especially newsprint, has been recycled for generations. Many grandparents of today's middle school students collected newsprint in recycling drives when they were young.

Newsprint recycling is still popular. In 1988, 35% of all newspapers were collected for recycling.

The newspaper industry is a strong supporter of recycling. Many newspapers are using recycled paper for newsprint.

Recycled newsprint can also be used to make:

- Paper towels
- Paperboard boxes
- Cellulose insulation
- Animal bedding
- Egg cartons
- Seed mulch
- Shipping stuffing

EVEN NOW, 20% OF ALL NEWSPRINT USED BY THE KNOXVILLE NEWS-SENTINEL  
IS PRINTED ON RECYCLED NEWSPRINT

### AVERAGE LANDFILL

8%	35%
N	P
E	A
W	P
S	E
P	R
A	
P	
E	
R	

## PLASTICS

Two plastic bottles might look alike but may be made up of different chemical compounds and might have to be recycled in different ways.

The plastics industry has developed a coding system that identifies the chemical compounds in plastic to make separation and recycling faster and more efficient.

### SOFT DRINK PLASTIC CONTAINERS USE LESS ENERGY TO RECYCLE THAN ALUMINUM OR GLASS.

Plastics have suffered from a bad reputation due to the fact that they are not "biodegradable," which means that they cannot be broken down in the ground by bacteria. This reputation is undeserved because plastics are very easy to recycle.

Recycled plastic can be used to make:

- Sleeping bags
- Pillows
- Floor tiles
- Fiberfill for jackets
- Carpet backing
- Baseball bats
- Paint brushes
- Plastic building materials

## YARD WASTE

Composting saves 20% of our landfill space.

When a community composts, it extends the use of its landfill for many years. The rich soil produced by composting is often sold to gardeners, or is used in flower beds of public buildings.

You can help by creating your own compost pile.

- First, place a 6 inch layer of leaves on a six foot by six foot square.
- Next, cover with 6 inches of grass clippings along with what food waste you have available.
- Then place a layer of cow or chicken manure on top (fertilizer will also work).

Continue layering with leaves, grass, food waste, and manure until the pile is 5 feet tall, then cover with top soil. Moisten the pile thoroughly, and make sure it always stays damp. If you turn it over completely every day, you'll have compost within weeks.

Composting turns yard waste (leave, limbs, and grass clippings) and home waste, other than bones, back into soil. Over 20% of our landfills are made up of yard waste.

## SOLUTION

Recycling begins with each one of us. We must be willing to separate glass, cans, paper, and plastics from non-recyclable trash. Companies, corporations and communities must also commit to recycling.

A person who recycles can take pride in the fact that he or she is helping to solve a serious problem. A community that recycles can take pride in the fact that it is helping to turn a lot of its trash into valuable resources.

Once recycling becomes a part of our lives, it will be easy because it will be just another one of those things we do every day.

These are the things we can do to start the recycling solution:

- Separate glass, newsprint, paper, plastic and aluminum cans and take them to recycling drop off centers.
- If convenient drop off centers are not available, ask your local government to provide them.
- Buy, when possible, only those products made with recycled materials, or . . .
- Buy products whose containers can be recycled.
- Conduct, or be a part of, a recycling drive in your community.
- Encourage community composting, as well as start your own compost pile.

Successful recycling programs are happening. San Jose, California processes 2,000 tons of material per month. Almost 60% of its citizens help do this. Oak Lawn, Illinois processes 1,000 tons of material per month with 70% of its citizens participating.

## VOCABULARY

**BALING** (refuse) — a method of waste disposal in which refuse is compacted, fastened in bales (like hay), and deposited in a systematic order, reducing the amount of space needed for disposal.

**BI-METAL CAN** — A beverage container with a steel body and an aluminum top.

**BIODEGRADABLE** — Capable of being broken down into harmless pieces by the action of nature (sunlight, moisture, air).

**COMPOST** — Layering of waste such as food scraps and grass clippings so that it decays into humus. (See humus)

**CONSERVATION** — The controlled use and systematic protection of natural resources.

**CULLET** — Scraps of waste glass that can be remelted and reused.

**DECOMPOSE** — To rot, or decay; to break down through chemical change into simple compounds.

**DUMP** — A site where mixed wastes are indiscriminately deposited, without regard to the protection of the environment; compare landfill.

**EPA** — Abbreviation for the Environmental Protection Agency; the Federal agency charged with the enforcement of all Federal regulations having to do with air and water pollution, radiation and pesticide hazard, ecological research, and solid waste disposal.

**GARBAGE** — Food that is thrown away. Wet food waste, not dry trash.

**GROUNDWATER** — Water below the earth's surface that fills the spaces and moves between soil particles and rock. More than half of the people of the United States depend upon groundwater for their drinking water.

**HAZARDOUS WASTE** — Waste that is dangerous to human health and/or the environment.

**HDPE** — High density polyethylene; a type of plastic used in making milk and water jugs.

**HUMUS** — Organic material consisting of decayed vegetable matter that provides nutrients for plants and increases the ability of the soil to retain water.

**INCINERATOR** — A facility designed for the controlled burning of waste; reduces waste volume by converting waste into gasses and a relatively small amount of ash.

**LANDFILL** — A large, outdoor area for waste disposal; landfills where waste is exposed to the atmosphere are called open dumps; in sanitary landfills, waste is layered and covered with soil.

**LITTER** — Solid waste that is generated by consumers and carelessly and improperly discarded (e.g., along roadsides or on streets and sidewalks).

**LULU** — Acronym for Locally Unwanted Land Use; for example, prisons, airports, and landfills.

**METHANE** — A colorless, odorless, flammable, gas that is a product of the anaerobic decomposition of organic matter; can be burned as a fuel.

**NATURAL RESOURCES** — Valuable nature material such as soil, wood, air, water or minerals.

**NIMBY** — Acronym for Not in My Back Yard; refers to the fact that people want the convenience of products and proper disposal of the waste generated by their use of the products, provided the disposal site is not located near them.

**NIMEY** — Acronym for Not in My Election Year; refers to the attitude of politicians concerning controversial actions during an election year.

**NONBIODEGRADABLE** — Not capable of being broken down by microorganisms.

**ORGANIC** — Composed of living or once-living matter; more broadly, composed of chemical compounds principally based on the element carbon.

**OSHA** — Acronym for the Occupational Safety and Health Administration; regulates and sets the standards for health and safety practices in the workplace.

**PET** — Abbreviation for polyethylene terephthalate; a type of plastic used in making soft drink bottles.

**RECYCLE** — To separate a given waste material from other wastes and process it so that it can be used again.

**REFUSE** — Solid waste.

**REUSE** — To use something again for its original purpose; for example, returnable milk bottles are reused.

**RUBBISH** — A term used for soil wastes (excluding food wastes and ashes).

**SANITARY LANDFILL** — A land area where solid wastes are disposed of using a method that protects human health and the environment by spreading the waste in layers, compacting it to the smallest practical volume, and covering it with soil at the end of each working day.

**SOLID WASTE** — Unwanted, discarded material that does not contain enough liquid to flow easily.

**TIPPING FEE** — A fee charged for waste disposal in a landfill per given amount of waste.

**THROW-AWAY LIFESTYLE** — A way of living characterized by a high level of product consumption and discarding, especially if the products are meant for one-time usage.

**TRASH** — Dry waste materials, not including food waste (garbage) and ashes.

**WASTE** — Anything that is discarded, useless, or unwanted.

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IF CURBSIDE RECYCLING IS NOT AVAILABLE TO YOU,  
THE FOLLOWING BUSINESSES IN KNOX COUNTY COLLECT RECYCLABLES

A-1 Wiping Rag Co.

1942 Western Ave.

521-6580

Aluminum, copper, brass, radiators, batteries,  
lead, cast iron, dye cast, stainless steel.

Alcoa Recycling Center

600 N. Gay Street

971-1907

Aluminum cans.

Central Recycling

3015 N. Central Street

525-9775

Aluminum, copper, brass, copper-brass, stainless  
steel, radiators, batteries, cardboard and  
newspapers.

Dale Avenue Junkyard

1214 Western Ave.

523-1226

Aluminum, copper, brass, lead and stainless steel.

Enterprise Oil

Lexington Drive

690-9751

Waste motor oil only.

Industrial Oil Service

Crossline Road, Karns

693-7627

Used motor oil or petroleum based products such  
as transmission fluid.

Inskip Glass Recycling

210 Sylvia Drive

688-1563

Aluminum cans, glass, auto batteries, plastic con-  
tainers, rubber inner tubes, radiators, heater cores,  
stainless steel, lead scrap, sheet copper and scrap  
aluminum.

The David-Joseph Co.

2420 Schofield St.

637-0683

Steel and motor cast.

Justin's Recycling

935 Oldham Ave.

525-2358

Aluminum cans, auto batteries, glass, plastic con-  
tainers, rubber inner tubes, scrap aluminum,  
stainless steel, copper-aluminum, copper, lead,  
radiators/heater cores, brass, iron and aluminum.

Knoxville Metal Corp.

822 Richards St.

637-4353

Scrap iron, copper, brass, aluminum, aluminum  
cans and cast iron steel.

Knoxville Recycled Fiber

410 Frazier St.

522-6129

Newspaper, mixed paper, cardboard (corrugated),  
computer paper and any paper not waxed or  
coated.

Middlebrook Recycling

2908 Middlebrook Pike

637-7739

Aluminum cans, copper, brass, all types of  
aluminum, lead, batteries, stainless steel and all  
non-ferrous metals.

Paper Stock Dealers, Inc.

1111 Mitchell St.

524-0309

Computer paper, newspaper, cardboard (cor-  
rugated), ledger paper, IBM computer cards,  
and aluminum cans.

Sacred Heart Cathedral

711 Northshore Drive

588-0249

Computer paper, cardboard (corrugated), ledger  
paper, IBM computer cards, newspaper, and  
aluminum cans.

Willy's Recycling

7220 Central Avenue Pike

947-1442

Glass, batteries, copper, aluminum cans, brass,  
radiators and other aluminum.

South Knox Recycling  
4303 Edington Road  
637-7739

Aluminum cans, copper, brass, junk batteries, non-ferrous metals, and glass.

Southern Foundry  
2826 N. Central St.  
524-2791

Most metals (ferrous and non-ferrous), aluminum, copper, brass, steel, iron appliances and junked cars.

David Witherspoon Inc.  
901 Maryville Pike  
577-1613

Cast iron, iron, tin, stainless steel, aluminum, aluminum cans, brass, copper, and radiators.

#### KNOX COUNTY SOLID WASTE AND RECYCLING CONVENIENCE CENTERS

Carter, 8815 Asheville Highway  
Halls, 6659 Maynardville Highway  
Lovell Road, 119 Lovell Road

Summer hours of operation are:  
Monday-Friday 9 a.m.-7 p.m.  
Saturday 7 a.m.-3 p.m.  
Lovell Road and Halls locations

Monday-Friday 10 a.m.-6 p.m.  
Saturday 7 a.m.-3 p.m.  
Carter location

Winter hours of operation are:  
Monday-Friday 9 a.m.-7 p.m.  
Saturday 7 a.m.-3 p.m.  
All locations

Aluminum cans, plastic bottles, newspaper, oil and glass accepted.

#### DROPOFF CENTERS

Krogers, 5003 Broadway  
Buy for Less, Kingston Pike and Walker Springs

Newspapers, glass bottles and jars, aluminum cans, plastic milk jugs and clear soda bottles are accepted.

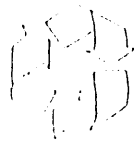
For all locations, separate plastic soft drink bottles — clear from green. Combine plastic milk cartons; step on them to conserve space. Do not include detergent or automotive bottles, plastic bags or food containers with your recyclable plastics.

## YOU CAN MAKE A DIFFERENCE

- Recycle everything you can.
- Conserve water.
- Use cloth napkins and dish towels.
- Do not use disposable anything — razors, lighters, diapers.
- Buy fast foods at places that use paper packaging rather than styrofoam.
- Turn off the water between wetting your toothbrush and rinsing your mouth.
- Do not use pump style toothpaste.
- Use rechargeable batteries.
- Buy products packaged in glass or paper rather than plastic.
- Insist on paper bags or carry your own cloth bag when shopping.
- Compost.
- Buy detergent in glass bottles or paper boxes.
- Use waxed paper instead of plastic wrap.
- Buy eggs in cardboard cartons, not plastic.
- Use glass dishes and cups and metal silverware instead of plastic.
- Take a shower instead of a bath.
- Keep a bottle of water in the refrigerator rather than letting the water run until it's cold.

## CLASSROOM ACTIVITIES

- I. Discuss recycling and what is being done in your community. Have the students make a list of all the things they use that could be recycled.
- II. Have the students draw a picture or a series of cartoons about the need for, or value, of recycling.
- III. Have a "recycling" bulletin board. Ask the students to bring in articles and/or pictures from magazines and newspapers which pertain to recycling.
- IV. Have the students write a theme about the benefits of recycling.
- V. Have a poster contest about recycling.
- VI. Environmentalists are concerned about the use of disposable diapers. Landfills are not designed to handle fecal material. There is a possibility that the feces could leach into the surrounding groundwater and contaminate it. Others say that the energy expended washing cloth diapers and the fuel used for delivery and pick-up if a diaper service is used greatly outweigh the chance of contamination of a landfill. Have the students debate the issue of cloth vs disposable diapers.
- VII. Have each student write a 1 minute public service announcement concerning the importance of recycling. Or, have them write, direct and act in a play. If possible, videotape the activities and perform the play for the student body or PTA.
- VIII. Have a class discussion on what the earth will be like twenty years from now if we continue with our throw-away, one-use attitude.
- IX. Start a "Recommended Purchase" list. Ask the students to make lists of products they use at home which either use recycled materials or are recyclable. Make a master list and post it.
- X. It has been said that: "We don't have to worry about destroying the environment. We aren't going to destroy it and probably couldn't if we wanted to. The environment was here before us and has survived Ice Ages, etc. It will be here after we are gone! The environment will survive. We may not. We need to concern ourselves with keeping the environment suitable for human life." Have the students respond to these statements.
- XI. Many stores offer a choice between plastic or paper bags. Poll your classroom. How many choose plastic; how many choose paper? Have the students select a leader from each side to defend their positions. \*Note: Students may not realize that though paper bags are biodegradable the conditions for decomposition are not present in a landfill. Plastic bags, though non-biodegradable, take up less space. Will this information make a difference in what they choose? Some are now labelled as "biodegradable" because they have had cornstarch added. Bacteria supposedly eat the cornstarch thus breaking down the plastic, but the bacteria need moisture and oxygen which are not found in landfills. \*Note again: Plastic bags take up less space in a landfill than paper bags, but plastic bags are made from petroleum products. Petroleum is a non-renewable resource. Does this fact make a difference in choices between plastic and paper bags?
- XII. The symbols below make it possible to tell what products are using recycled materials and which products or containers are capable of being recycled.



The dark circle with the three white arrows inside indicates that the product uses recycled materials. The three arrows in a circle mean that the product can be recycled.

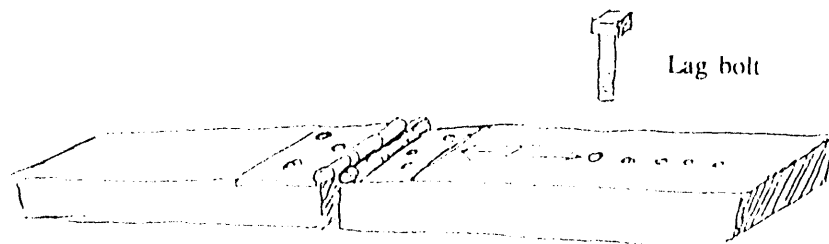
Divide students into collecting teams and have a contest to see how many different items each team can collect. Display them so that the students will be more aware of products which can be recycled or are made from recycled materials. Encourage use of these products.

## INDIVIDUAL ACTIVITIES

The activities below are designed to promote individual involvement in recycling. If students do not accept responsibility for their own contribution to the solid waste problems, recycling efforts will be greatly curtailed.

1. Make a search of your kitchen cabinets. Look inside boxes — cereal, cracker, cookie, etc. If the inside is gray, those boxes are made of recycled newsprint and recycled office paper. How many did you find? Swap your information with others to encourage use of products which are packaged in recycled materials.
2. Choose an aisle at a supermarket and make a list of those items which display a recycling symbol.
3. Make a can-crusher. Cut down on the amount of storage space needed between trips to a recycling collecting site. Remember to keep aluminum cans separate from "tin" cans. Sometimes it isn't easy to tell just by looking. Use a magnet! Aluminum is not attracted by a magnet; "tin" cans (which are mainly steel) are.

Materials: 2 feet of 2 x 6 lumber  
1 heavy duty door hinge  
6 flat-head hinge screws 1 ½ inches long  
1 lag-bolt ¼ inch by 1 ½ inches long



1. Position each hinge plate on the boards. (note that the hinge-pin loops extend beyond the board edges.)
2. Mark the hole locations.
3. Drill the holes and screw the plates in place.
4. Drill five holes down the center of the base board for the lag bolt. Start the holes 7 inches from the hinge end of board and space 1 inch apart. The lag bolt prevents the cans from sliding when you apply pressure. Place the lag bolt in whatever hole is needed for the length of can to be crushed.

NOTE: The crusher will only be as strong as the hinge you use.



4. Do your own study of "photodegradable" plastic bags. In a remote corner of your yard, stake a "photodegradable" plastic bag and see how long it takes to break down. How long for a paper bag?
5. If your parents are not already composting, encourage them to do so.

6. For one week, weigh your garbage and trash daily. How much is accumulated each day? How many pounds per week does your family send to the landfill. Consider recycling!
7. Check your toilet for leaks. Remove the tank cover and drop in 10-12 drops of red or blue food coloring. Wait about 15 minutes. Make sure the toilet isn't used while you're waiting. If colored water shows up in the bowl there's a leak. During the course of a year, a leaky toilet can waste over 22,000 gallons of water! About 20% of the toilets in homes have leaks that go unnoticed.
8. Carry a paper bag around with you at school and put all your throwaway paper in it. How much did you have after one day? After one school week? Now recycle all that paper!
9. Put some garbage and trash into a bag. Weigh it. Keep adding or subtracting until you have about 5.5 pounds. That's the average amount of garbage thrown away by each person in the United States each day. Now dump your sack and divide the items into two piles — recyclable and non-recyclable. Which pile is larger?
10. Do you keep the water running while you brush your teeth? If you are one of "those," devise a way to measure the amount of water that you don't actually use. For a family of four, how much water could be saved by turning off the faucet between wetting a toothbrush and rinsing?
11. Find out how bacteria and moisture affect soil waste. You will need a container about 1 ½ feet long, 1 foot wide and a few inches deep — a cardboard suit box will do. Line it with a plastic trash bag (which will be one of your test samples). Limit yourself to small, thin items such as nylon, cotton, a tin can lid, newspaper, styrofoam, paper towel, etc. Put about an inch of soil into the tray, add your samples, cover with another inch of soil, moisten with water and let Nature take its course. Add a little water each day and wait a month or so to check for decomposition.
12. Have a "trash" sale or swap. Games, toys, clothes — any item you've outgrown, or no longer use, that might end up in the can for garbage collection. Remember, your "trash" can be someone else's treasure!
13. Go to the store with your mom when she's got a big grocery list — this will take some time! Find the aisle with the soda and beer cans. Count out 250 six-packs. After counting, take a look at all those cans. That's the number of cans the average person uses every single year — and all are recyclable.
14. Help start a recycling program at your school.
15. Make a dam for your toilet. Most toilets use about four and one-half gallons of water per flush — that's more than needed and a waste of good, clean water. To decrease the amount of water used, fill a large plastic yogurt or cottage cheese container with water, put on the lid and drop in the toilet tank. Make sure that the container doesn't get in the way of the arm or chain.
16. Magazines are not good materials for recycling. But, they can be re-used. Save all magazines and take them to nursing homes, hospitals, or residential treatment centers. Can you think of other places that might want magazines?

## HOW LONG DOES IT TAKE?

For materials to decompose, there must be sufficient water, sunlight, and bacteria. Assuming that these factors are optimum, see if you can match the time with the object.

- |                   |                  |
|-------------------|------------------|
| 1. Glass bottle   | A. 1-5 months    |
| 2. Wool sock      | B. 200-500 years |
| 3. Tin can        | C. Unknown       |
| 4. Cotton T-shirt | D. 2-4 weeks     |
| 5. Laundry ticket | E. 100 years     |
| 6. Aluminum can   | F. 1 year        |

ANSWERS: 1. C; 2. F; 3. E; 4. A; 5. D; 6. B

Words about recycling are hidden in the block below: See if you can find: ALUMINUM, BAUXITE, BURN, CANS, CEMENT, DISPOSAL, ENVIRONMENT, COLLECT, COMPOST, GARBAGE, GLASSPHALT, GLASS, INCINERATOR, LANDFILL, MAGNET, METHANE, PAPER, PLASTICS, REDUCE, REUSE, RECYCLE, TIN, SEPARATE, STEEL, TRASH, WASTE, WATER, WOOD.

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D H J D N Q W T L A H P S A L G
S C O U Y C A E G H A W N K G C
I O L E R T S Y A K E X A M J D
W N N G R O T A R E N I C N I R
Z S J S A C E F B S B U I S W E
E E L E T U D X A C O M P O S T
N R M T S S A L G Z E O Q P H A
V V B A U X I T E P S J A O B W
I E S R G K L E L A N D F I L L
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O C I P L R D L S E R N V R E C
N V T E H U W U I R E C Y C L E
M R S S F B M C N P D Y X Q A L
E P A U B O C I R E U S E T O L
N R L D L D T V N Q C K F X T O
T E P M P V G Z R U E O L F B C
E N A H T E M A I B M A G N E T

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11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 10

姓名	性别	出生年月	民族	籍贯	学历	学位	职称	工作单位	联系电话	电子邮箱
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徐磊	男	1981.01	汉族	安徽合肥	硕士		讲师	安徽大学	13805512345	xl@ahu.edu.cn
马静	女	1984.05	汉族	山西太原	本科		助教	山西大学	13503516789	maj@sxu.edu.cn
高伟	男	1979.09	汉族	陕西西安	本科		副教授	西安交大	13929110123	gaw@xjtu.edu.cn
林娜	女	1986.12	汉族	云南昆明	硕士		讲师	云南大学	13808714567	lina@ynu.edu.cn
周强	男	1977.03	汉族	贵州贵阳	本科		教授	贵州大学	13985118901	zq@gzu.edu.cn

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Project Name	Project Lead	Start Date	End Date	Status	Progress (%)	Notes
Project A	John Doe	2023-01-15	2023-03-31	Completed	100	Exceeded expectations
Project B	Jane Smith	2023-02-01	2023-04-30	In Progress	75	Minor delays in testing
Project C	Mike Johnson	2023-03-01	2023-05-31	On Hold	20	Waiting for client feedback
Project D	Sarah Lee	2023-04-01	2023-06-30	Planned	0	Initial planning phase

Landesbank Hessen- Thüringen	Landesbank Berlin	Landesbank Baden- Württemberg	Landesbank Bayern	Landesbank Braunschweig	Landesbank Kärnten	Landesbank Mecklenburg- Vorpommern	Landesbank Niedersachsen	Landesbank Nordrhein- Westfalen	Landesbank Rheinland- Pfalz	Landesbank Saar	Landesbank Schleswig- Holstein	Landesbank Sachsen	Landesbank Sachsen- Anhalt	Landesbank Südbayern	Landesbank Tirol	Landesbank Thüringen	Landesbank Hamburg	Landesbank Mecklenburg- Vorpommern	Landesbank Niedersachsen	Landesbank Nordrhein- Westfalen	Landesbank Rheinland- Pfalz	Landesbank Saar	Landesbank Schleswig- Holstein	Landesbank Sachsen	Landesbank Sachsen- Anhalt	Landesbank Südbayern	Landesbank Tirol	Landesbank Thüringen	Landesbank Hamburg
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1. Baza danych	2. Nazwa bazy danych	3. Nazwa tabeli	4. Nazwa kolumny	5. Nazwa wartości	6. Nazwa wartości	7. Nazwa wartości	8. Nazwa wartości	9. Nazwa wartości	10. Nazwa wartości
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## SIMULATION: CRISIS IN CENTER CITY

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### CONCEPT

Using a simulation as the culminating activity to synthesize information regarding local waste management.

### OBJECTIVES

Students will be able to (1) discuss local issues and examine facts regarding waste management, (2) make decisions based upon information given and the roles played, (3) examine the consequences of decisions and actions taken, and (4) evaluate the activity in terms of specific subject areas.

**SUBJECTS:** Social Studies, Science, Language Arts, and Mathematics

**TIME:** 2-3 class periods (not consecutive)

**CURRICULUM FRAMEWORK REFERENCE:** IV.A., B.

**KEY VOCABULARY:** transfer station, disposal, landfill, recycle, reuse, exchange, hazardous waste, design capacity, tipping fee, source separation

**MATERIALS:** reference materials for role playing (newspaper articles, chapter factsheets, and background information from activities in this material), a sign-up sheet (for the Open Meeting), student sheets (included)

### BACKGROUND

A simulation is an enactment of a real-life situation. This activity is a simplification and partial representation of an actual experience.

Some learning occurs as a by-product of coping with the environment rather than by "trying to learn." Similarly, during a simulation activity, facts are learned in a meaningful way because information must be organized and used rather than memorized. As a result, the teacher becomes a facilitator of learning rather than a dispenser of information. Discussion and evaluation of the enactment become valuable learning experiences for the students.

In this simulation, each student assumes a role in a representative community and responds to a crisis in waste management. Students participate in gathering information, making decisions based on that information, and examining the consequences of their decisions. By experiencing this process, students will become more interested in waste management problems that affect their lives and will understand more clearly the many factors involved in finding solutions to those problems.

As the director of the simulation, the teacher will: (a) plan the length of time for each component (adjusting stated times according to the needs of different classes); (b) select the roles most appropriate for the students (adding needed roles to the 24 roles provided); (c) assemble the resource materials for students, including the supplement "CRISIS IN CENTER CITY: ENGINEERING REPORT SUMMARIES," included; (d) move the simulation along when student activity slows down or refocus the class's attention when it wanders from the central theme. The teacher should assume the role of facilitator to ensure well-paced progression through the activity.

The simulation includes: (a) **Introduction** (background information, role assignments, and the mayor's news conference); (b) **Open Meeting** (groups plan for presentations and special commission members prepare for and preside over the meeting); (c) **Decision** (groups consider possible outcomes and special commission members announce decision); and (d) **Evaluation** (the activity and the issue in relation to the class subject area).

This activity was written and compiled by Tennessee Valley Authority  
and can be found in **Waste: A Hidden Resource**.

The Resource Articles provided by the Knoxville News-Sentinel can provide  
background information for this Simulation activity.

## PROCEDURE

### I. Introduction

A. Explain to the students that although it is important to be aware of the problems associated with waste, it is also important to understand that people perceive the problems from different points of view and that every citizen has an opportunity to present his or her viewpoint in the decision-making process. To help students understand both of these concepts, they will take part in the simulation of a crisis regarding waste disposal in a small community. The focus should be on the **process** involved, not right or wrong answers. Give the students an overview of the activity.

1. Each student will be assigned a role.
2. Students will participate in the decision-making process based on the information available to them and their own roles in the community.
3. The activity will require 2 or 3 class periods.

B. Distribute copies of the student sheets "CRISIS IN CENTER CITY" and the map of the county, included.

C. Tell the students they have approximately 10 minutes to read the student sheets and to list some possible solutions to the problem.

D. Ask the students the following questions.

1. What are some ways in which the people could handle the problem?
  - a. List and number the answers on the board. Ask the students to paraphrase lengthy answers.
  - b. Do not evaluate the answers.
2. Which of the listed alternatives can be labeled "short-term"? Which can be labeled "long-term"?
  - a. Briefly explain what is meant by "short-term" and "long-term."
  - b. Designate "short-term" answers with the letter "S" and "long-term," with the letter "L."

(This activity gives students an opportunity to think through the situation before taking on assigned roles.)

E. You may either assign roles or allow the students to choose their roles. The roles represent only members of the community who will be directly affected by the decision.

1. Distribute copies of "ROLE DESCRIPTIONS," included, to the students. Five students will assume the roles of the following special commission members.
  - a. Mayor, Center City
  - b. Member, Center City Council
  - c. Executive Judge, Pretty Good County

- d. Member, County Governing Board
  - e. Citizen-at-large
2. The rest of the students will assume the remaining roles. Be sure that in the selection of the roles, all three positions below are represented. Have the role cards (included) copied and cut out for the students to wear during the simulation. The letters of the role cards indicate the positions of the characters named on the cards.
    - a. **M** position -- modify present landfill
    - b. **P** position -- purchase land for new landfill
    - c. **C** position -- continue hauling to Neighboring State
  3. Give a copy of "CRISIS IN CENTER CITY: ENGINEERING REPORT SUMMARIES," included, to each student.

**F. Ask the students to prepare for the simulation.**

1. The students should do the following:
  - a. Interview counterpart members of the community and/or teachers in various disciplines for help with their assigned roles.
  - b. Conduct research in the library, use classroom reference materials, or read activities in this material, "Waste: A Hidden Resource."
2. All the students should dress for their roles (at least one key item) and **WEAR THEIR ROLE CARDS**.
3. The students are to be prepared for the simulation on the date you determine to be best suited to your class situation (for example, next week on Monday).

**II. Open Meeting**

- A. Role cards can be pinned to shirts, worn around the students' necks on strings, or used in other way for identification. The important thing is that students be identified visually with their roles.
- B. Begin the news conference.
  1. Tell the mayor of Center City that it is time for the news conference.
  2. Have the mayor read the prepared statement on the role description sheet.
- C. Begin formation of the coalition groups.
  1. Following the news conference, inform the class that many citizens have become concerned and worried about the news from City Hall.

2. In the next 20 minutes, citizens are to find others who share the same position (roles designated M, P, or C) on the issue, and they are to form coalition groups. Each group is to do the following:
  - a. Plan and prepare for a presentation to be made to the City/County Special Commission on Waste Management.
  - b. Present a clear statement of its position and support it with facts and experiences. State the impact of the problem on the lives of individual citizens.
  - c. Choose a spokesperson for the group. Each person in the group must identify how he or she will take part in the presentation. (Each person addressing the Commission will follow the same procedure — identify him/herself, state how the issue affects him/her, and explain his/her concern regarding the issue.)
  - d. The spokesperson should sign up on the sheet in preparation for the commission meeting. He/she will make most of the six-minute presentation, but other members of the group may speak. Presentations during the meeting will be made in the order that the names appear on the sign-up sheet.

D. Begin the meeting of the City/County Special Commission on Waste Management.

1. While the citizens are organizing their groups, have the five members of the Commission meeting in a separate area with the following instructions:
  - a. You have 20 minutes in which to develop the criteria you will use to evaluate the presentations.
  - b. The criteria should include the needs of the people and the strengths and weaknesses of short- and long-term plans.
  - c. Develop a chart to use to record the presented facts that are important to the decision you will make. (an example appears below.)

GROUP	CRITERIA FOR DECISION

- d. At a specified time following the Open Meeting, you will make a decision regarding your recommendation to the County Governing Board and to the City Council. Explain the reason(s) for your decision. (A response of "No decision" is not permissible.)
2. Begin the Open Meeting.
  - a. At the appointed time, have the members of the Special Commission enter the room and sit facing the citizens.
  - b. Tell the mayor to conduct the meeting as instructed in his/her role description.
  - c. After the meeting is adjourned, tell the class that, at the beginning of the next class period, the Special Commission will meet to reach its decision and will then announce the decision.

### III. Decision

- A. The Special Commission makes a decision.
  1. Tell the members of the Special Commission that they are to meet for 15 minutes to discuss the statements made in the Open Meeting, and they are to reach a decision regarding short- and long-term plans for waste disposal that will benefit all the people.
  2. Tell the Commission members they should be prepared to announce their decision and to explain the reason(s) for their decision.
- B. The coalition groups consider possible consequences.
  1. While the members of the Commission are meeting, have each coalition group meet (for 15 minutes) to discuss the Commission's possible decisions.
    - a. Members should determine the impact that each outcome would have on their own lives.
    - b. Groups should examine alternative actions in the event that the decision is not favorable to their positions.
  2. After this discussion, each group should write short statements of its response to each of the possible decisions.
- C. The Commission announces its decision and the groups respond to the decision.
  1. Have a member of the City/County Special Commission on Waste Management announce the recommendation and give the reason(s) for the decision.
  2. Have a member of the Commission read the evaluation criteria used in reaching the decision.
  3. Have a representative from each coalition group read his/her group's statement describing how that decision will affect the lives of its members.

### EVALUATION

- I. Evaluation of the activity is an extremely important part of the learning process. Work through these questions with the students.
  - A. Were the Commission's criteria comprehensive? What else should have been included?
  - B. Were the groups' responses to the possible decisions well thought out? What other responses could have been included?
  - C. Were presentations to the Commission well prepared? Were they realistic?
  - D. What additional information would the citizen groups like to have had? (List on the board the students' responses — for example, data regarding landfills; information about ways other communities have

handled a similar situation; money available; educational needs; zoning restrictions; land use; or specific information about such alternative management practices as recycling, reuse, and exchange.)

**NOTE:** This is an important part of the discussion because it demonstrates the need for having a variety of information and data before making decisions concerning waste management. A comprehensive list will include elements from the areas of social studies, science, language arts, and mathematics.

- II. Another important part of the learning process is relating the activity to the issue of waste management in **your** community and to the subject in **your** classroom. Have the students discuss the appropriate items below.

A. Social Studies

What are some important things to remember when making a presentation before a real decision-making board (city commission, legislature)? When is conflict healthy and constructive, and when is it bad for a society? Attend a meeting of your local decision-making board; note elements of effective presentations. Observe the handling of conflicting viewpoints. How were they resolved?

B. Science

Develop a list of scientific information that was included in the group presentations. In the presentations, which seemed more important — scientific facts or personal interests and concerns? Was the decision reached consistent with available scientific knowledge regarding waste management? If not, explain why.

C. Language Arts

Write an objective article describing the simulation activity; include the three major positions that were expressed. Write a subjective article for use as an editorial. Defend the position that the decision was good for the community, or defend the position that the decision was bad for the community. Include what the community might gain or lose as a result of this decision.

D. Mathematics

How did the citizens use mathematics (statistics, projections, percentages, costs, or other data) in making their presentations? How could the use of mathematics and the treatments of data (projections, extrapolations, or comparisons) strengthen the positions of the citizens? How could the use of clear, visual displays enhance their presentations?

## EXTENSION

Use the following information to develop a second simulation regarding hazardous waste.

Big Wheel makes synthetic rubber and plastics for the automobile industry. It has operated an unlined disposal pond (15 acres, 40 feet deep) for its industrial waste since 1945. In 1980, its waste was declared hazardous. In 1988, management received an order to remove the pond by January, 1991.

**Big Wheel has three choices:**

- I. Move the waste 1,000 miles to Big Secure Hazardous Waste Landfill.
  - A. Advantages
    1. The landfill is located far away from the community.
    2. There would be no future risk for the community.
  - B. Disadvantages
    1. It would cost \$13,000,000 to dispose of the waste in the pond.
    2. There would be a loss of 250 jobs due to cancellation of a marginal manufacturing process that uses (recycles) much of the waste now being generated.
    3. A loss of capital would result in canceling a program to upgrade the factory and add 40 jobs.
    4. The shipment of newly generated waste would cost \$675,000 per year.
    5. Transportation of the waste would be hazardous.
    6. The company could be liable for cleaning up its waste at Big Secure.
- II. Build an incinerator large enough to meet the 1991 deadline; then, beginning in 1992, accept hazardous waste from other facilities. (A smaller incinerator is not feasible.)
  - A. Advantages
    1. The cost would be \$5,600,000 to dispose of waste from the pond (instead of \$13,000,000).
    2. There would be 24 new jobs created in order to run the incinerator.
    3. Continuation of the planned company expansion would save 250 jobs and add another 40.
  - B. Disadvantages
    1. The company would have to invest \$18,600,000 for an incinerator. If the company commits to this alternative, the expected obstacles in undertaking a project of this magnitude will make it unable to meet its 1991 deadline; this would put the company in violation of a court order and may force a shutdown.
    2. Waste from other facilities would be transported through town.
- III. Declare bankruptcy and let taxpayers clean up the site.
  - A. Advantages

Stockholders could take their money out of the company before it declares bankruptcy and not have to put up with the headaches.

**B: Disadvantages**

1. There would be a loss of 1,100 jobs. The county would be in serious financial trouble.
2. The Federal government would have to spend \$14,500,000 to clean up the site, and might recover only \$5,000,000 in bankruptcy court.

**Roles for extension:**

**Plant Manager**

You have no financial interest in the plant, but you will lose your job and may face legal problems if Option III takes place. You want an incinerator to dispose of the waste in the proper way and to keep your friends and neighbors employed.

**Chairman of Board**

You feel the plant is obsolete. You favor bankruptcy and the loss of the \$5,000,000 salvage value. You want the taxpayers to pick up the remainder of the costs. Your personal property would not be involved, and you could hide behind the corporate shield.

**Plant Engineer**

You feel that permitting an incinerator to be built would be a nightmare. You want to ship the hazardous waste out of the area.

**Citizen**

You want no waste-hauling trucks on Elm Street. The only transportation route to the plant is Elm Street; residents do not want waste transported on their street. You are willing to compromise for two years to get rid of waste that is already at the plant, but you do not want waste transported to the incinerator from elsewhere.

**Local Banker**

You have made a \$25,000,000 loan to the plant. You will get nothing if the plant declares bankruptcy. You also live on Elm Street.

**County Executive**

Big Wheel pays 32 percent of the county's tax revenue. Company bankruptcy would seriously hurt the county and ruin the school development program.

**President of Clean Air**

Clean Air is a coalition of people downwind of the proposed incinerator. They don't live in the same county or work for Big Wheel. They do not want the incinerator to be built. The group believes the waste should be shipped to a disposal site.

**Fire Chief**

You do not have the equipment or training to handle a major hazardous waste transportation accident. You prefer that the wastes stay onsite and be incinerated.

**Impacted Land Owner**

You feel that no one objected to the ponds until now. You want the waste moved away. You feel that an incinerator would make your land and house worthless.

**Hysterical Mother**

You're afraid that your children will die. You think that the wastes are poisoning your family. You insist that the "poisons" be taken away.

**Company Accountant**

You feel that the company might spend all of its money on the incinerator and then still may have to close. You say that it isn't worth the risk. Your position is to minimize the risk and to ship the waste offsite.

**Company Attorney**

You feel that the greatest risks are waste transportation and the company's long-term liability if Big Secure Hazardous Waste Landfill leaks. You want to incinerate the waste onsite; damage from an incinerator is almost impossible to prove.

**Insurance Company Representative**

The company cannot get insurance on any of the alternatives. Big Wheel must self-insure for \$2,000,000 to run the incinerator.

**State Permit Engineer**

Your position is that the incinerator employs "state-of-the-art" technology and should work very well. A public hearing must be held before a permit can be issued. A 30-day public notice is required; a hearing must be held; a response to comments must be made; and a Commissioner's Review must follow, then possibly another round of hearings. Obtaining a permit will take one year even if there are no hitches. You understand that Big Wheel is under court order and delay would force closure of the plant. However, the process cannot be speeded up. It's the law.

**Union President**

You place the highest priority on preventing the loss of jobs.

## CRISIS IN CENTER CITY

Read the background information for Center City and then list some ways in which the people of the community might handle the problem.

**The State has ordered that the Center City landfill be closed down.**

### Background Information

Approximately 30,000 people live in Pretty Good County:

- 15,000 live in Center City;
- 1,800 live in Hometown;
- 1,200 live in Smalltown; and
- 12,000 live outside cities in the county.

Although construction of the Center City landfill has met State standards, operation of the landfill has been poorly managed.

- Industrial wastes dumped into the landfill have resulted in unpleasant odors.
- Livestock has been affected.
- Roads leading to the landfill have been littered and have become high traffic areas.
- Open burning has occurred.
- Poor operation could contaminate wells located near the landfill.

Time has run out. There is no more room; the landfill within Center City has reached its design capacity. The people of Pretty Good County say "No" to locating a landfill outside the city limits. A makeshift transfer station has been established, and a trucking company has been hired to drive 62 miles to Neighboring State to dump the city's waste. Meanwhile Hometown, Smalltown, and Pretty Good County have also hired a trucking company to haul their waste out of state.

The waste disposal problem has become a crisis in Center City. The people must make some important decisions regarding short- and long-term solutions to the problem. In the years to come, people will be living with the consequences of the decisions made today.

Record your first response to this situation by listing some ways in which the people might handle the problem.

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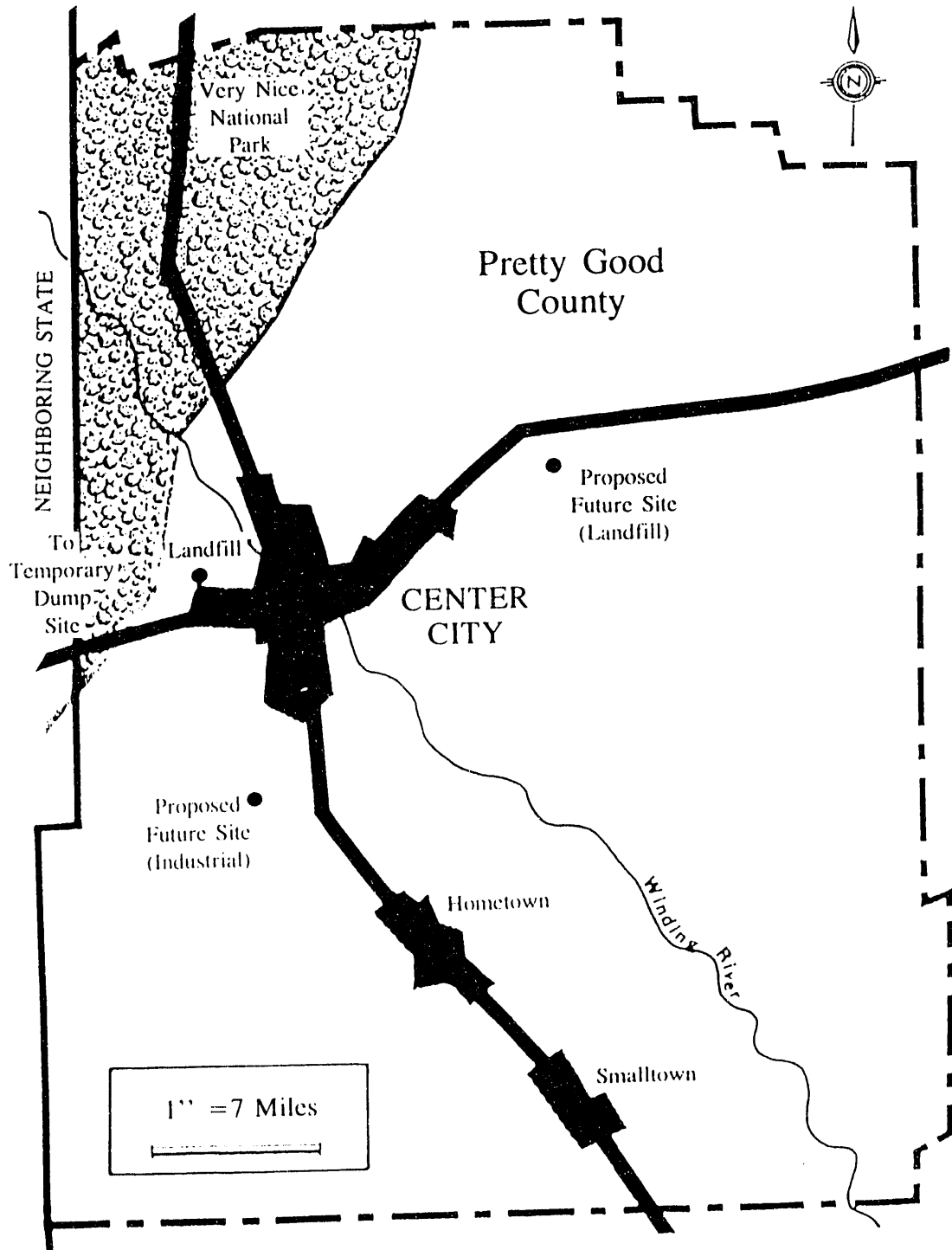
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## ROLE DESCRIPTIONS

**Handd Schaker:** Mayor of Center City (Age--43)  
The mayor is the chief elected administrative official of the city.

This is your first term in office and you want to do an especially noteworthy job. You want to handle this crisis in such a way that the people in your city will have enough confidence in your leadership abilities to re-elect you in the upcoming elections. You would even like to become governor of the State someday! Your immediate responsibilities are to:

1. Hold a news conference to inform the citizens of the current crisis and what you plan to do about it. At the news conference, you will read the following statement.

"I have been notified by the State that the city landfill has been closed down. As a result of the State order, either costs will increase or the collection of trash will have to be halted, and a special fee will have to be levied for homeowners, businesses, and industries. I have been in contact with Senator Bullhorn about this problem. We are consulting with a highly qualified engineer, Planitt Wright, who has identified three possible solutions to our problem.

The first possibility is to modify the present landfill and purchase adjacent land to increase design capacity. To do this, we must purchase expensive residential properties and install a water distribution system for the surrounding community.

The second is to purchase land for a new landfill. There's no room **within** the city and the county says 'No' to our request for land!

The third option is to continue hauling waste to a facility in Neighboring State. We are finding out that this is a very costly method of disposing of our wastes.

This is a serious problem, not easily solved. As head of the newly formed City/County Special Commission on Waste Management, I am calling a meeting, which will be open to the public, so that citizens can present their opinions regarding this crisis. The commission will then make a recommendation to city and county officials for ratification. We are seeking to resolve this matter in the best interest of all the good citizens of our community."

2. Preside at the Open Meeting.
  - a. Call the meeting to order.
  - b. Permit citizens to speak in the order in which they are listed on the sign-up sheet.
  - c. Appoint a timekeeper to limit each group presentation to 6 minutes.
  - d. Provide a 5-minute period at the end of the meeting for questions from the members of the Special Commission to the presenters.
  - e. Adjourn the meeting and, together with the other members of the Special Commission, make a decision.

**E.Z. Goahen:** Member, County Governing Board (Age—55)  
The governing board is a group of elected county residents that manages the affairs of the county.

You are usually an active member of the board but you do not have ambitions to become more involved in politics. You enjoy the position you have now and you do only what you need to do to win the seat in election years.

You were selected to serve on this special commission because you have been on the board longer than anyone else. You like to see everyone happy and you avoid conflict and controversy whenever possible.

You will be looking for an easy, uncomplicated solution to the problem. You go along with the majority.

**E. Gerr Beevir:** Member, City Council (Age—25)  
The City Council is a group of elected citizens that manages the affairs of the city.

You are a born politician. You are the youngest person ever to hold a seat on the City Council! You enjoy solving problems and being involved with people. To you, that is where the action is. You are very ambitious, and you plan to run for the office of Mayor when you feel the time is right. You handle yourself in such a way that people recognize how adept you are at handling problems. You are alert, perceptive, and articulate. You know what will influence the voters to continue their support of you — strong leadership with a sincere concern for their welfare.

You take a lead in asking for the specific cost factors of what is proposed.

**B.A. Voatir:** Executive Judge, Pretty Good County (Age—45)  
The Executive Judge is the chief elected administrated official of Pretty Good County.

You have lived in Pretty Good County all your life. Your family has been involved in politics as long as you can remember. You know everyone in the county and call them by their first names.

You have seen many changes in your community. A lot of folks don't like so many changes; they prefer to keep things the way they have always been. You want an improvement of services to the county while maintaining the old values and customs.

You respect your constituency's wishes not to locate a landfill in the county. On the other hand, if you can acquire improved services for the county, it might be a good trade-off for allowing a landfill to be located at a currently unused site.

You take the lead in asking speakers if they would be willing to contribute to the costs of the services they want.

**O.K. Repp:** Citizen-at-Large, City/County Special Commission on Waste Management (Age—31)  
The Citizen-at-Large holds a non-elected position and represents the residents of Pretty Good County, including those who live in the cities.

You have been asked to represent the general population on the City/County Special Commission on Waste Management. You appreciate the opportunity to serve in this role because you have spent many hours working on community projects to improve the quality of life in Center City. In your business life, you try to see each one's point of view and have gained a reputation as being fair. You are not beholden to any special interest group.

At the same time, you realize the importance of this decision and how it will affect the community for years to come. You want to make a decision that will be in the best interest of all the people, including the growth of the city and the protection of the environment. You take this responsibility very seriously.

**Sellitt Quick:** Realtor (Age—40)  
(P) A realtor helps people buy or sell land or buildings.

You have been named repeatedly as Outstanding Realtor of the Year because of your aggressive techniques. You are excited about the possible move by Alliance Industries to Pretty Good County.

You have been in contact with the landowners (who reside on the East Coast) of the parcel [marked "Proposed Future Site (Industrial)" on the map] which Alliance wants for its factory. Seymore Proffitt has just phoned you about Alliance Industries' decision to locate its factory in Pretty Good County **if** the landfill problem is resolved within 30 days. You are planning to meet with the Chamber of Commerce to see that action can be taken toward settlement of the issue.

A new landfill would be attractive to new businesses.

**B. Goodenough:** President, Center City Chamber of Commerce (Age—43)  
(P) The Chamber of Commerce is a council of business people that promotes the commercial sector of a community.

Alliance Industries has selected Pretty Good County as its first choice for the location of a new factory. The factory will employ 250 local residents for construction and production. Pretty Good County's unemployment rate has been on the rise. The factory industry would bring in additional satellite businesses and provide growth for the area; the additional businesses would create even more jobs.

A new landfill would be attractive to new businesses and is necessary for the entire community.

**Goldie Ager:** Impacted Landowner (Age—70)  
(M) This landowner is directly affected by problems resulting from the management (or mismanagement) of local waste disposal facilities.

You are a retired high school teacher who was recently been widowed. You have lived at your current residence for 45 years. You remain active in community affairs, often volunteering 25 hours a week to various organizations that you feel are important to the welfare of Center City.

Although several acres separate your house from the landfill, you have encountered problems with flies, rats, and foul odors. You had not noticed any problem with the drinking water until Reellie Sharpe called one evening several weeks ago. The two of you discussed the increased fly and rat populations, the foul odors associated with the landfill, and the tremendous increase in traffic to and from the landfill along the road that runs in front of your homes. Since then you have contacted the health department and the city water department about the

situation. Runnie Poole, a water district representative, has been out to take water samples but has not yet returned any information to you.

You are a small voice and need to find others who feel the same about the landfill problem. You are willing to make telephone calls or do any other volunteer work that would help alleviate the landfill problem.

**Reellie Sharpe:**  
(M)

Impacted Landowner (Age—35)  
This landowner is directly affected by the problems resulting from the management (or mismanagement) of local waste disposal facilities.

You are the single parent of two elementary-age children. Your home is near the current landfill. Approximately six weeks ago, you noticed a discoloration of your drinking water and a great deal of sediment buildup in your kitchen sink. You contacted the local water department about the problem and were told they would get back with you after they were able to examine water samples taken from your home. You have not yet heard from the water department.

You are fearful that you and your children may become ill from using the water. You have invested in a water filtration system for the kitchen sink to “clean” the drinking water. You contacted your neighbor, Goldie Ager, about the problem. The two of you discussed problems that you have both encountered — littering along the roadside, increased fly and rat populations, and foul odors coming from the landfill.

You are glad that the landfill has been closed, but your problem continues. You are determined to see that the landfill is modified and the water problems resolved.

**I.M. Boss:**  
(C)

Factory Worker (Age—38)  
The location of a factory worker’s home is dictated by the location or relocation of the company for which he/she works.

You are a foreman in production work. You “worked your way up” to the job you have now, and you like it. You don’t want your company to move because of its being shut down or because of its taxes being increased.

You feel the simplest, cheapest solution is to continue hauling waste to Neighboring State.

**D. Vide:**  
(P)

Certified Public Accountant (CPA) (Age—56)  
A certified public accountant inspects, keeps, or adjusts financial records.

It would cost the taxpayers a lot of money to pay for the modification of the landfill that was recently closed. Hauling the waste to Neighboring State has been a good temporary solution but, of course, this cannot continue for very long.

It would cost your clients (many business people in the community) less to pay for a new landfill than it would cost them to pay for having the old landfill modified. Costs to modify the old landfill to expand its capacity and make it meet current State standards make it more expensive to do than to build a new landfill. You favor the building of a new landfill.

**Onthuh Line:** Factory Worker (Age—29)  
(P) A factory worker's paycheck depends on the success of the company for which he/she works.

You are new to the community. You moved to Center City from Smalltown because you heard wages are better here. You are not happy about the idea of having your larger paycheck reduced because of increased taxes. (Showing the commission your paycheck tax deductions might be helpful.)

You want your company to stay in business; you favor the building of a new landfill.

**Inthuh Dell:** Farmer (Age—49)  
(M) It is very important to farmers to maintain the agricultural heritage passed down to them by their families.

Your land is adjacent to the present landfill. This has been a constant source of irritation because of increased traffic along the road on which you frequently must drive your tractors.

Additionally, five calves have been stillborn and older calves have suffered from health problems. Increased veterinary costs, high interest rates, low grain prices, and bad weather have compounded your financial problems to the point that you have become very anxious and angry. You are writing letters to the editor of the local newspaper to inform people of the major problem that exists in your area.

The existing landfill **must** be cleaned up!

**M.A. Lerner:** Educator (Age—28)  
(M) An educator, interested in both knowledge and character, focuses on the quality of life.

As a new resident of Center City, you feel that the people of this area have not even considered reducing the amount of waste generated; they only talk about dumping it. Hauling waste to Neighboring State is a short-sighted solution. Land suitable for use as a landfill is becoming more expensive and more difficult to find.

You advocate first cleaning up and modifying the present landfill, and, second, educating citizens about the value of reducing the amount of landfilled waste through recycling. If the quantity of landfilled waste is reduced and the present landfill cleaned up, the need for a new landfill will be lessened.

**Forrest Akers:** Manager National Park (Age—60)  
(M) A national park manager is primarily concerned with preserving and maintaining natural areas for the public to visit.

You have worked and lived in or near the Very Nice National Park most of your life. You have developed a program called "Save the Wildlife." This program has helped save several animal species from extinction by providing a natural setting for their survival. Therefore, you are very angry that the city and county have found it necessary to truck the waste through Very Nice National Park in order to dispose of it in Neighboring State.

Trucking the waste through park territory has increased the likelihood of an accident that could cause a dangerous pollution problem for wildlife and the streams and other elements of their environment.

You would like to see the old landfill modified and an effort made by citizens to reduce the amount of waste generated.

**“Handl” Handler:** Owner, Handler’s Hauling (Age—56)  
(C) Hauling waste is one of the occupations related to the production and consumption of goods.

You are currently trucking the city’s waste to Neighboring State. Your truckers have encountered problems with the workers at the out-of-state landfill. There appear to be personnel problems at the site; a strike may be possible. You own 12 trucks, four of them used for other commercial transportation needs besides waste hauling. You see increased insurance premiums and road taxes as an annoyance.

You can testify to the expenses and problems of hauling, but you don’t want to lose the contract with Center City! You want to continue hauling to Neighboring State.

**Seymore Proffitt:** Industrial Developer for Alliance Industries (Age—36)  
(M) An industrial developer selects sites and oversees the planning and construction of facilities for new industrial development.

You have been given the responsibility of locating a site for company expansion in Pretty Good County or in another county. Financially, it is not feasible for Alliance Industries to locate in Neighboring State because of poor road systems and the long distance from resource suppliers. Pretty Good County is closer to Alliance’s resource suppliers and has a better road system for transporting the product.

Alliance Industries will contract for 50 local residents to construct the factory and will hire 200 local residents to work on production in the new facility.

You have written a memo to the mayor of Center City confirming Pretty Good County as the first choice for the new factory location. The new factory would be located at “Proposed Future Site (Industrial)” on the map. The realtor, Sellitt Quick, is handling negotiations between the site’s owners and Alliance Industries.

You would like to see the waste disposal situation resolved as quickly as possible. Modifying the present landfill, while looking for a suitable location for a new landfill in the county, looks like the best solution.

**Tieu Counts:** Certified Public Accountant (CPA) (Age—27)  
(P) A certified public accountant inspects, keeps, or adjusts financial records.

Alliance Industries depends on your judgment regarding financial matters. The increased taxes needed to clean up the existing landfill would not be attractive to the company.

In the long term, the most advantageous solution for your client would be for the community to build a new landfill, assuring adequate service for many years.

**I.M. Pushin:** Environmentalist (Age—28)  
(M) An environmentalist is a person who is knowledgeable and concerned about the environment and how mismanagement affects it.

You have recently received a doctorate in Environmental Science at Alma Mater State University. You are concerned not only about the present landfill problem but also about the lack of public education in the area of waste management. People need to be informed about possible alternatives to disposing of waste in a landfill. Your main goal is to educate people about the shortsightedness of using land for waste disposal and rally them to the cause.

You feel the present landfill needs to be cleaned up immediately; discussions should be terminated regarding future land acquisitions for a landfill; and the landfilling of potentially dangerous toxic wastes should stop at once.

**Ohl McDonald:** Farmer (Age—43)  
(C) A small increase in costs can eliminate all profit for operators of small farms.

You live near the site designated on the map as "Proposed Future Site (Landfill)" and selected for a possible new landfill. You have heard that some of Inthuh Dell's livestock have had health problems, and area residents in close proximity to the current landfill have had signs that their water may be contaminated.

With rising farm costs and low grain prices, you do not want to deal with a tax increase to cover the costs of cleaning up the old landfill and modifying it. The current arrangement with Neighboring State for waste disposal sounds good to you. You do not want to face the same problems currently facing Inthuh Dell. You are opposed to the proposed location for the new landfill.

**Runnie Poole:** Representative, Health Department (Age—39)  
(M) The Health Department is concerned with all aspects of the health of the citizens in the community.

You have been working for the City/County Health Department for 12 years and are knowledgeable about the operation of the water treatment facility. You sent water samples from the wells at the Ager and Sharpe residences to the State Health Department. The State Health Department tested the sample and found evidence of possible contamination. Additional water samples will be required for extensive testing. Until then, it is recommended that you inform the homeowners not to use the water for consumption or for washing. At the request of the City/County Special Commission on Waste Management, you have calculated the cost of extending water lines to this community; it is \$155,000.

It is evident that the current landfill will have to be cleaned up. There might be some funds available to help with this problem. You are willing to provide data or expert testimony to help secure financial assistance.

**Slick Fleet:** Owner, Fleet's Trucking Co. (Age—36)  
(C) A trucking company must invest a lot of money in equipment.

You have had your own business for 10 years and are eager to expand. The additional capital from a new hauling contract with the county has helped increase your fleet to a total of eight trucks.

An additional increase in road tax and rising insurance premiums have necessitated your borrowing additional monies to cover these expenses until permanent contracts can be established. You are submitting such a contract to Center City for handling its refuse.

Recent talk about a new landfill has made you anxious because of the possibility that your contract with the county will be short-lived. With the additional overhead of several new trucks to handle the waste, you need to lobby for continued hauling.

**Ghetting Interest:** Vice President, First National Bank (Age—51)  
(P) The vice presidency of a bank is a very prestigious position.

You have lived in Center City all your life and are personally concerned about the quality of life in Center City. You are next in line for the presidency of the Bank, after Will Gain retires in 1990. You are interested in demonstrating to the Board of Directors your talent for securing important depositors and managing large accounts.

You have been working closely with the Chamber of Commerce in attracting new business to Pretty Good County. Alliance Industries is your "pet project" for the bank. You are very eager for the landfill problem to be resolved quickly.

A new landfill appears to be the answer.

**Suphra Jett:** President, League of Women Voters (Age—34)  
(P) The League of Women Voters is an organization whose primary goal is to help citizens become well-informed voters.

You have worked hard in Center City to educate citizens about candidates and issues so that they can make intelligent choices. Acquiring land for a new landfill is probably the best long-term solution, but your concern is that the site location will be politically determined. Influential citizens will make sure that sites near their properties are not selected for this purpose.

You favor the recommended location marked "Proposed Future Site (Landfill)" on the map.

## CRISIS IN CENTER CITY: ENGINEERING REPORT SUMMARIES

### WASTE CHARACTERIZATION STUDY FOR PRETTY GOOD COUNTY

Last year a special task force was organized to examine the county's waste stream (all the waste generated by human activity). To determine average waste quantities, a weighing program was conducted for two weeks in each of the four seasons. An analysis of the waste stream focused on items that could be recycled.

<u>Community</u>	<u>Waste Quantities (Tons per week)</u>
Center City	328
Hometown	35
Smalltown	20
Unincorporated area of county	87
Total Waste	470 (24,400 tons per year)

#### Recyclable Content of Waste

<u>Material</u>	<u>Amount (lb/ton)</u>	<u>Recoverable* (lb/ton)</u>	<u>Average Compaction** (lbs/cu yd)</u>	<u>Equivalent*** (cu yd/ton)</u>
Aluminum Cans	10	3	200	0.015
Ferrous/Bimetal Cans	120	35	600	0.060
Glass	220	66	1000	0.066
Paper/Cardboard	600	180	500	0.360
Plastic	100	30	200	0.150
Totals	1,050	315		0.651

Recyclable materials represent about 16 percent of the waste stream by weight and about 39 percent of the waste stream by volume.

\* "Recoverable" refers to those components that can be easily removed from the waste stream either by source separation, recycling, or conventional processing methods. The 315 lb total indicates that 16 percent of the county's waste can be easily recycled.

\*\* These are values that allow weights of certain components to be expressed in terms of volume. Volumes are expressed in cubic yards (cu yd). Example: 500 lb of mixed paper and cardboard will occupy a volume of 1.0 cu yd when compacted.

\*\*\* This column expresses the volume (cu yd) of recyclables in each ton of waste. Example: the 180 lb of mixed paper and cardboard, at 500 lb/cu yd, will occupy or represent 0.360 cu yd of landfill capacity. Recycling all the listed components could save 0.651 cu yd of landfill capacity for each ton of waste.

**DISPOSAL ALTERNATIVES**  
(report done by Wright Engineering Consultants, Inc.)

ALTERNATIVE ONE:        Modify Present Landfill  
ALTERNATIVE TWO:        Develop New Landfill  
ALTERNATIVE THREE:      Transfer/Haul to Outstate Landfill in Neighboring State

**ALTERNATIVE ONE: Modify Present Landfill**

- Close out the old landfill, and cover with the required 75,000 cubic yards (cu yd) of trucked-in soil and/or material excavated from all available areas on the old landfill property.
- Purchase more land to expand landfilling operations (closeness to a subdivision limits expansion to around 20 acres — about five years' capacity).
- Extend water lines to each residence in the community (estimated cost \$155,000) so owners of the available property will honor an intent-to-sell contract for \$12,000 per acre.
- Fulfill new State disposal regulations requiring this site to have a double-liner system, a leachate collection and treatment system, a landfill gas collection system, and a complete environmental monitoring system.
- Purchase three pieces of heavy equipment to operate this expanded landfill at its optimum capacity.

Site acquisition, engineering, and permitting	\$ 320,000
Site and fill area construction	275,000
Equipment (landfill compactor, dozer, and pan)	280,000
Community water distribution system	155,000
<b>TOTAL INITIAL COSTS</b>	<b>\$1,030,000</b>

Operating and maintaining the landfill will require the following:

- Seven employees
- Major repairs and maintenance work on landfill equipment.
- Estimated annual operating cost of \$224,000. (Assuming that bonds will be used to finance the initial cost, the annual charges were calculated for a 5-year period at 9 percent interest [multiplier = 0.2571].) (See next page.)
- Landfill must be capped with a single liner when completed.
- Landfill closure and post-closure monitoring cost of \$140,000. (Annual cost should include a sinking fund payment of \$23,400 per year to pay for landfill closure [multiplier = 0.1671].)

Annual operations and maintenance costs	\$224,000
Principal and interest on initial investment (\$1,030,000 X 0.2571)	265,000 (rounded)

Sinking fund payment for closure and post care  
 (\$140,000 X 0.1671)

23,400 (rounded)

TOTAL ANNUAL COST

\$512,400

- Total design capacity of the landfill is 137,800 tons of waste (compacted to 1200 lb per cubic yard).
- Total volume capacity is 229,700 cubic yards.
- First-year wasteload is 24,400 tons, based on 470 tons per week average.
- Growth in Center City and in the county is expected to cause the wasteload to increase 6 percent per year for the next 10 years.

<u>Projected Year</u>	<u>Estimated Annual Wasteload (tons)</u>
1	24,400
2	25,900
3	27,500
4	29,100
5	30,900
Total Capacity	137,800

$$(137,800 \text{ tons} \times 2000 \text{ lb} \times \text{cu yd} = 229,700 \text{ cu yd})$$

ton      1200 lb

- Recommended tipping fee for the first year's operation is based on the annual cost estimate of \$512,400 and the estimated wasteload of 24,400 tons.

$$\text{Estimated tipping fee} = \$512,400 / 24,400 \text{ tons} = \$21 \text{ per ton}$$

#### ALTERNATIVE TWO: Develop New Landfill

- Fulfill new state disposal regulations requiring this site to have a double-liner system, a leachate collection and treatment system, a landfill gas collection system, and a complete environmental monitoring system.
- Purchase a 200-acre tract of land at a yet-to-be-disclosed location in the county (available under a no-condition sales contract).
- Plan for a 10-year service life of the new landfill (based on projected wasteloads).

Site acquisition, engineering, and permitting  
 Site and fill area construction  
 Equipment (landfill compactor, bulldozer, and pan)

\$ 480,000

530,000

280,000

TOTAL INITIAL COSTS

\$1,290,000

Operating and maintaining the landfill will require the following:

- Seven employees
- Major repairs and maintenance work on landfill equipment.
- Estimated annual cost of \$224,000. (Assuming that bonds will be used to finance the initial cost, the annual charges were calculated for a 10-year period at 9 percent interest [multiplier = 0.1558].)
- Landfill must be capped with a single liner when completed.
- Landfill closure and post-closure monitoring cost of \$215,000. (Annual cost should include a sinking fund payment of \$14,200 per year to pay for landfill closure.)

Annual operation and maintenance costs	\$224,000
Principal and interest on initial investment (\$1,290,000 X 0.1558)	201,000
Sinking fund payment for closure and post care (\$215,000 X 0.0658)	14,200
<b>TOTAL ANNUAL COSTS</b>	<b>\$439,200</b>

- Total design capacity of the landfill is 322,900 tons of waste (compacted to 1200 lb per cubic yard).
- Total volume capacity is 538,200 cubic yards.
- First-year wasteload is 24,400 tons, based on 470 tons per week.
- Growth in Center City and in the county is expected to cause the wasteload to increase 6 percent per year for the next 10 years.

<u>Projected Year</u>	<u>Estimated Annual Wasteload (tons)</u>
1	24,400
2	25,900
3	27,500
4	29,100
5	30,900
6	32,800
7	34,800
8	36,900
9	39,100
10	41,500
<b>Total Capacity</b>	<b>322,900</b>

$$(322,900 \text{ tons} \times 2000 \text{ lb} \times \text{cy yd} = 538,200 \text{ cu yd})$$

ton      1200 lb

- Recommended tipping fee for the first year's operation is based on the annual cost estimate of \$439,200 and the estimated wasteload of 24,400 tons.

$$\text{Tipping fee} = \$439,200 / 24,400 \text{ tons} = \$18 \text{ per ton}$$

### ALTERNATIVE THREE: Transfer/Haul to Outastate Landfill in Neighboring State

- Consolidate waste transfer and hauling operations to prevent continued use of Outastate Landfill from becoming prohibitively expensive.
- Construct a centrally-located transfer station upon recommendation of the City/County Special Commission on Waste Management. (A transfer station is a facility that receives wastes brought in by citizens, businesses, industry, city collection trucks, and private waste collection companies. Wastes are compacted inside large tractor-trailers. One trailer holds approximately 20 tons of waste.)

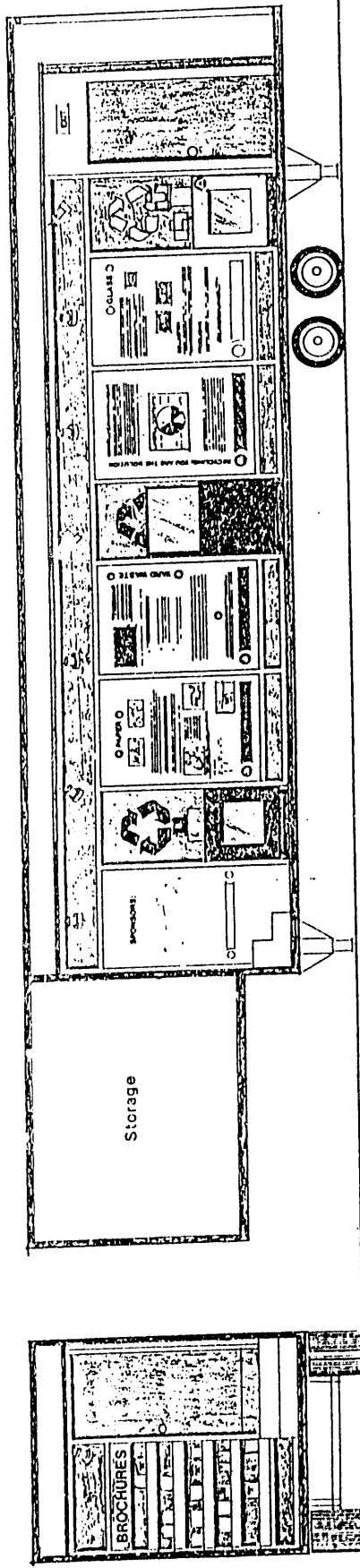
Site acquisition, engineering, and permitting	\$ 80,000
Site preparation	50,000
Transfer station construction	220,000
Hauling equipment (two tractors @ \$60,000 each, four trailers @ \$40,000)	280,000
<b>TOTAL INITIAL COSTS</b>	<b>\$630,000</b>

Operating and maintaining the transfer station will require the following:

- Six employees (including two full-time drivers)
- Financing of facility through bonds using a 9 percent interest rate and a 10-year term (multiplier = 0.1558).
- Financing of equipment using a 9 percent interest rate and a 5-year term (multiplier = 0.2571).
- Truck mileage of 154,800 per year, based on estimated wasteload of 470 tons per week, 24 trips per week, at 124 miles per roundtrip.

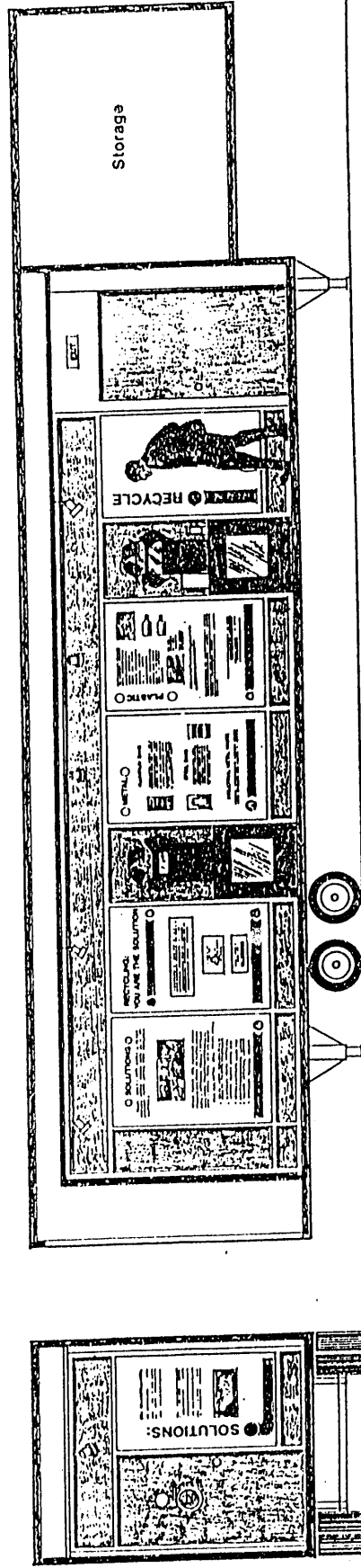
Negotiations between the owners of Outastate Landfill and members of the city/county commission have resulted in an agreement:

- Outastate Landfill will agree to take wastes, at a \$9.50 per ton tipping fee, for 5 years. (Note: Outastate Landfill is a very large disposal facility, and is operating under "old" regulations that do not require expensive liners, and other environmental protection measures. Its current disposal fee is \$7.00 per ton; the reason for the higher fee is the 5-year waste acceptance guarantee.)
- Outastate is the only disposal operation within 150 miles that would even consider taking Pretty Good County's wastes.



Section View

Section View



Section View

Section View

Scale: 1/2"=1'-0"

# Recycle Exhibit Trailer

## Sections

TO: MIKE ARMS  
FROM: RUCS  
ALLEN  
(BVI)



**JUANITA HILL**, of Bicentennial Volunteers Inc. talks to kindergarten and first grade students of Krista West at Fairview Elementary School on Tuesday concerning the recycling of paper. The exhibit has been seen by more than 20,000 children during this past school year.

## Fairview Students View Recycling Exhibit

The Mobile Recycling Exhibit, a display shown to students at Fairview School on Tuesday, is housed in a 44-foot trailer with its own generator.

The exhibit contains a working model can crusher, plastic shredder, paper shredder, and glass crusher. There are also wall graphics and information about the merits of recycling and the reduction of solid waste.

Visitors to the exhibit observe and are able to participate in the shredding of paper and plastic and the crushing of glass and aluminum cans that they may be processed for the manufacturing of products.

The MRE is scheduled to visit 20 middle schools in 10 counties in East Tennessee during the 1991-1992 school year. Subject to the availability of funding, it will be

visiting other East Tennessee schools in 1992 and 1993.

The MRE is presented by the East Tennessee Discovery Center and is sponsored by the Roddy

Coca-Cola Bottling Company, Knoxville News-Sentinel, Tennessee Valley Authority, Department of Energy, and Bicentennial Volunteers Inc., which operates and staffs the exhibit.

## Three SHS Football Players Named All-District

Three players from Scott High have been selected to the All-District Seven (AA) football team.

Earning positions on the honor squad are: Steve Watters, senior tailback-linebacker; Jason Terry, senior quarterback-defensive back; and Marc Serra, senior offensive

guard-defensive end.

Other honorees include:

Kingston--Aaron Roberts, Stacey Moore, Travis Baker, Byron Woods, Jamie Millican, and Mike Boles.

Rockwood--Kelvin Inman, Stephen Johnson, Clinton Foland, Eric Bowman, Robbie Newby,

Jamie Presley, and Jason Eskridge (MVP).

Wartburg--Jay Moore, Brandon Peters, and Matt Vespice.

Harriman--Wayne Bullard, Steve Gresham, and Mike Lewis.

Oliver Springs--Nathan James, Wendell Jones, and Dewayne Butler.

## Former RSCC Athletes Invited To Event

All former Roane State Community College athletes, coaches, and cheerleaders are being invited to attend the Roane State/Motlow State basketball game on Saturday, February 8.

A reception and special recognition are being planned as part

of Roane State's 20th Anniversary Celebration.

Roane State athletes and coaches have won division, state, regional and national titles in men's and women's basketball, baseball, men's and women's tennis, and golf.

who helped make Roane State's athletic programs so successful on the playing fields as well as in the classrooms.

The Raiderettes will face the Motlow State Lady Bucks at 6 p.m. and the men's game will follow at 8 p.m.

# Students see benefits of recycling

By JIM KENNEDY  
Staff Writer

**THE MERITS OF** recycling and the reduction of solid waste were brought home to school children in Madisonville this week by a touring exhibit.

It is called the Mobile Recycling Exhibit and is housed in a trailer 44 feet long.

The exhibit has a working model can crusher, plastic shredder, paper shredder and glass crusher. In addition, there are wall graphics and information explaining the benefits of recycling.

Children entered the exhibit in small groups and were guided by volunteers from Bicentennial Volunteers, Inc. from Knoxville.

The operation of each device was demonstrated. The children participated in the shredding of paper and plastic, the crushing of glass and aluminium cans.

The children were told that each of the materials used in the demonstration can be used in the manufacturing of products.

"**MORE THAN 13,000** children have already seen the display, and our goal for the end of this year is for 60,000 to see it," said Jean Demonbeum, a volunteer.

The exhibit is scheduled to visit 20 different middle schools in 10 counties in East Tennessee during the 1991-92 school year.

According to Demonbeum, a retired Tennessee Valley Authority employee, if the funds are available next year, the project will continue.

As the children enter the exhibit, they are shown how each machine works. Volunteers take simple bottles and cans and insert them into the various devices.

By allowing the kids to see how trash can become useful raw material, the sponsors hope to encourage the value of recycling.

The exhibit is presented by the "East Tennessee Discovery Center," and is sponsored by Roddy Coca-Cola Bottling Company, the Knoxville News-Sentinel, the Tennessee Valley Authority, the U.S. Department of Energy and Bicentennial Volunteers, Inc.



**ROY SLIGER, an Athens volunteer with Bicentennial Volunteers, Inc. Welcomes Madisonville Middle School 5th-grader James Glen Key into the Mobile Recycling Exhibit Wednesday. Photo by Jim Kennedy**



**SIXTH GRADE** students Jeremy Brewer, left, and Nicky Toomey ask retired volunteer Roy Sliger about the aluminium can crushing machine. The two boys, along with other Madisonville Middle School students toured the Mobile Recycling Exhibit Wednesday.

# Students take a closer look at recycling devices

Area students can get a close look at recycling equipment when the East Tennessee Discovery Center's mobile recycling exhibit makes appearances at their schools this year.

Students at Robertsville Junior High will be invited to put their hands on recycling equipment featured in the mobile display when it appears at their school Oct. 7-12. Students at Jefferson Junior High will have the same opportunity Oct. 14-19.

The exhibit, permanently housed in a 44-foot trailer, contains displays of a glass cruncher, plastic

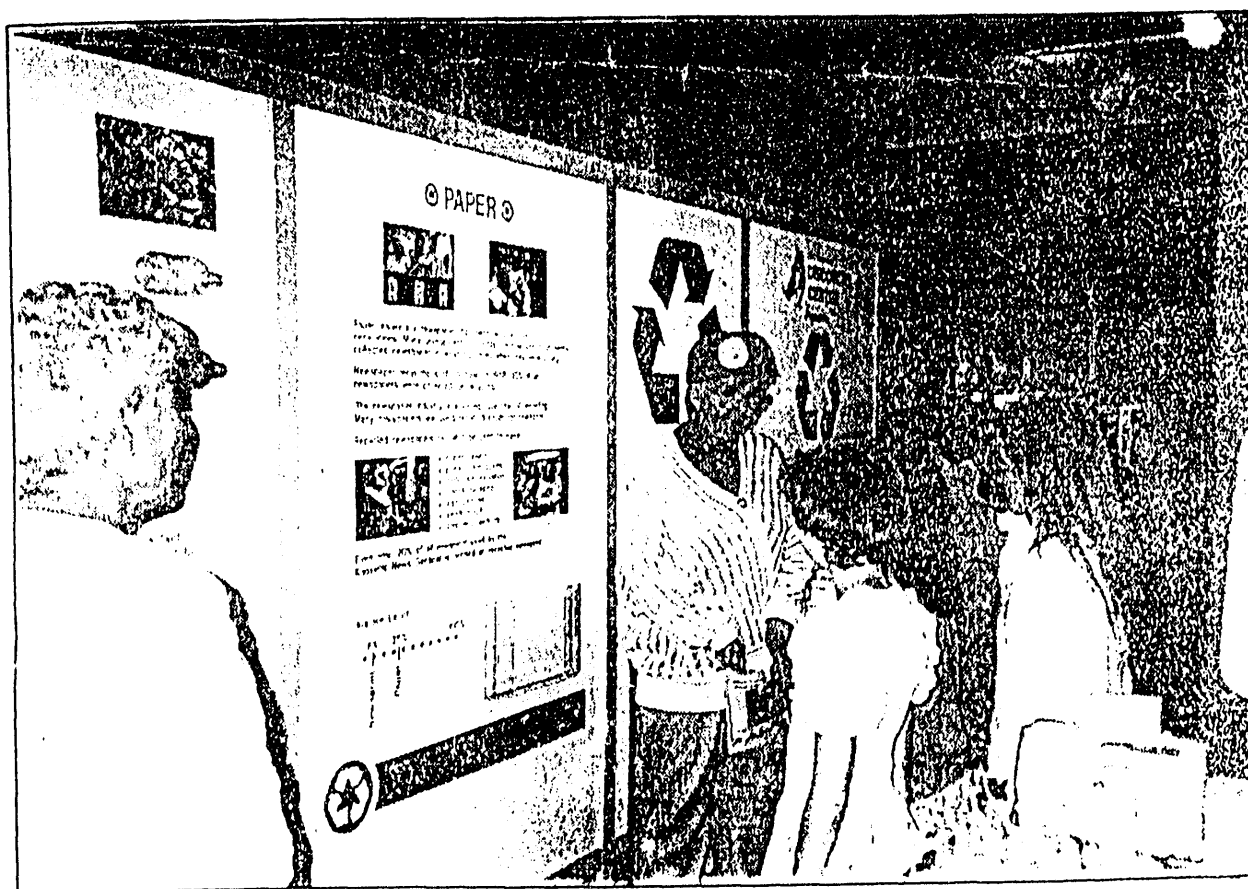
shredder, can crusher, paper shredder and photos of a compost pile. The trailer shows up at the intended school on a Monday, the display is set up, and visitors tour the exhibits from Tuesday to Saturday, according to a news release from the Discovery Center.

The trailer appeared at Clinton Middle School last month, marking the debut of its tour for this school year. Visits to schools in Union, Anderson, Loudon, Monroe, Blount, Sevier, Hamblen and Granger counties are planned for the mobile educational unit this year.

The traveling exhibit was made possible by a \$50,000 grant from the U.S. Department of Energy and sponsorship by the Tennessee Valley Authority.

Other sponsors include the Roddy Coca-Cola Bottling Co. and the Knoxville News-Sentinel Co. The exhibit toured all Knox County middle schools last year.

The trailer features handicapped access, the release said, and the exhibit is operated by TVA Bicentennial Volunteers.



The Courier-News / PATRICIA TRUEX

## Recycling exhibit at Clinton Middle

JUANITA HILL OF KINGSTON speaks to Clinton Middle School sixth-grade students about recycling. Hill is a member of the Bicentennial Volunteers Inc., one of the sponsors of the recycling exhibit at the school. The exhibit, from Tuesday to Thursday, includes glass, paper and plastic shredders as well as aluminum can crushers and is open to the public from 8:30 a.m. to 2:30 p.m.

## Recycling exhibition visits L.C.E.S., L.C.M.S.

A traveling recycling exhibit came to the local elementary and middle schools last week.

All of the students at L.C.E.S. and L.C.M.S. were able to see firsthand how paper, glass, aluminum cans, and plastic can be recycled.

Many of the students

brought their own cans to school and watched them get squashed.

L.C. Madron, principal of L.C.E.S. said Friday that he considered the venture to be very important and educational.

"I wish Lake City could get something like this started. We need it desperately."

"Right now, it's the inconvenience that is keeping people from doing it. If you could make it more convenient, people would do it." (The nearest recycling bins are in Oak Ridge or Norris)

"Recycling is especially important with each new year because the landfills are filling up," said Madron.

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## Recycling display at Maynardville Elementary

With space for landfills becoming much harder to find the East Tennessee Discovery Center has begun an educational program for students. They brought a 44' trailer equipped with replicas of recycling machines to Maynardville Elementary School for three days last week. The recycling program sponsored by Roddy Coca-Cola Co., Knoxville News Sentinel, U.S. Dept. of Energy, TVA and Bicentennial Volunteers. Leonard and Jean DeMonbreun and Martha Allen are volunteers and travel with the unit.

Deborah Lay, sixth grade social studies teacher at M.E.S. is the coordinator of the recycling program now in operation at the school. Ms. Lay said "I'm trying to teach the children that one person can make a difference when they work together and teach others to recycle. Ninety percent of the school is now involved in

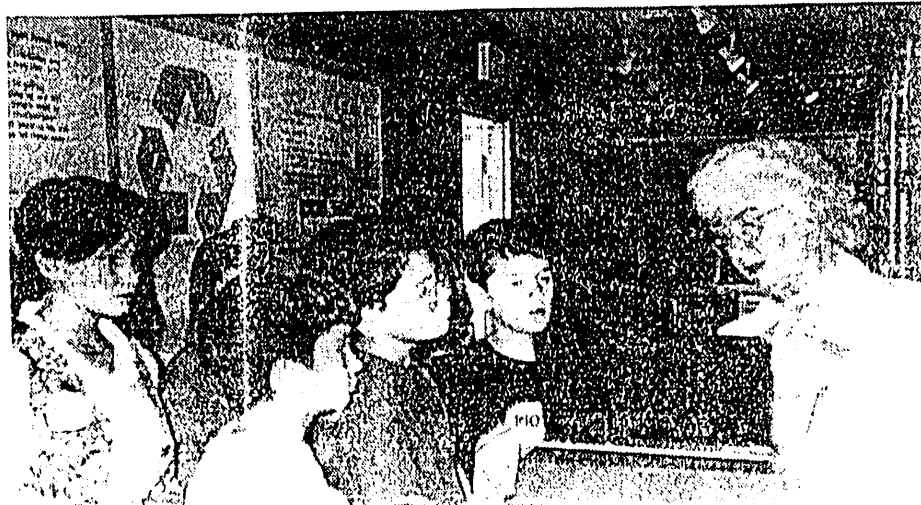
real landfill's, if we can find the space," she said.

Today, there are more types of solid wastes that are recyclable than there was in the 1960's. In addition to paper and glass, cans

and some plastics can be made into usable products.

Robert Miller is Operations manager with Halsey Construction Company in charge of booking the display. Mr. Miller

"complimented the students of MES on being very well behaved and cooperative." Ninety hundred students have all seen the display and the before year's end is 59,000



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Deborah Lay, sixth grade social studies teacher at M.E.S. is the coordinator of the recycling program now in operation at the school. Ms. Lay said "I'm trying to teach the children that one person can make a difference when they work together and teach others to recycle. Ninety percent of the school is now involved in recycling and Alcoa picks up our aluminum cans that are being saved throughout the school." Recently her class had a project for each student to take an item and make it to something else, as a way of understanding recycling.

"Plans are for the class to do a sample landfill project to see what happens to the items that are put in

real landfill's, if we can find the space," she said.

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Shown are 5th grade students of Ms. Carolyn Murr as they observe how paper is being shredded in preparation for recycling. Mrs. Jean DeMonbreyn shows the students how it operates and answers questions.

# Mobile Recycling Exhibit demonstrates methods used, benefits

By MICHELLE LONG  
Staff Writer

School in Kingston Jan. 14 through 16.

"We are getting the message to our youngsters because they are our future," said Clarence Hill of Bicentennial Volunteers Inc., which staffs the exhibit. "They need to know about how to keep things clean."

The exhibit is designed to show different methods of recycling including paper, plastic, aluminum and glass; what benefits recycling has on the environment and natu-

**"They need to know how to keep things clean," said Clarence Hill.**

ral resources and what individuals can do toward the effort.

Inside the 44-foot trailer is a working model can crusher, plastic shredder, paper shredder and glass crusher. Visitors to the ex-

hibit are able to participate in these methods of recycling. They are also shown a cross section of landfill contents and instructed by volunteers on the benefits of recycling.

"It helps keep the water supply cleaner and makes the countryside cleaner," Hill explained.

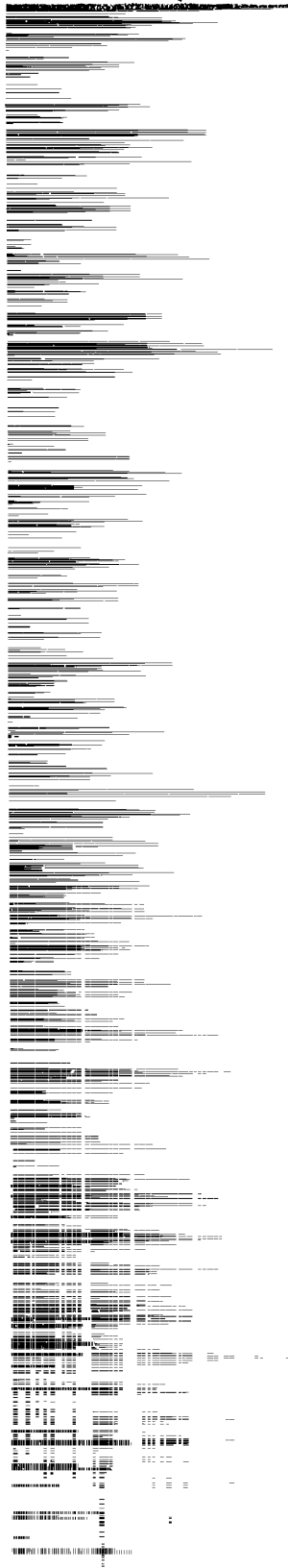
Hill and his wife Juanita of Kingston and Allen and Othalee Tighe of Rockwood staffed the exhibit in Harriman. The staffers are rotated, with two two-member teams staffing each school visit.

The exhibit is not just limited to students. Informational brochures are available and include step-by-step instructions to design a compost heap, which recycles

biodegradable makes an or-

The unit schools so fa- vicing 21,000 to more tha 49,000 stud-

The ex- through Ea Center and Coca-Cola News-Senti Authority. and Bicent-



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The exhibit is not just limited to students. Informational brochures are available and include step-by-step instructions to design a compost heap, which recycles

biodegradable food wastes and makes an organic fertilizer.

The unit has been shown in 18 schools so far this school year, serving 21,000 students, with plans to more than double that figure to 49,000 students by year's end.

The exhibit is presented through East Tennessee Discovery Center and is sponsored by Roddy Coca-Cola Bottling Co., Knoxville *News-Sentinel*, Tennessee Valley Authority, Department of Energy and Bicentennial Volunteers Inc

**END**

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