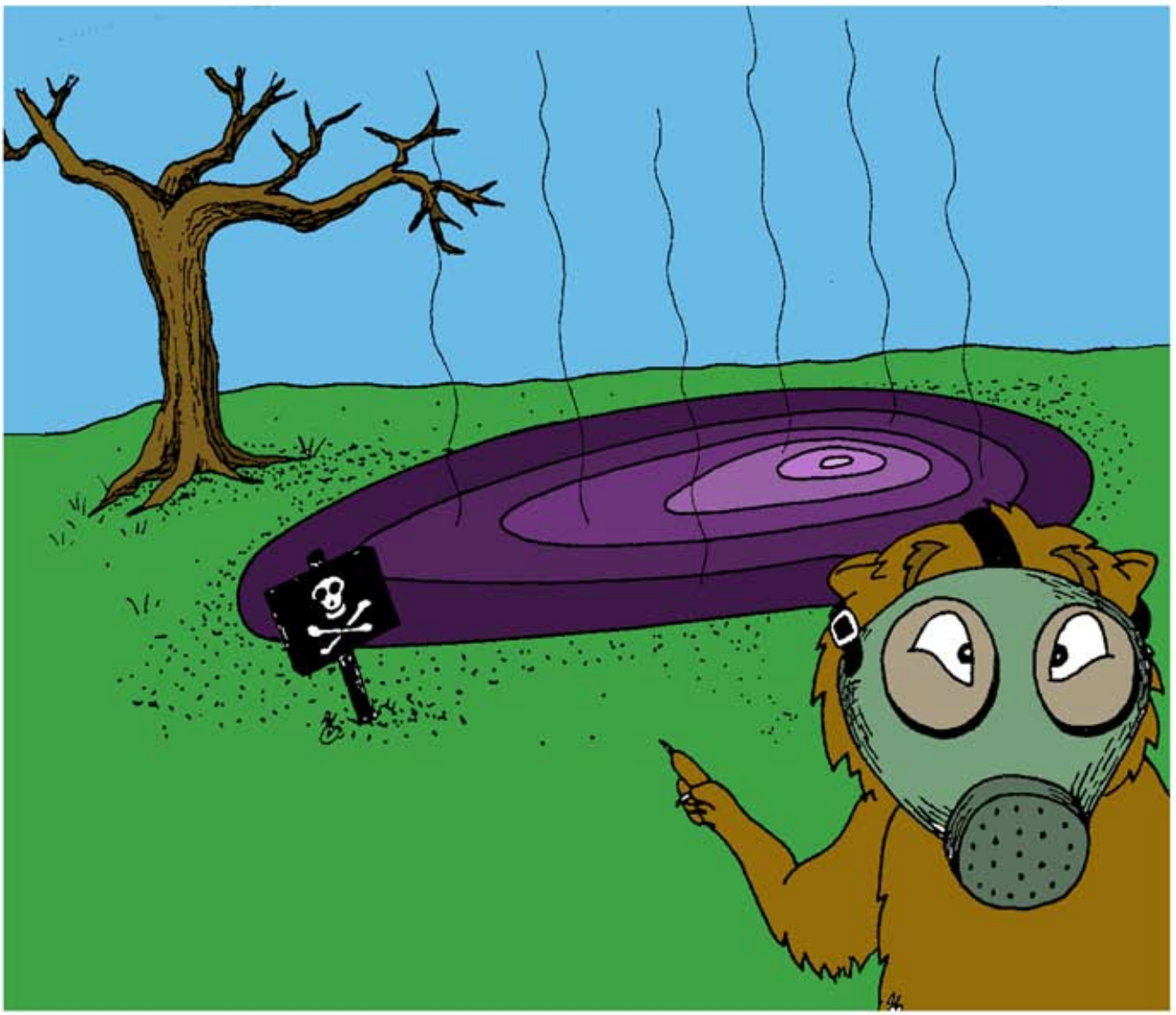
Table of Contents

HAZARDOUS WASTE



Hazardous Waste

The average Canadian household produces 35 litres of *hazardous waste* (H.W.) each year. Based on this, the thirty-one thousand homes served by the Bluewater Recycling Association (B.R.A.) would produce 1.1 million litres of H.W. annually. This is enough to fill two and a half Olympic-sized swimming pools. It would take eighty-three trucks, totaling half a kilometre in length, to hold all this waste. Not including industrial or agricultural hazardous waste, Ontario homes produce a total of one hundred, forty million litres (140,000,000 litres) per year. This would require over ten thousand, five hundred fuel trucks stretching from the city of London to Lake Huron, at Grand Bend.

Hazardous waste is the most dangerous of all wastes. It can immediately affect man and the environment or its full effects may take years to appear.

Defining hazardous waste is as difficult as managing it. Government, industries and individuals all define the term differently. *The Ministry of Environment and Energy's* definition is contained in *Ontario Regulation 347*.[1] For our purpose, we will use the following definition:

Hazardous waste is dangerous to human health and/or the environment. It includes toxic, corrosive, flammable, reactive and radioactive waste from homes, industry and agriculture.

Who is to blame for all this deadly trash? We, the public are. Industrialization and advertising have taught us to seek products that are more "convenient" and "easier to use". These wonders of modern living have replaced old-fashioned elbow grease and exercise with "no scrub" chemicals and "disposable" poisons.

While some of us will come in contact with hazardous waste from industry and agriculture, the majority of the waste we face is "homemade", generated from the daily operations of our homes. This is called *household hazardous waste.*

Hazardous Products

Agriculture and industry may produce the most hazardous waste by volume and mass, but the biggest threat to the majority of Canadians is in our homes. Our closets, cupboards, basements and garages are full of hazardous products, also known as household hazardous waste (H.H.W.).

Products are considered hazardous when they are *corrosive, reactive, flammable, toxic* and/or *radioactive.* These hazards are usually identified by the use of graphic symbols; these symbols are illustrated and explained in Figure H-1.

A product may pose several hazards in which case its container/packaging will have several symbols. A written explanation may accompany or replace the symbols.

Dangers associated with a product can be reduced through careful shopping. Most *aerosol* cans are explosive; if a product can be purchased in a "pump", do so. Not only will you reduce the danger of an explosion, you will replace possibly flammable and atmospherically harmful propellants with "people power". The "pump" may be reused or recycled more readily than the "aerosol".

Household Hazardous Waste Identification Symbols

CORROSIVE
Substances that eat and wear away at many materials.
e.g. battery acid, drain cleaner

FLAMMABLE
Liquids that can ignite.
e.g. lighter fluid, turpentine, gasoline

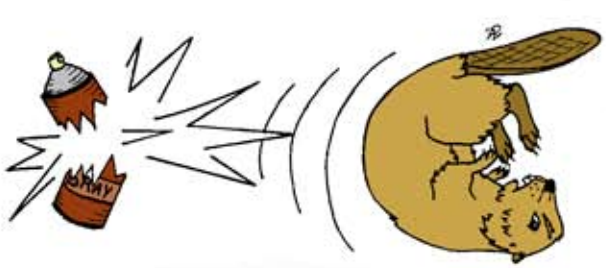
REACTIVE
Materials that can create an explosion or produce deadly vapours.
e.g. chlorine bleach, ammonia

TOXIC
Materials that, even in small quantities, are poisonous or lethal.
e.g. rat poison, potent medicines, cleaning fluids, pesticides/herbicides, chlorine bleach

RADIOACTIVE
Materials that give off small doses of radiation.
e.g. ionizing smoke detectors

Figure H-1

The best method of coping with hazardous products is to *reduce, reuse, recycle* and re-evaluate those already in our homes. Do we really need five kinds of cleaner for the bathroom? Are two types of bleach necessary? Are batteries needed to run an electronic device when an adapter would do the same job? The answer to these questions is ... probably not. Safer alternatives are available. They pose less of a threat and are usually cheaper than specialized products. A chart identifying household hazardous products, proper disposal techniques and alternatives is provided in this section on pages H3 to H5.



Some hazardous products are essential to life in the late 20th century. They provide a clean living environment and a healthy life. Most, however, are chemical concoctions marketed to replace a little time and effort.

HAZARDOUS WASTE - HANDOUT

Household Hazardous Products & Alternatives

	HOUSEHOLD ITEM	HAZARD	DISPOSAL METHOD	SAFER ALTERNATIVES
BATHROOM	TUB, TILE, TOILET BOWL CLEANER+	Corrosive Toxic	Use existing product, then convert to alternative or Landfill	rub with soap flakes & baking soda or sliced lemon dipped in borax, rinse & dry OR dissolve 50 ml soap flakes or powder with 10 ml borax in 375 ml boiling water. Cool down. Add 50 ml chalk line powder (whiting) & pour in sealed plastic or glass container-
	DISINFECTANTS+	Toxic	Use existing product, then convert to alternative	-use 125ml borax in 4 1/2 litres of water
	PERSONAL AEROSOLS+	Toxic Reactive	Waste Depot	-buy products in non-aerosol form
	DRAIN CLEANER	Toxic Corrosive	Waste Depot	-use 1 or 2 handfuls of baking soda &125ml vinegar. Allow to sit one hour, then run water or pour boiling water down drain OR use a plunger
	NAIL POLISH REMOVER	Toxic Flammable	Waste Depot	-no alternative
	TOILET BOWL ADDITIVES	Toxic Corrosive	Use existing product, then convert to alternative	-use safe all-purpose cleaner -for stains, mix lemon juice & borax into a paste. Apply, then let set for 2 hours & scrub off
	UNUSED MEDICINES	Toxic	Pharmacy Waste Depot	-take all medication as instructed
LAUNDRY ROOM	NON-PHOSPHATE & PHOSPHATE DETERGENT	Corrosive Toxic	Use existing product, then convert to alternative	-use 50 ml washing soda per load to remove detergent residue before switching -use 250 ml soap flakes or powder plus 25 to 50 ml washing soda or baking soda
	CHLORINE BLEACH	Corrosive Toxic Reactive	Use existing product, then convert to alternative	-use 1 part hydrogen peroxide to 5 parts water. Soak garments in solution, then rinse. -OR use125ml borax per wash load
	SPRAY STARCH+	Flammable	Use existing product, then convert to alternative	-mix 15ml cornstarch with 250 ml water in pump spray bottle
	FABRIC SOFTENER & STATIC CLING PREVENTION+	Toxic	Use existing product, then convert to alternative	-toss small wet towel into dryer a few minutes before end of cycle -use plant spray mister on the underside of clothes you are wearing
	SPOT & STAIN REMOVER+	Toxic	Use existing product then convert to alternative	-immediately soak spot in cool water & sponge away GREASE - rub with a cloth dipped in borax OR apply a paste of cornstarch & water, let dry & brush off INK (ballpoint) - sponge with rubbing alcohol (hair-spray), rub with soap, rinse & wash FRUIT & RED WINE - sponge with club soda CHOCOLATE & COFFEE - soak in cold water, rub with soap & mild borax solution GRASS - rub with glycerine, let stand 1 hour & wash

Household Hazardous Products &Alternatives (cont.)

	HOUSEHOLD ITEM	HAZARD	DISPOSAL METHOD	SAFER ALTERNATIVES
GARAGE & BASEMENT	SOLVENTS (paint thinners, brush cleaner, degreaser, turpentine)	Flammable	Waste Depot (some items can be recycled)	-use latex or water-based products
	PAINT STRIPPERS	Flammable Toxic	Waste Depot	-use a heat gun and sandpaper
	GLUES & EPOXIES	Flammable Toxic Reactive	Solidify in a well ventilated area & then Landfill	-use a water based product
	PAINTS+ (enamel or oil base, all spray paints)	Toxic Flammable	Solidify & Landfill (see note)	-use latex or water based paints
	STAINS & FINISHES	Toxic Flammable	Waste Depot	-use latex paint or natural earth pigment finishes
	PENETRATING OILS+	Toxic Flammable	Waste Depot	-use vaseline
	MOTOR OIL	Flammable	Recycle	-purchase recycled product
	FERTILIZERS	Toxic	(see note)	-organic fertilizer: compost, mulch
	INSECTICIDES+	Toxic	Waste Depot	-crop rotation, companion planting, insecticidal soap, attract insect-eating birds, integrated pest management
	HERBICIDES+ (weed killer)	Toxic	Waste Depot	-keep grass short, hoeing & hand weeding
	FUNGICIDES+	Toxic	Waste Depot	-do not overwater, keep areas dry & clean
	PROPANE CANNISTERS	Reactive Flammable	Waste Depot	-barbecue with charcoal or wood
	ANTI-FREEZE	Toxic	Waste Depot or Recycle	-no practical alternative
KITCHEN	DISHWASHING DETERGENT*	Phosphates	Use existing product, then convert to alternative	-use commercial phosphate free or environmentally friendly soaps -use liquid soap or powdered soap with 10-15ml of vinegar OR 1 part grated bar soap & 8 parts water boil, cool & store
	AUTOMATIC DISHWASHER DETERGENT	Corrosive	Use existing product, then convert to alternative	-use equal parts borax & washing soda
	SILVER POLISH	Corrosive Toxic	Waste Depot	-soak in boiling water with baking soda, salt & a piece of aluminium

Household Hazardous Products &Alternatives (cont.)

	HOUSEHOLD ITEM	HAZARD	DISPOSAL METHOD	SAFER ALTERNATIVES
KITCHEN	METAL POLISH	Corrosive Toxic	Waste Depot	-rub flour over surface with a dry cloth
	FLOOR CLEANER+ (All purpose cleaner)	can be Corrosive Toxic	Waste Depot	-use 75ml washing soda & 125 ml ammonia in 4 litres of warm water
	RUG & UPHOLSTERY CLEANER+	Corrosive Toxic	Waste Depot	-sprinkle dry cornstarch on rug & vacuum -for spills, sponge rub promptly with mixture of vinegar & water, then sponge with clean water & pat dry
	GLASS & MIRROR CLEANER+	Toxic	Waste Depot	-mix 30ml of vinegar in 1.1 litres of water
	OVEN CLEANER+	Corrosive Toxic	Waste Depot	-use steel wool with washing soda & water -use 250 ml of ammonia with 750 ml of water -place 250 ml of ammonia in a pan on the top shelf & a pan of boiling water on bottom shelf in preheated 100°C (215°F) oven. Turn off oven and leave over night. Before opening oven to clean, be sure to provide plenty of ventilation.
	FLOOR & FURNITURE POLISH*+		Use existing product then convert to alternative	-use 1 part lemon juice to 2 parts olive or vegetable oil
MISCELLANEOUS	AIR FRESHENER+	Toxic	Landfill	-use house plants, dry or simmering potpourri, good ventilation, dish of baking soda or vinegar
	MOTH BALLS	Toxic	Waste Depot	-use cedar chips, newspaper, lavendar
	RAT & MOUSE POISON	Toxic	Waste Depot	-use live traps & remove food supply
	BATTERIES	Toxic	Waste Depot	-use rechargeable batteries OR adapter & power cord
	SWIMMING POOL CHEMICALS	Toxic	Waste Depot	-use ozone or ultra violet light systems
	SMOKE DETECTORS (Ionizing type)	Radioactive	Waste Depot	-use non-ionizing detector

*This product may not be considered H.H.W., but is environmentally unfriendly.

+Products in an aerosol can are explosive and contain flammable propellants; CFC's in aerosols deplete the ozone layer.

NOTE: Use a product up or give it to someone who can, so only the empty container need be disposed.

Shopping for 6 Safer Substances

ITEM	PURCHASING SOURCES
1. Vinegar	Grocery Store
2. Pure Soap (Flakes, Powder, Bars)	Grocery or Hardware Store
3. Baking Soda	Grocery or Hardware Store
4. Borax	Grocery or Hardware Store
5. Washing Soda	Grocery or Hardware Store
6. Ammonia	Grocery or Hardware Store

ADDITIONAL PRODUCTS

1. Hydrogen Peroxide	Drug Store
2. Glycerin	Drug Store
3. Corn Starch	Grocery Store
4. Chalk Line Powder (Whiting)	Hardware Store
5. Steel Wool	Grocery or Hardware Store
6. Battery Recharger	Department Store
7. Adapter and Cord	Department Store
8. Plastic Spray Bottles	Department Store
9. Reusable Containers	Department Store

If any of the above items are not readily available in your area store, please request the manager to order them. This will make it easier for everyone to do their share to make our corner of the Earth healthier.

Storage

You searched through your home and uncovered all the household hazardous waste (H.H.W.) in it. Instead of putting it in a garbage bag or pouring it down the drain, you decide to do the right thing by taking it, for example, to the H.H.W. day (a special day organized to collect this waste at a temporary location). Eventually the day comes and upon arriving at the site, you unload your waste only to be told it cannot be accepted. Why not? It was improperly stored.

In order for H.H.W. to be successfully recycled and/or disposed it must be correctly identified. Only the original containers provide the information needed to correctly deal with the waste. H.H.W. in unlabelled jars or cans may be identifiable, but the process can be long and expensive. Because an H.H.W. day is a short-term exercise, there is no time to test jars of "stuff".

The second reason for keeping waste properly stored is for your own personal safety. Improperly stored H.H.W. may increase the waste's flammability, reactivity, toxicity and/or corrosiveness. If bleach and ammonia are mixed they form a **very poisonous gas**; keep each in properly sealed, well marked containers. Used motor oil is not only flammable but also *carcinogenic* if swallowed. Gasoline vapours can ignite in high enough concentrations. Children can ingest antifreeze and other hazardous liquids, mistaking it for juice or pop, if they are not in the original child-proof containers. Waste left outside or poured on the ground can contaminate well water and soil or ruin septic tanks.

For the storage of H.H.W. to be effective and safe general guidelines are provided on page H9. Please note this is not a finite list: check with a qualified chemist or the Ministry of the Environment and Energy if you are unsure.

Personal Notes

Household Hazardous Waste Storage Guidelines

- Keep substances in original container
- Ensure the cap, lid, etc. is securely on
- Check to be sure the label is legible and properly affixed to the container
- Store substances in a cool, dry place and out of reach of children and pets
- Separate incompatible/reactive substances
- Keep a list of all H.H.W. in your home; include name of product/substance and date purchased
- Check containers for deterioration

Household Hazardous Waste Day Guidelines

- Set up a committee to organize an H.H.W. day.

- Estimate the cost of holding an H.H.W. day. Compare the projected costs of a licensed handler staging the entire event versus the cost of using volunteers (including a qualified chemist) to supervise the collection, then using a handler dispose of the H.H.W., only.

- Choose a site best suited for the H.H.W. day, as per Ministry of Environment and Energy (M.O.E.E.) guidelines[2].

- Have qualified handlers bid by tender for the contract to either stage the entire event or to dispose of the H.H.W. Terms of reference should be used to obtain accurate costs and terms from the handlers.

- Send appropriate applications to the M.O.E.E.
  - these should include:
    a) H.H.W. Collection Program application submitted to the Waste Management Branch (M.O.E.E.)
    b) a form for a Certificate of Approval to operate a hazardous waste collection/transfer site
    c) register as a waste generator

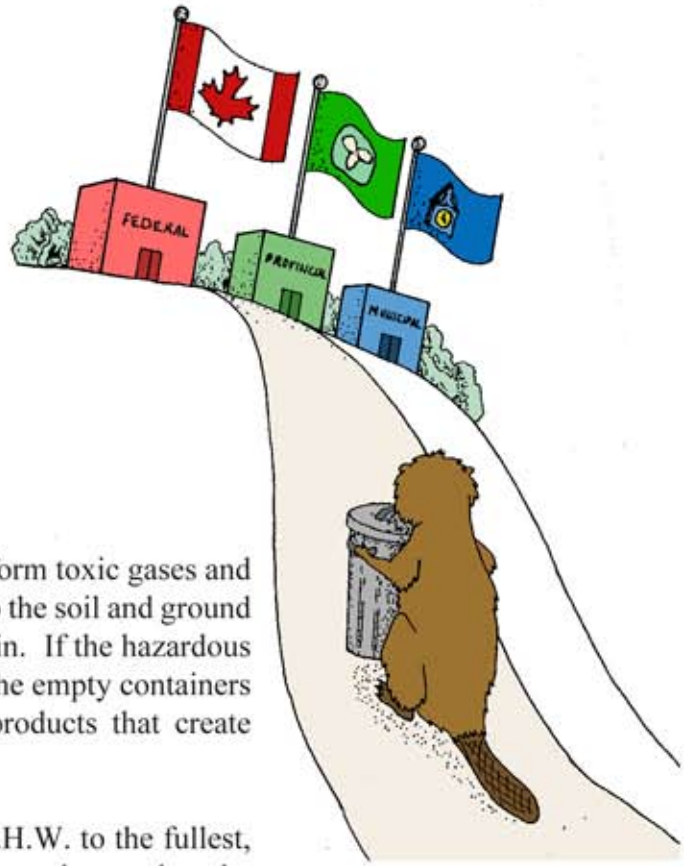
- Apply to Ministry of Environment and Energy for grants to help offset the cost of the H.H.W. day.

- Begin a campaign, pending M.O.E.E. approval of above applications, to educate the public as to what H.H.W. is; use as many free advertising sources as possible. Explain what can and cannot be taken to the H.H.W. days.

- Double check the equipment, handler, and volunteers, etc., are ready for the H.H.W. day.

- Stage the event and take pride in the knowledge that you and those involved have done something worthwhile.

Collection



Household hazardous waste (H.H.W.) is, for the most part, collected with our regular garbage. Old cleaners, paints and oils are thrown into garbage bags along with potato peelings, empty tooth paste tubes, and milk bags, then collected at the curb or taken directly to the landfill. **This is not the correct method of collecting H.H.W.!**

Collecting waste in this manner is potentially dangerous. Explosions and fires can occur during transportation. Chemicals can react to form toxic gases and vapours. H.H.W. in unsecured landfills can leach into the soil and ground water contaminating water supplies and the food chain. If the hazardous products in our homes are used up, the collection of the empty containers does not pose a great dilemma; it is the unused products that create problems.

After you have reduced, reused and recycled your H.H.W. to the fullest, then there are three types of collection that can be used to gather the remaining material. Special **curbside pick-up** is the first type.

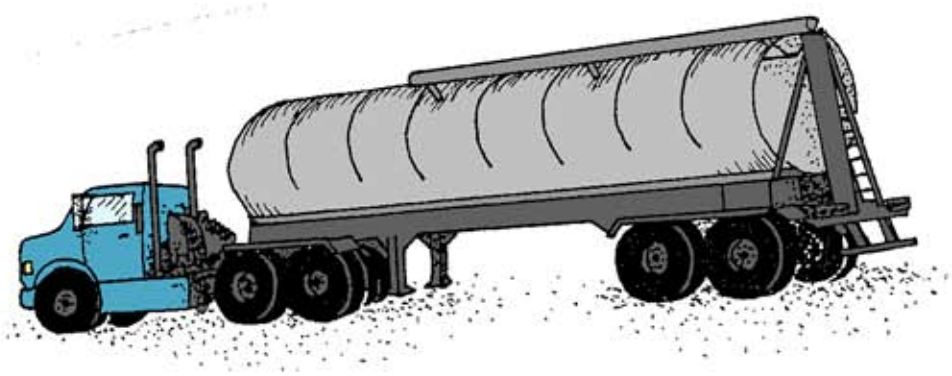
A citizen telephones the Public Works department to arrange pick-up of H.H.W. at the citizen's home. This system of collection is expensive and has only been done on a small scale, in large urban areas.

Permanent depots, the second method, are carefully designed and controlled facilities where waste is labeled, packaged and stored until it can be processed for reuse/recycling or placed in a *secured landfill*. A chemical engineer, chemist or similar professional is normally on site to ensure the H.H.W. is handled properly.

Lastly, **H.H.W. days** are similar to depots, except they occur periodically in a community. Smaller municipalities may not be able to justify or afford a depot, but still produce H.H.W. that needs attention. A mobile "depot", complete with all the technology of a permanent facility, is set up to collect the waste, then it is safely transported away.

Check to see if either a depot or H.H.W. day is accessible in your area. If neither exists, you may want to organize a H.H.W. day. The basic guidelines for such an event are provided on page H10.

Disposal



After the household hazardous waste (H.H.W.) day is over or your depot is full, special trucks haul the waste away. This waste rides off into the sunset and everyone lives happily ever after. If disposing of H.H.W. was a movie, the film would end here. However, it must go somewhere to be disposed. The following will explain the where and how of disposal.

The first step is the shipment of household hazardous waste. Due to the dangers of moving any hazardous waste, the federal government created *the Transportation of Dangerous Goods Regulations.*[3] These regulations are quite extensive and should be reviewed separately. For now, the most important detail is hazardous waste **must go directly from the generator to the receiver;** it cannot be processed during transit.

Now that the H.H.W. is mobile, it will end up at one of several destinations. Material that is suitable will be taken to facilities for reuse and recycling.

Another destination is a licensed, secured landfill. It is slightly different from a *sanitary landfill*. A secured landfill must possess a natural ability to contain materials and protect ground water for thousands of years. The base must be clay soil located on top of a geologically stable region. The facility near Sarnia, Ontario, the only licensed secured landfill in the province, has a clay base forty-one metres thick. Fencing and security patrols are used to avoid accidents and trespassing.

H.H.W. is analyzed before it is shipped to and after it arrives at a secured landfill. Not only is this a safeguard against illegal disposal, it helps the chemists and engineers develop a chemical or physical process which will render the H.H.W. *inert.* Material that cannot be made inert may be burned using *controlled incineration*. Some paints, for example, cannot be recycled or easily made inert so they are incinerated at a very high temperature; high incineration temperatures are used to help reduce harmful emissions.

Certain materials, like *sludge*, are combined with lime to become an inert solid. Then it is placed in the landfill using the *continuous trench* method. A trench is plotted, then excavated at one end. Once enough space is available, waste is placed into the ground and covered with clay. As one end of the trench is being filled, digging continues at a rate equal to the filling at the other end. As a result a continuous trench is formed. The main benefit to this method, over one large pit, is the amount of waste exposed to precipitation is kept to a minimum. Rain and snow can not collect in the trench or filter through the waste easily, therefore

Disposal (cont.)

leachate is reduced. The continuous trench method is illustrated in Figure H-2. The trenches are mapped so the location of a certain material can be found if need be.

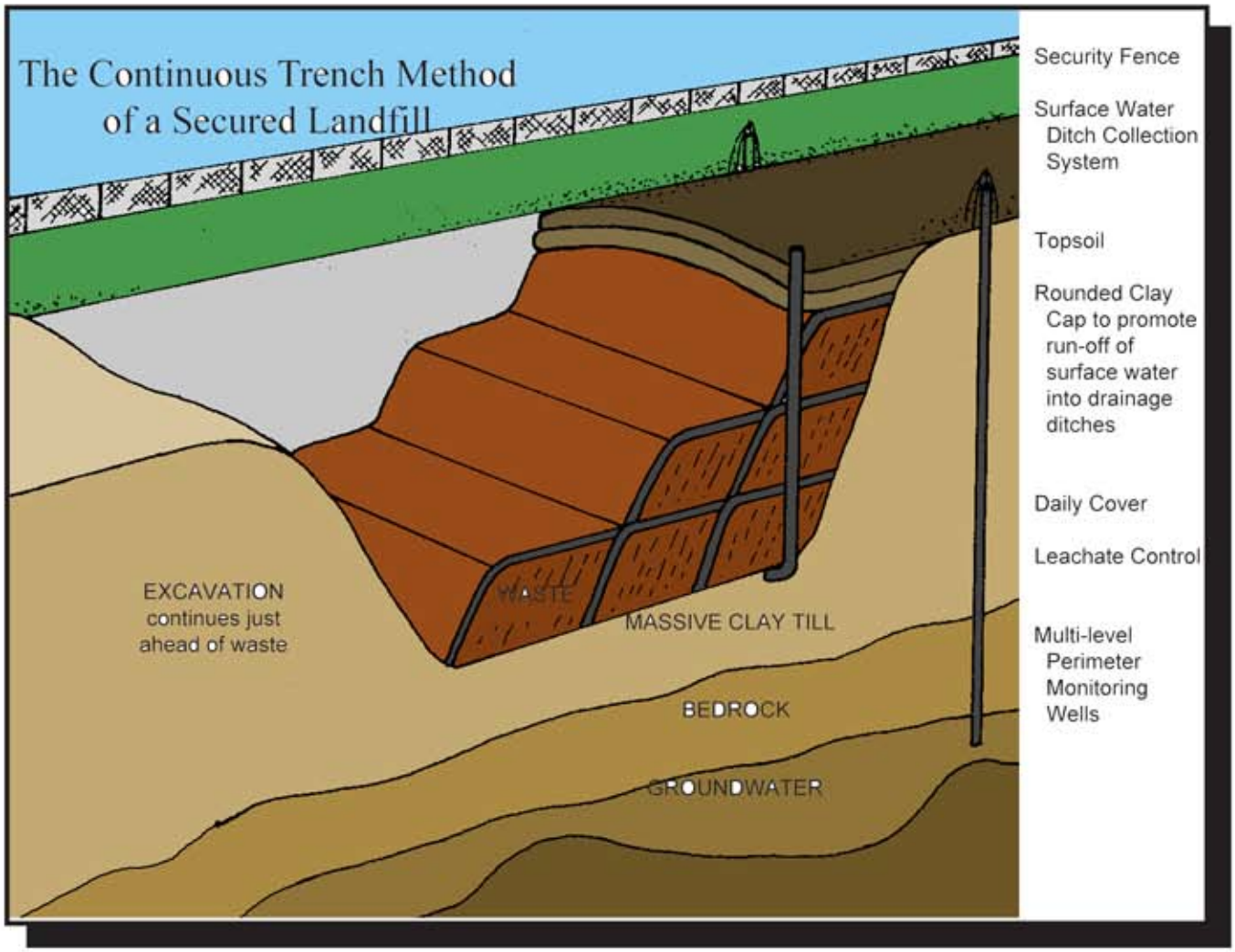


Figure H-2

Leachate that forms is collected in monitoring wells. Tests of the leachate are done regularly at the surface, sub-surface and groundwater levels. Twice a year, the Ministry of Environment and Energy (M.O.E.E.) conducts tests duplicating those of a landfill's management. The results are compared to ensure the secured landfill is properly operated and maintained. Test results are available to local municipalities and environmental groups.

The incineration of waste, mentioned earlier, is a controversial subject. The licensing of incinerators is becoming stricter and stricter; the government has been cutting down on the use of incineration. For some waste, like hospital *biomedical waste*, incineration is the most common means of disposal.

Disposal (cont.)

Other disposal methods include deep well injection, above ground storage and storage lagoons or ponds. Some waste is treated using bacteria and enzymes, then farmed into soil. Most of these methods are short term and have been or are being replaced by more environmentally friendly methods. Unfortunately, some H.H.W. is still illegally dumped, both consciously and unconsciously. The M.O.E.E. and other agencies can police industry and businesses, but only we can police ourselves. Do not pour the old oil along the fence to kill the weeds. **Dispose of it properly!**

Careful handling and disposal of any waste is important. H.H.W. is in special need of attention due to the dangers it poses. Take time to treat it correctly at home, at work, at school and everywhere else.

Agricultural Hazardous Waste

Fertilizers and *pesticides* have become fixtures of modern agriculture. The use of these products has helped to increase crop yields and rid fields of unwanted plants and animals. Some people argue that the environmental impacts, caused by this use, far outweigh the benefits. Others maintain they are essential to farming. Regardless of either viewpoint, one thing is certain, use, storage, collection and disposal of these substances and their containers is potentially hazardous.

Some farm additives, especially pesticides, can be toxic, corrosive, flammable and/or explosive. **Absorbing toxic products is the most serious threat to humans**. *Dermal absorption* results from exposed skin coming in contact with a harmful substance. The rate of absorption varies depending upon skin condition (cuts can speed absorption) and state of the substance (liquids are more readily absorbed than solids/powders). Wearing clothing contaminated with a toxic product can cause the product to "pass through" the skin into the body. **Dermal absorption is the most common form of pesticide poisoning.**

When a toxic product enters the body through the mouth, it is called *oral absorption.* Harmful residues, caused by leaching of improperly treated products, can be swallowed in a glass of water. A farm worker may consume a pesticide if he does not wash his hands before eating.

The third type of absorption is *inhalation.* Airborne particles caused by spraying or burning of material or packaging, can be inhaled as a person breathes in. Once inside the body, the toxic substance can damage the lungs and be transferred into the blood stream.

The Ministry of Environment and Energy (M.O.E.E.) and the *Ontario Ministry of Agriculture & Food* oversee the use, storage, display and transportation of pesticides according to the *Pesticides Act and Regulation.*[4] Transportation is also governed by the Transportation of Dangerous Goods Act.[5] The M.O.E.E. has a mandatory program to educate retailers selling fertilizers and other substances. While each individual substance has specific hazards there are some common practices and precautions that should be taken for all.

All of the fertilizer bought by an individual should be utilized. If it can not be used, the extra should be given to someone who can. **Do not pour it into the ground or open bodies of water!** By using up all the materials, only the empty containers and the residues they contain have to be handled; agricultural hazardous waste can be reduced.

Storing pesticides, fertilizers and vacant containers under unsafe conditions is illegal in Ontario. Proper storage procedures are given in the Pesticide Act. Site selection along with storage requirements conditions and layout are all outlined in this legislation.

Agricultural Hazardous Waste (cont.)

Eventually, even the most carefully stored containers need collecting; there should be no excess material to collect, as all of it will have already been used. Some rural communities have periodic collection days. A vehicle collects *triple-rinsed* containers from area farms. Triple-rinsing involves filling an empty 4 litre jug, for example, with water. The jug is shaken and the contents are poured into the tank or other vessel where the original contents of the jug was deposited. This process is repeated twice more (three times in total) or until the scent of the original substance is no longer evident. The collected containers are then taken to a sanitary or secured landfill. If you are interested in arranging a collection day in your area, call your township office, the M.O.E.E. and the Ministry of Agriculture and Food for proper procedures.

Some companies are trying to solve the container problem by issuing reusable packaging. Materials sold and used in bulk are placed in specially sealed containers. Empty containers with the seals intact are refilled; a broken seal means a fee is charged to the person who returns the damaged container. Another option is water soluble bags. Granular products are packed in polyvinylalchohol bags. When ruptured and placed in water, the bags and their contents dissolve.

But what does a person do if non-disposable packaging is unavailable and/or no collection service exists? The farmer takes the properly stored and properly cleaned containers to the landfill for disposal. In recent years, some landfills have been refusing agricultural containers. The M.O.E.E. has addressed the issue by detailing burn and bury methods that allow a farmer to dispose of waste on his own property. Metal, glass and plastic containers must be cleaned then crushed, broken or punctured before being buried at least fifty centimetres underground. Burial must not take place near a water source or high water table.

Paper and cardboard packaging can be burned. Some paper products are strong enough to be triple-rinsed before burning; this helps reduce the possibility of toxic fumes occurring. A person must take steps to avoid smoke drifting towards buildings, roads or any outdoor public area. The validity of these burn and bury routines is questionable.

Careful treatment of agricultural hazardous waste from the point of purchase to the time of disposal is a safeguard. Steps taken today will help soil, air and water supplies of the future sustain new generations of farmers and the valuable resources they will provide.

W.H.M.I.S.

The *Workplace Hazardous Materials Information System* (W.H.M.I.S. - pronounced whim-iss) was developed through the co-operation of government, labour and industry. The system and associated legislation are too extensive to be fully dealt with in this section, so an overview of W.H.M.I.S. will be provided. However, this should not be taken as a substitute for a thorough examination of W.H.M.I.S. material.[7]

The aim in creating the system was to inform workers about hazardous materials they may produce, handle, use or dispose of in the workplace while simultaneously reducing accidents and health hazards. It should be noted that hazardous materials refers to **controlled products only**, as defined by Part IV of the *Controlled Products Regulations*.[8] Also, W.H.M.I.S. does not deal with the environment, the transportation or household use of hazardous materials.

There are three mandatory elements to W.H.M.I.S.: labels, *Material Safety Data Sheets* (M.S.D.S.) and worker education. Labels inform a person of the hazards a product presents, proper handling techniques and give reference to the product's M.S.D.S.

Material Safety Data Sheets are usually two pages or more as they provide information that could not fit on a label. Product information, hazardous ingredients, physical data, fire and explosion hazards, reactivity data, toxicological properties, preventive measures, first aid measures and preparation information are all found on a product's M.S.D.S. To ensure the sheets are used correctly, W.H.M.I.S. has very thorough instructions explaining each section of a M.S.D.S.

The third element, worker education, is provided by the employer. A company will train its employees to interpret and use the information labels, and M.S.D.S. Workshops, seminars, videos and accompanying workbooks are just a few examples of how workers are taught W.H.M.I.S.

Tying the three elements together and providing the foundation for the entire W.H.M.I.S. program are symbols. These circles, each enclosing a different graphic, instantly tell a person of the basic hazards a product presents (hazard symbols) or the necessary protective equipment needed for working with the product (personal protective equipment symbols).

Graphics are used to ensure hazards and necessary precautions are universally understood by all workers. A chart of hazard symbols, the classes and divisions they represent and associated information is included in this section (H19-H20).

W.H.M.I.S. ideally ensures hazardous materials are identified properly before, during and after use. However, the proper use and disposal of hazardous materials is the responsibility of employers and their employees.

Personal Notes

W.H.M.I.S. - Guidelines for Controlled Products

CLASS & SYMBOLS	DESCRIPTION	DANGERS	EXAMPLES	HANDLING SAFEGUARDS
CLASS A	Compressed Gas	-contained under pressure -containers can rupture if heated/ damaged; rupture of vessel could cause explosive decompression -frostbite may occur if compressed gasses in liquid state leak/spill -some compressed gasses are flammable and combustible (propane), others can cause immediate and toxic effects (chlorine)*	-propane (heating) -freon (refrigerant)	-handle with care -do not subject to temperature changes or heat
CLASS B	Flammable and Combustible Material	-may catch fire or explode -flammable materials will burn readily at room temperature -combustibles will burn when heated		-keep away from heat -keep away from sources of ignition -take measures against static discharge -avoid impacts that may cause sparks -no smoking -keep containers tightly closed
Division 1	Flammable Gas		-hydrogen	
Division 2	Flammable Liquid		-gasoline	
Division 3	Combustible Liquid		-diesel fuel	
Division 4	Flammable Solids		-magnesium alloy	
Division 5	Flammable Aerosols	-aerosols may also contain flammable propellants (e.g. butane)	-penetrating oil	
Division 6	Reactive Flammable Materials		-celluloid	
CLASS C	Oxidizing Materials	-gives off oxygen under normal conditions, when heated or when reacting with reducing agents (e.g. acids) -materials themselves might not be combustible but oxygen produced could contribute to combustion of other materials	-explosives (nitrates & nitrites) -chlorates	-store in cool place -keep away from heat -avoid shock or friction -remove from vicinity of flammable and combustible materials
CLASS D	Poisonous and Infectious Material			
Division 1	Materials Causing Immediate and Serious Toxic Effect (Toxic Acute)	-highly poisonous and immediately dangerous to life and health (IDLH) -effects are acute -effects can be caused by the material being inhaled, swallowed or absorbed through the skin	-hydrogen sulfide -cyanides -nerve gas	-do not breath gas -avoid skin contact -wear appropriate protective equipment (gloves, goggles, etc.) -wash hands thoroughly

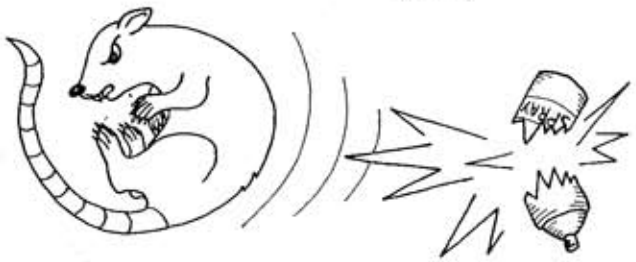
*when a controlled product falls into two or more classes, two or more hazardous symbols are provided

W.H.M.I.S. - Guidelines for Controlled Products (cont.)

CLASS & SYMBOLS	DESCRIPTION	DANGERS	EXAMPLES	HANDLING SAFEGUARDS
CLASS D				
Division 2	Materials Causing Other Toxic Effects (Toxic Chronic)	-poisonous but effects are long-term (chronic) -effects include cancer, reproductive toxicity, teratogenicity, embryotoxicity, mutagenicity, sensitization and skin or eye irritation	-asbestos fibres -saccherin -mercury -aromatic solvents (e.g. xylene, phenol)	-do not breath gas -avoid skin contact -wear suitable personal protective equipment
Division 3	Biohazardous Infectious Materials	-these are organisms and the toxins of organisms that cause diseases -included are cultures and concentrates and diagnostic specimens -three risk categories 1. Moderate Worker Risk, Limited Community Risk: an organism that could cause human disease but is unlikely to be a serious hazard to workers or the community 2. High Worker Risk, Low Community Risk: an organism that produces serious human disease but does not spread by casual contact 3. High Worker and Community Risk: an organism that could produce very serious human disease, possibly untreatable and may be easily transmitted	-viruses -bacteria -fungi -blood -feces -organs -body tissues -salmonella -brucellosis -AIDS virus -hepatitis	-keep containers tightly closed -wear respiratory equipment and protective clothing -if feeling of illness occurs, seek medical advice
CLASS E	Corrosive Material	-can cause severe burns to skin and eyes and to tissues of the respiratory tract if vapours are inhaled -the burns are the result of a chemical reaction between the skin and material; the damage is irreversible -most acids and bases along with some gasses are corrosive	-sulphuric acid -hydrochloric acid	-wear suitable protective clothing -use recommended respiratory equipment
CLASS F	Dangerously Reactive Material	-material undergoes vigorous polymerization, decomposition or condensation		

Brewster Facts

1. Hazardous waste is very bad. It can make people, animals and plants sick.



2. Hazardous waste can cause a fire or blow-up. It can burn your skin and eyes. If you eat or breathe hazardous waste, it can make you very ill. Some waste gives off radiation that makes people sick.

3. Cleaners, paints, old medicine and gasoline can be hazardous waste.

4. Hazardous waste should only be touched by adults.

The Sign Find

OBJECTIVE: To familiarize the students with Household Hazardous Waste Identification Symbols.

MATERIALS: coloured pencils or crayons, HANDOUT: **Danger Signs** (H25)

VOCABULARY: corrosive, flammable, lethal, radiation, radioactive, reactive

BACKGROUND:

Hazardous waste can be found in nearly every household. While most adults know the dangers of certain household products, many children do not. This activity will help younger children to recognize dangerous household items by the symbols shown on them.

PROCEDURE:

1. Make enough photocopies of the HANDOUT: **Danger Signs** (H25) for the entire class and one for yourself. Colour the symbols on your HANDOUT with a magic marker, etc. Finished symbols can be found on page H2 of the BACKGROUND INFORMATION.

2. Show your completed symbols to the class. Ask the children if anyone knows what any or all of the symbols mean.

3. Explain each symbol to the class starting with the corrosive symbol. Be sure to explain that the symbol is a skeleton hand in a jar. The reason the hand is all bones is because corrosive things can melt skin. Corrosive materials can also dissolve metal or plastic. Tell the children to stay away from corrosive things just in case they spill.

4. Now draw the classes attention to the flammable symbol. This symbol is a picture of fire because flammable things burn. Ask the children if they know of any flammable liquids in their home (i.e. gasoline, varsol, etc.). Tell the class it is especially important to keep things with the flammable symbol away from fire, sparks or very hot places (the stove top for example).

5. The symbol in the middle of the page stands for radioactivity. Tell the children that radioactive things are sneaky. They make something called radiation. Radiation is invisible but it can make people very sick. Children should stay away from radioactive things. An old smoke detector may have this symbol.

6. The funny looking symbol at the bottom left corner of the handout is the reactive symbol. Some things with this picture on them can explode. Other reactive things make a type of gas that can kill people if they are mixed together such as chlorine bleach and ammonia. Reactive things should be kept away from fire or heat, stored in a tight closed container and placed in an area with lots of air circulation.

The Sign Find (cont.)

PROCEDURE (cont.)

7. The last symbol is a skull and cross bones. This picture is found on products that are poisonous or lethal. Tell the children that they could become very sick or even die if they swallow something that has this symbol on it.

8. Finally explain to the class that they should stay away from all of these symbols unless an adult is around to help.

9. Give each child a photocopy of the HANDOUT: **Danger Signs** (H25). Tell them to colour the symbols any colour they want. After they are finished the children should take the HANDOUT home and place it on the fridge. This will remind other people in the house to be careful with containers that show these symbols.

EXTENSION:

1. Ask the children to correctly identify the hazards of each symbol. Tell them they will get a bonus point, gold star, etc. if they can give the symbols name as well (i.e. corrosive, toxic, etc.).

2. Ask each child to find, with their parent or guardians's help, one thing in their home that has one of the symbols on it. Have the child write the name of the object on a piece of paper and bring it to class the next day.

3. Do a survey of the classroom to check for products that contain any of the hazard symbols.

EVALUATION:

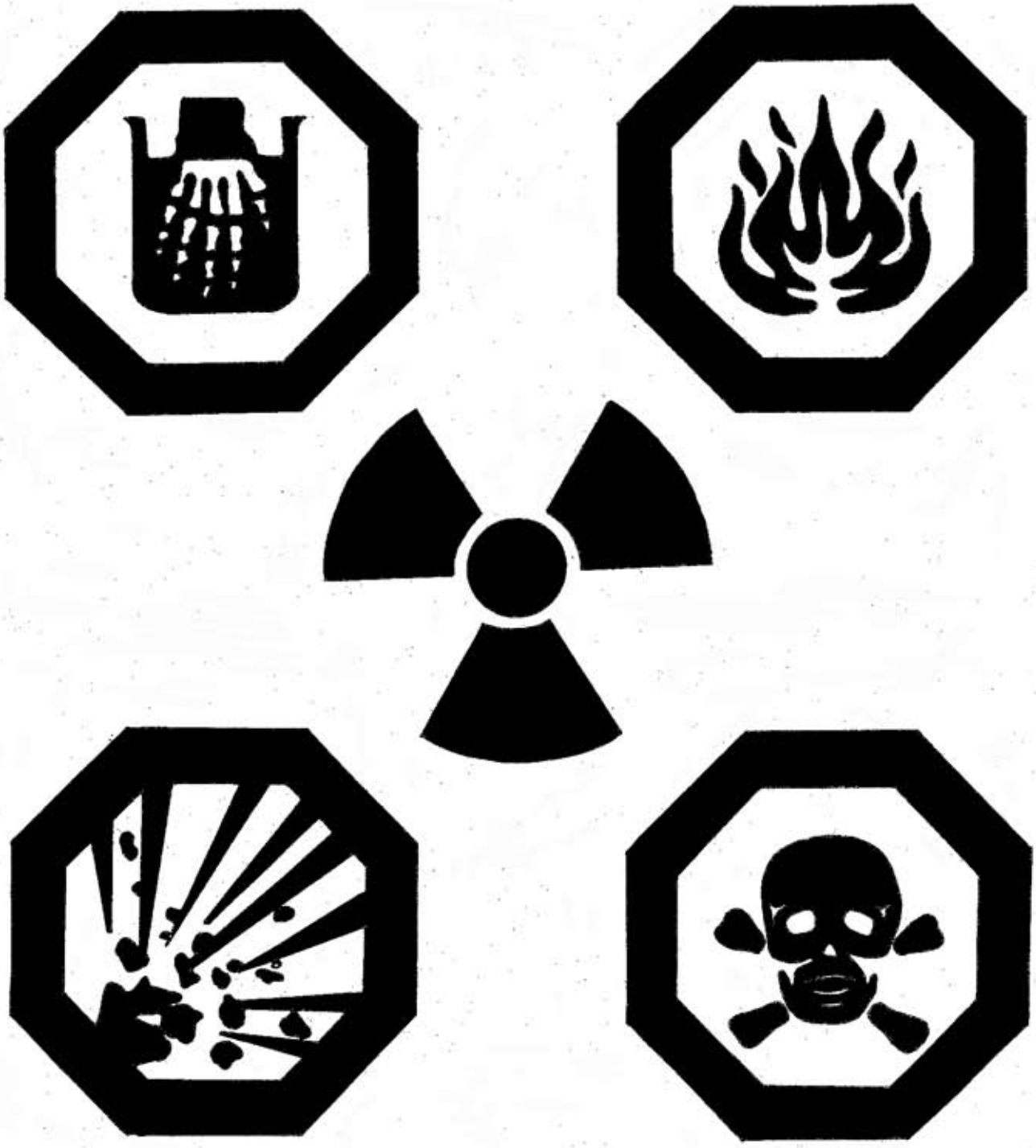
1. Have the children been careful around household hazardous waste?

2. Can they identify a hazardous product?

3. Do the children understand the dangers of certain products?

Danger Signs

Colour in the Hazardous Waste symbols below and take them home to put on the refrigerator so that you will always remember them.



Search & Rescue

OBJECTIVE: To show improper methods of handling hazardous waste.

MATERIALS: pencil, HANDOUTS: **I Spy•••** (H29), **Good & Bad** (H30)

VOCABULARY: hazardous waste, litre, original, container

BACKGROUND:

In Ontario, 3.6 million tonnes of hazardous waste are produced each year. A single litre of gasoline can pollute a million litres of drinking water. If such a small amount of waste can have such dramatic ramifications imagine the damage the provincial total could inflict.

To stop hazardous waste from causing harm, it must be disposed of carefully. Proper disposal starts with proper storage. Hazardous waste should be stored in its original container (i.e. used varsol is kept in the can or bottle in which it was purchased). Containers should be clearly labelled and their cap, lids, etc. on tight. The containers should also be kept out of the reach of children and pets.

Collection itself is simple. Hazardous waste must go to a special landfill called a secured landfill. It is extremely dangerous to dispose of hazardous waste by taking it to a regular landfill or pouring it down sewers, sinks, or onto the ground.

In this activity the children will learn proper methods of handling hazardous waste by utilizing their comparative skills.

PROCEDURE:

1. Explain to the children that some of the waste we make is dangerous. It can make people, animals, and the environment very sick. It is called hazardous waste.

2. Continue by telling the class that there are "good ways" and "bad ways" to treat hazardous waste.

3. Give each child a copy of the HANDOUT: **I Spy •••** (H29). Tell them they are going to look at the picture and circle "bad ways" to handle waste.

4. Read the "good ways" and "bad ways" on the HANDOUT: **Good & Bad** (H30) aloud, one at a time, to the class. Give the children time to circle all the "bad ways" they can find on the HANDOUT: **I Spy •••** (H29) (Note: The answers to the HANDOUT are as follows: 1. bleach not in its original container, 2. oil pouring down the drain, 3. aerosol can next to the stove, 4. rat poison next to the sugar, 5. hazardous materials within reach of a child).

Search & Rescue (cont.)

PROCEDURE (cont.)

5. Finish the activity by reading through the "good ways" and "bad ways" again. Do not tell the class whether what you have read is good or bad. Have the children express what they think is the correct answer.

EXTENSION:

1. Have the children draw or paint a picture of a "good" or "bad" method of handling hazardous waste.

2. Ask the children if they can name something that is a hazardous waste (i.e. bug spray, medicines, furniture polish).

3. Take the drawings or paintings the children produce and make them into a bulletin board display.

EVALUATION:

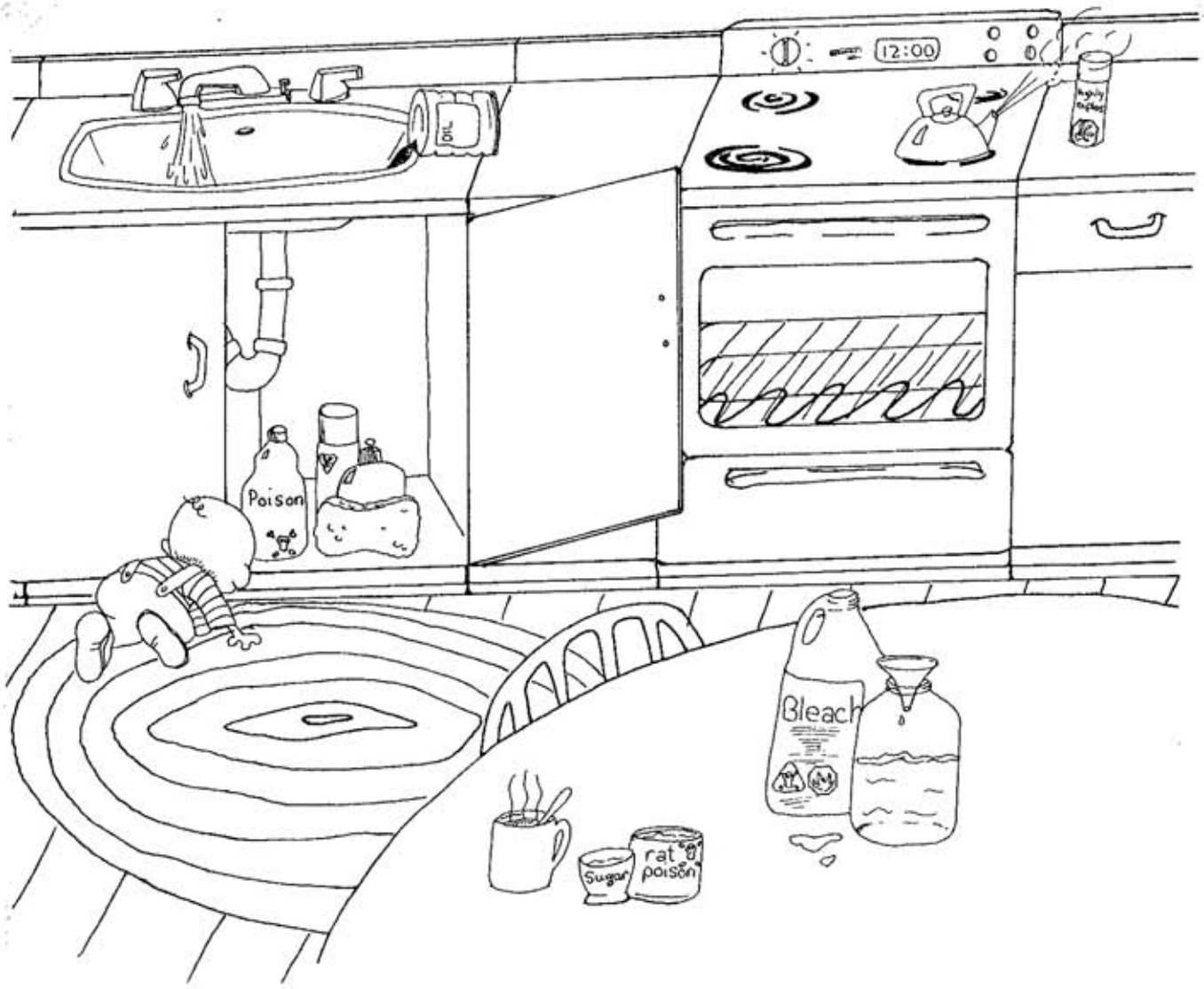
1. Ask each child to report on "good" or "bad" methods of handling hazardous waste.

2. What do the children think about hazardous waste?

3. Were the children able to relate what they heard to what they saw? (Did they find all the good and bad ways read aloud to them?)

I Spy…

In the picture below there are five things that are being done wrong. Circle them so that everyone can see how not to treat hazardous waste.



Good & Bad

Good Ways

- Keep chemicals and other hazardous waste in their original containers.
- The lids and caps of the containers should be on tight.
- Hazardous waste should be in containers that have easy to see and easy to read labels.
- Hazardous waste should be kept out of reach of children and pets.
- Hazardous waste should be stored in a cool and dry place.

Bad Ways

- Hazardous waste should never be stored in a very hot place or next to fire.
- Hazardous waste should never be put in a garbage bag or can with regular garbage.
- Leaky containers are not good places for hazardous products.
- Bleach and ammonia should never be kept together.
- If you do not know what something is never drink or smell it.
- Never keep hazardous waste in open bottles, jars or near food.
- Do not pour hazardous waste such as used motor oil down the drain, into a sewer or on the ground.

Brewster Facts

1. Hazardous waste is very dangerous to people and the environment.

2. Hazardous waste can burn your skin. Some hazardous waste is poisonous. Radioactive hazardous waste can make you very sick.

3. Hazardous waste should be stored carefully. This means keeping the waste in its original container. Waste that is not stored correctly is even more dangerous than regular hazardous waste.

4. To dispose of hazardous waste it should be taken to a Hazardous Waste Day or depot. Never pour hazardous waste on the ground or down the drain.

5. The best thing to do about hazardous waste is not to buy it. By using environmentally friendly paints and homemade cleaners, polish and sprays hazardous waste can be reduced.

Personal Notes

Sighting Symbols

OBJECTIVE: To make children aware of hazardous products in their homes.

MATERIALS: ADULT SUPERVISION, a pen or pencil, HANDOUT: **Proceed With Caution!** (H35)

VOCABULARY: corrosive, explosive, flammable, radiation, radioactive, reactive, toxic

BACKGROUND:

Most homes are full of potentially dangerous items. Poisonous cleaners, flammable gasoline, explosive aerosol cans and corrosive bleaches are just a few examples. Children are taught to avoid certain items by recognizing the danger symbols on the labels. Young children know they should avoid things with a skeleton hand or skull and cross bones; this activity will explain what each of the five Household Hazardous Waste Identification Symbols means. This will help the students to learn why something is dangerous and enable them to identify hazards around their homes.

PROCEDURE:

1. Distribute the HANDOUT: **Proceed With Caution!** (H35) to the students.

2. Ask the class if anyone knows what the first symbol means. Wait for a response. If the correct answer is not given explain the symbol is a hand that has been placed in a liquid and lost its skin. This symbol is found on corrosive things. Corrosive things dissolve or melt not only human skin but, metals, some paints and plastic. Bleach is a corrosive home product.

3. Ask if anyone knows what the second symbol on the HANDOUT signifies. The answer is flammable liquids. The symbol represents liquid that has caught fire and is burning. Flammable liquids ignite easily and burn readily, gasoline is a good example.

4. The third symbol warns about reactive materials. Tell the students reactive products, such as aerosol cans, can explode. Reactive items can also form deadly gases if mixed. Bleach and ammonia are two such items.

5. Symbol number four is probably the one most students will recognize. A skull and cross bones can be found on things that are toxic. Tell the children the word toxic means poisonous. If toxic things get into a person's body they could become sick or even die. Weed killer, metal polishes and some cleaners are toxic.

Sighting Symbols (cont.)

PROCEDURE (cont.)

6. The last symbol on the HANDOUT represents radioactive objects. The children should understand that there will not be many radioactive things in their home but radioactive waste is dangerous. Radiation given off by this waste is invisible; a person cannot see or feel radiation but it can make people very sick. Certain kinds of smoke detectors display this symbol.

7. Now that they know what the symbols mean the children are to take the HANDOUT home. With adult supervision, each child is to find as many things as possible in their home with the five symbols. Each item is to be written down next to the appropriate symbol, for example gasoline would be next to the flammable symbol.

8. Finally explain to the class that they should decide if each item on their list is in the original container. If the answer is yes, have the students place a check mark in the appropriate column on the HANDOUT; add an **X** if the answer is no. Tell the class that hazardous products not stored in their proper containers can be more dangerous than products stored correctly. Give the example of antifreeze stored in a glass jar. The jar could break, letting the corrosive antifreeze spill or someone could mistake the antifreeze for juice and become ill.

EXTENSION:

1. Have the children think of things on their list that they probably could do without.

2. Ask the students to think of where they found the most hazardous products (i.e. bathroom, kitchen, etc.).

3. Have each student write a paragraph or two about what they think would happen if all their hazardous products were poured down a sink.

EVALUATION:

1. Do the children realize how many things in their house can be hazardous?

2. Do the children understand the meaning of the five symbols?

3. Are the children able to explain what a particular product can do? (i.e. gasoline can burn)

HAZARDOUS WASTE - JUNIOR HANDOUT

Proceed With Caution!

Household Hazardous Waste Identification Symbol	Household Items Found With These Symbols On Them	Are They In The Original Container YES( ) NO (X)
		
		
		
		
		

Clean Cleaners

OBJECTIVE: To make environmentally friendly replacements for commercial cleaners.

MATERIALS: ammonia, baking soda, bar soap, hydrogen peroxide, olive oil, pure soap flakes or powder, washing soda, water, vinegar, HANDOUT: **Six Safer Substances** (H39)

VOCABULARY: aerosol, commercial cleaners, disinfectant, hazardous product, impacts

BACKGROUND:

Under our sinks and in our cupboards are hazards waiting for us. Window cleaners, aerosols, starch, disinfectants and air fresheners all have some negative impacts. Many people can do without some of the hazardous products they use. Even for those who absolutely must starch shirts or use a special floor cleaner there are alternatives; environmentally friendly alternatives.

In this activity, children will make six "earth friendly" replacements for commercial cleaners and similar products.

PROCEDURE:

1. Ask the class if there is a special place for cleaners in their homes. If yes, ask them why do they think this is? Tell the children many people keep cleaners and other things in a special place to avoid accidents. Because many of the things are hazardous; both people and the environment can be hurt by certain products.

2. Continue by explaining that even some safe cleaners are wasteful. Some are 97% water with most of the other ingredients being colouring and perfumes. When a person buys these items they are buying something that is not needed.

3. Hazardous and wasteful products can be replaced with homemade alternatives. Tell the class they are going to make their own alternative products.

4. Give each student a copy of the HANDOUT: **Six Safer Substances** (H39). Give the students a few days to buy the ingredients needed to complete their cleaners or you may wish to supply the class with the ingredients. The students should bring clean, recyclable, refillable containers to hold their finished cleaners.

5. After the students have made the cleaners and bottled them, labels should be affixed to the cleaners so each can be clearly identified.

Clean Cleaners (cont.)

EXTENSION:

1. Instead of chocolate bars or cheese sell homemade cleaners as a source of class funding.

2. Tell the students other alternatives to hazardous products that exist. If the students wish to use these alternatives give them copies of pages H3-H5 of the BACKGROUND INFORMATION of this chapter.

3. Establish a program to replace many of the cleaners, used by the custodial staff in your school, with homemade alternatives.

EVALUATION:

1. Did the students read and follow the recipes carefully?

2. How do the students feel about using homemade cleaners?

3. Ask the students to think of reasons why reducing hazardous waste is beneficial.

Six Safer Substances

All Purpose Cleaner

125 ml (1/2 cup) ammonia
125 ml (1/2 cup) vinegar
50 ml (1/4 cup) baking soda
2L (1/2 gallon) water

Use this on bathroom fixtures, floor, tiles and painted walls. Put some in a spray bottle to use for quick cleanups. After washing, rinse with a little clear water.

Laundry Powder

250 ml (1 cup) pure soap flakes or powder
25 to 50 ml (2 to 4 tbsp) washing soda

This will wash one load of a family's laundry. Adjust the amount of washing soda according to the hardness of your water, since washing soda is a water softener.

Toilet Cleaner

5 ml (1tsp) ammonia
250 ml (1 cup) hydrogen peroxide
2L (1/2 gallon) water

Mix the ingredients and then pour into toilet. Let it stand 30 minutes. Scrub with brush and flush. Leave the cleaner in the toilet for several hours to remove stubborn stains.

Furniture Polish

25 ml (2 tbsp) olive oil
15 ml (1 1/2 tbsp) vinegar
1L (1/4 gallon) water

Mix the ingredients in a spray bottle. Warm the polish in a pan of hot water, it works better. Apply and rub with a soft cloth.

Window Cleaner

1 part vinegar
1 part water

Combine ingredients together in a pump spray bottle (reuse old ones). This cleaner can also be used for streak-free mirrors simply by adding a little ammonia.

Dishwashing Liquid

500 ml hard pure bar soap
4L (1 gallon) water

Grate the soap and mix with water. In a pot, bring to a boil over medium heat stirring occasionally. Lower heat and simmer for 10 minutes. Let it cool, then store it in a covered container.

Personal Notes

Brewster Facts

1. Hazardous waste is the most dangerous type of waste.

2. Most waste takes time to cause problems. Hazardous waste causes problems right away.

3. Some hazardous waste is flammable or explosive. Some waste is corrosive to metals and human skin. Toxic hazardous waste is poisonous. Radioactive waste can cause serious illness. All of these hazardous wastes must be treated carefully.

4. Hazardous waste should be stored in the original containers. This makes collecting and disposing of the waste safer. Incorrectly stored hazardous waste can increase the danger of the waste.

5. Cleaners, paints, polishes and other household items can become hazardous waste if they are thrown away. They should be used up, then replaced with environmentally friendly items. Any hazardous waste that cannot be avoided should be stored safely then taken to a Hazardous Waste Depot or Collection Day.

6. Hazardous waste should never be poured down the drain or on the ground. It can cause many problems, both directly and indirectly; it must be handled properly.

The Quest

OBJECTIVE: To provide students with an overall knowledge of hazardous waste using the format of the television program Jeopardy.

MATERIALS: HANDOUTS: **QUEST(ion) Cards** (H45-H50)

BACKGROUND:

Hazardous waste is a very serious subject. Unfortunately, most serious subjects are not very exciting or fun. Learning should be both fun and exciting. This activity will have the students learning about hazardous waste in a manner based loosely on the television game-show Jeopardy.

PROCEDURE:

1. Tell the students they are going to see who is the "King or Queen of Hazardous Waste Knowledge".

2. Explain the following rules of the game to the class. Each card has an answer and a question. After the answer on each card is read aloud the first student to raise their hand or signal, is to give the question, found below the answer, on the card. The students response should be posed as a question. For example if the answer is "The number after four", the student should respond "What is 5?". If the response is not in the form of a question it is incorrect. The answer and question cards should be shuffled. Cards should be taken in sequence from the top of the pile.

3. For every correct question a student is awarded the number of points the question is worth. Points range from 1 to 3 depending on the question's difficulty; Level 1 questions are worth one point, Level 2 are worth two points and Level 3 are worth three points.

4. The student who has collected the most points after the 30 cards have been read is declared the "King or Queen of Hazardous Waste Knowledge". (Note: You may wish to have one student read the answers so you can decide which of the other students raised their hand or signalled first.)

EXTENSION:

1. Produce answers and question cards for other waste management issues (i.e. recycling or composting).

2. Have each student create their own answer and question. In turn, each student should read their answer. The other students try to provide the correct question.

EXTENSION (cont.)

The Quest (cont.)

3. Give the students a fact at the beginning of the school week. On Friday have a final Jeopardy answer based on the fact. Each student who can write down the correct question is given a bonus mark.

EVALUATION:

1. Ask the students to repeat one of the 30 answers and its correct question.

2. Do the students have a better understanding of the dangers hazardous waste can cause.

3. Were the students able to improve the listening skills in trying to give the correct question?

QUEST(ion) Cards

A Fertilizers and these things used to kill pests can produce agricultural hazardous waste. Q What are pesticides?	A Materials that give off small doses of radiation. Q What are radioactive?
A A substance that eats or wears away at many materials. Q What is corrosive?	A Hazardous waste generated at home is called this. Q What is household hazardous waste?
A Liquids that can ignite. Q What are flammable?	A One litre of gasoline can make a million litres of this undrinkable. Q What is water?
A Materials that, even in small quantities, are poisonous or lethal. Q What are toxic materials?	A Hazardous waste should be handled by these "3 R's" before being disposed of. Q What is reduce, reuse and recycle?
A Materials that can create an explosion or produce deadly vapours. Q What are reactive?	A A dangerous leachate can form when this liquid combines with hazardous waste. Q What is water?

QUEST(ion) Cards (cont.)

LEVEL 1 QUESTION	LEVEL 1 QUESTION
LEVEL 1 QUESTION	LEVEL 1 QUESTION
LEVEL 1 QUESTION	LEVEL 1 QUESTION
LEVEL 1 QUESTION	LEVEL 1 QUESTION
LEVEL 1 QUESTION	LEVEL 1 QUESTION

QUEST(ion) Cards (cont.)

A Dangerous to human health and/or the environment, this includes toxic, corrosive, flammable, reactive and radioactive wastes.

Q What is hazardous waste?

A When hazardous waste is disposed it goes to a secured one of these.

Q What is a landfill?

A Aerosol cans should be replaced with these whenever possible.

Q What is a "pump" container?

A A secured landfill is the only landfill legally allowed to accept this.

Q What is hazardous waste?

A The average Ontario home produces, not one, not two but this many litres of hazardous waste each month.

Q What is three?

A Oral absorption occurs when hazardous waste enters a person's body through this.

Q What is the mouth?

A When bleach and ammonia are mixed together they form this deadly thing.

Q What is vapour or gas?

A A person who breathes in air and hazardous waste is said to have done this to the waste.

Q What is inhaled?

A These can replace hazardous products.

Q What are homemade or biodegradable products?

A Also used to describe a type of loud music, these kinds of metals can accumulate in people, plants, animals and water.

Q What are heavy metals?

QUEST(ion) Cards (cont.)

LEVEL 2 QUESTION	LEVEL 2 QUESTION
LEVEL 2 QUESTION	LEVEL 2 QUESTION
LEVEL 2 QUESTION	LEVEL 2 QUESTION
LEVEL 2 QUESTION	LEVEL 2 QUESTION
LEVEL 2 QUESTION	LEVEL 2 QUESTION

QUEST(ion) Cards

A In Ontario, this ministry is responsible for hazardous waste. Q What is the Ministry of the Environment and Energy?	A All hazardous waste and products should be in containers that are clearly what? Q What is labelled?
A Hazardous waste can be reduced by doing this. Q What is buying safer alternatives?	A Hazardous waste should not be placed with regular garbage at the curb for collection; it should be taken to one of these two things. Q What are a hazardous waste depot or collection day?
A A person should never reuse these to store things other than hazardous waste. Q What are empty hazardous product containers?	A Biomedical waste is hazardous waste produced from one of these places. Q What are hospitals, doctors' offices and laboratories?
A Hazardous waste should be kept in these. Q What are the waste's original container?	A Dermal absorption happens when hazardous waste is absorbed through this part of the body. Q What is the skin?
A If used motor oil is swallowed it may cause this. Q What is cancer?	A Hazardous waste should never be poured down this. Q What is the sink?

QUEST(ion) Cards (cont.)

LEVEL 3 QUESTION	LEVEL 3 QUESTION
LEVEL 3 QUESTION	LEVEL 3 QUESTION
LEVEL 3 QUESTION	LEVEL 3 QUESTION
LEVEL 3 QUESTION	LEVEL 3 QUESTION
LEVEL 3 QUESTION	LEVEL 3 QUESTION

Research Search

OBJECTIVE: Students will learn about hazardous waste through their own independent research.

MATERIALS: research material (hazardous waste article), pen or pencil, paper

VOCABULARY: collection, disposal, research, storage

BACKGROUND:

Hazardous waste is a constant threat. Its storage, collection, and disposal are all dangerous. This activity will have the students research different aspects of hazardous waste. By finding their own research materials the class will discover sources of information outside of the classroom and school.

PROCEDURE:

1. Write a definition of hazardous waste on the chalkboard. A definition can be found on page H1 of the BACKGROUND INFORMATION.

2. Ask the students to name some types or sources of hazardous waste.

3. Explain how this type of waste is dangerous to people and to the environment when the waste is stored, collected and disposed. Emphasize that hazardous waste is a constant threat.

4. Now tell the students they are going to research some of the problems hazardous waste is causing. Each student is to find a magazine or newspaper article on hazardous waste. The article may be on anything, collection, storage, misuse, etc. The only stipulation is that hazardous waste must be the focus of the article.

5. Give the class ideas for where to search for the articles. Mention the public library, used book stores, old newspapers, Ministry of Environment and Energy, and high school or college libraries as possible research locations.

6. Once they have found an article each student should write a small summary of the information. This should include the date and source of the article, the type of hazardous waste it mentions (i.e. dioxin, PCB's, used motor oil) and the problem(s) the waste created.

7. Each student then presents their summary to the class. After each presentation, lead a short discussion, with the entire class, as to possible solutions.

Research Search (cont.)

EXTENSION:

1. Have the class find out where they should take their hazardous waste.

2. Survey the school to find hazardous waste such as cleaners and bleaches. Find out how they are handled.

3. Design a poster that explains the "do's and dont's" of hazardous waste. Place these in all the school's classrooms.

EVALUATION:

1. Were the students thorough in their research?

2. Do the students have a better understanding of the dangers of hazardous waste?

3. Did the students attitude towards hazardous waste change after hearing the presentations? Why?

Ecotalk

AEROSOL - a type of container that uses pressure to spray things. Spray paint comes in an aerosol can.

COLLECTIONS - when a recycling truck empties your Blue Box or a garbage truck "picks up" your garbage.

COMMERCIAL CLEANERS - are things like furniture polish, glass cleaner and floor cleaner. Some commercial cleaners are hazardous to people and the environment.

CONTAINER - something that is used to hold something else. A toothpaste tube is a container for toothpaste.

CORROSIVE - is a word used to describe things that can burn a persons skin or melt metals. Acid is corrosive, so is bleach.

DISINFECTANTS - is a cleaner that kills harmful germs. Some disinfectants can also harm people.

DISPOSAL - means to put garbage in a safe place. You put garbage in a bag and then the bag is taken to a sanitary landfill. This is proper disposal.

EXPLOSIVE - is a word to describe things that can and do blow-up. A can of spray paint is explosive if it is heated.

FLAMMABLE - things that cause a fire or burn. Gasoline is flammable.

HAZARDOUS PRODUCTS - are things like poisons that can hurt the environment and people. When hazardous products are thrown away they become hazardous waste.

HAZARDOUS WASTE - is the most dangerous kind of waste. It can burn or explode. It can also kill people, plants and animals.

IMPACTS - is something that effects something else. If a person gets a penalty in hockey, it has an impact on the whole team because they have to play with one less player.

LETHAL - a word used to describe something that can kill other things. A gun is a lethal weapon.

LITRE - is the metric way to measure how much something can hold. A litre is made up of smaller units called millilitres. There are 1000 millilitres in a litre.

ORIGINAL - the first of something. If someone painted a picture and then someone else made copies of the picture, the first painting would be the original.

RADIATION - is invisible beams that can make people and animals very, very sick.

Ecotalk (cont.)

RADIOACTIVE - something that makes radiation is called radioactive.

REACTIVE - some things can explode. Other things can make a deadly gas when they are mixed. Both of these things are called reactive.

RESEARCH - to look something up in a book etc. or to study something carefully.

STORAGE - to carefully put something away until it is needed. Putting leftovers in the freezer is storage.

TOXIC - anything that can make a person sick or die if it is swallowed. Rat poison is toxic to rats and people.

Glossary

AEROSOL: a substance packaged under pressure, with a propellant gas, sprayed through a valve.

ATMOSPHERE: the gases that surround the Earth; the air in any enclosed space with respect to its effects on living organisms.

AUDIT: an examination or verification of materials.

BIOLOGICAL MAGNIFICATION: biological concentration of a substance increased through links in a food chain.

BIOMEDICAL WASTE: any part of the human body, including tissues and bodily fluids and non-anatomical waste infected with communicable diseases.

CARCINOGENIC: a substance or agent with the ability to cause cancer is said to be carcinogenic.

COMBUSTIBLE: the ability to catch fire or explode and burn when heated; a material that has this ability.

CONTINUOUS TRENCH: a method of waste disposal in which a trench is excavated at one end. When enough space is available, waste is deposited in the trench then capped with clay. Excavation continues at the same rate as deposition. This method helps reduce leachate and exposed deposits.

CONTROLLED INCINERATION: burning of waste under carefully calculated and monitored conditions. The process is designed to reduce the volume of waste, maintain acceptable emission levels and, in some cases, produce energy for heating and electricity.

CONTROLLED PRODUCTS REGULATION: under the authority of the Hazardous Products Act (federal); contains requirements that specify the form and content of supplier labels, the types and arrangement of information on the M.S.D.S., conditions of exemption and the definition of what constitutes a controlled product.

CORROSIVE: the ability to eat away at the surface of a substance (e.g. acids are corrosive to human tissue); a material that has this ability.

DDT: abbreviation for dichlorodiphenyltrichloroethane; a chlorinated hydrocarbon insecticide now generally banned.

DERMAL ABSORPTION: the absorption of a substance, into the body, through the skin.

EMBRYOTOXICITY: the capability to cause damage to an organism during the early stages of growth.

ENVIRONMENTAL PROTECTION ACT REGULATION 347: covers general waste management, its collection and disposal.

Glossary (cont.)

FLAMMABLE: the ability to catch fire and explode and burn readily at room temperature; a material that has this ability.

HAZARDOUS PRODUCTS ACT: federal legislation governing all aspects of hazardous products in Canada.

HAZARDOUS WASTE (H.W.): waste dangerous to human health and/or the environment. It includes toxic, corrosive, flammable, reactive and radioactive waste from homes, industry and agriculture.

HOUSEHOLD HAZARDOUS WASTE (H.H.W.): hazardous waste generated in normal household activities (i.e. cleaning, decorating, car maintenance).

INERT: unreactive with other substances; displaying no chemical activity.

INHALATION: to take through the nose when breathing. Inhalation can bring substances into the lungs.

LEACHATE: liquid formed when precipitation infiltrates the soil covering a landfill, percolates down through the waste and picks up a variety of suspended and dissolved materials from the waste.

MINISTRY OF THE ENVIRONMENT AND ENERGY (M.O.E.E.): provincial ministry responsible for environmental issues in the Province of Ontario.

M.S.D.S.: abbreviation for Material Safety Data Sheet; provides more detailed information about a hazardous material than is possible to put on a label.

MUTAGENICITY: the capability to cause changes in the genetic structure of subsequent generations.

NON-RENEWABLE RESOURCE: a resource not capable of being restored or replenished (e.g. crude oil is a non-renewable resource).

ONTARIO MINISTRY OF AGRICULTURE AND FOOD (O.M.A.F.): the provincial ministry that governs agriculture and agricultural related operation in Ontario.

ORAL ABSORPTION: the absorption of a substance, into the body, through the mouth.

PCB's: abbreviation for polychlorinated biphenyls; a large class of synthetic chlorinated hydrocarbons widely used in industry; they are persistent, subject to biomagnification and a suspected carcinogen.

PERSISTENT: slowly or very slowly degradable in the environment (e.g. glass, plastic and mercury).

PESTICIDE: substance used to kill pests (pests include microbes, plants, insects and animals).

Glossary (cont.)

PHOSPHATE: phosphoric acid containing chiefly phosphorus and oxygen. Found in dish and laundry soap, they do not break down easily and can cause excess algae growth, which in turn can reduce oxygen supplies to fish and other marine life.

PROPELLANTS: gas used to expel material in an aerosol container.

RADIOACTIVE: material that gives off radiation as a result of decaying nuclei or a nuclear reaction.

REACTIVE: the ability to vigorously polymerize, decompose or condense, become self-reactive under shock or increases in temperature or pressure, or release a poisonous gas when contacted with water; a material with this ability.

RECYCLE: the third "R". Recycling is a resource recovery method involving the collection and treatment of a waste product for use as a raw material in the manufacture of the same or a similar product.

REDUCE: the first of the "3 R's". Reducing the consumption of products and resources is the most effective method of waste management. Consuming less means producing less waste, which in turn means managing less.

REUSE: the second of the "3 R's", reuse involves keeping a product out of the waste stream. A product can be used again in its original capacity, reused in a new capacity or given to someone for either use. An old barrel can be used to collect rain water, cut in half to make flower pots or given to someone else.

SECURED LANDFILL: a landfill with the natural ability to contain material surpassing that of a sanitary landfill. A secured landfill is carefully controlled, maintained and monitored in order to uphold the integrity of the site. Laidlaw Environmental Services Limited operates the only licensed secured landfill, located near Sarnia, in the province of Ontario.

SENSITIZATION: the capability to respond readily to small changes of condition or environment.

SLUDGE: a thick suspension of solid matter in a liquid.

TERATOGENICITY (TERATOGENIC): the capability to cause fetal malformations or monstrosities.

TOXIC: materials that, even in small quantities are poisonous or lethal.

TRANSPORTATION OF DANGEROUS GOODS: an act under Transport Canada, that regulates the transportation of materials that may be harmful.

Glossary (cont.)

TRIPLE-RINSED: the process by which a container used to hold a pesticide and other hazardous material is cleaned. The container is filled with water, agitated and emptied into the tank or vessel where the container's original contents was deposited. These steps are done three times or until no scent can be detected in the empty container.

TROPHIC: relating to nutrition.

WASTE GENERATOR: a producer of any material normally viewed as waste (i.e. households, industry, hospitals, schools or individuals).

W.H.M.I.S.: an abbreviation for Workplace Hazardous Material Information System, a system to provide information about the hazardous materials that are produced, handled, stored, used or disposed of in the workplace.

Resources

1. Bluewater Recycling Association
   P.O. Box 1330
   Grand Bend, Ontario
   N0M 1T0
   Phone: (519) 238-8661
   Fax: (519) 238-2330

2. Ministry of Environment and Energy
   135 St. Clair Avenue West
   Toronto, Ontario
   M4V 1P5
   Phone: (416) 323-4321
   Fax: (416) 323-4643

3. Greenpeace
   185 Spadina Avenue, 6th floor
   Toronto, Ontario
   M6G 1K1
   Phone: (416) 345-8408
   Fax: (416) 345-8422

4. Laidlaw Environmental Services Limited
   3221 North Service Road
   Burlington, Ontario
   L7R 3Y8
   T.A.G. Wilson
   Phone: (416) 336-1800
   Fax: (416) 336-0670

5. Ministry of Government Services
   Publications Ontario
   88 Bay Street
   Toronto, Ontario
   N7A 1N8
   Phone: (416) 326-5300
   (800) 668-9938

6. Pollution Probe Foundation
   12 Madison Avenue
   Toronto, Ontario
   M5R 2S1
   Phone: (416) 926-1907
   Fax: (416) 926-1601

7. Recycling Council of Ontario
   489 College Street, Suite 504
   Toronto, Ontario
   M6G 1A5
   Phone: (416) 960-1025
   (800) 263-2849
   Fax: (416) 960-8053

Resources (cont.)

Videos

Unless specified all videos are available for use through the Bluewater Recycling Association.

Refuse Industry Productions, Garbage in America: Hazardous Waste - Priority One.

Sahasrabudha, Orr, Miller Associated Ltd, Your Green Home (with book), Soma Film & Video, 345 Carlaw Avenue, Suite 200, Toronto, Ontario M4M 2T1, (416) 466-0822

Speakers

1. The Bluewater Recycling Association
   P.O. Box 1330
   Grand Bend, Ontario
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   Phone: (519) 238-8661
   (800) 265-9799
   Fax: (519) 238-2330

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   489 College Street, Suite 504
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   Phone: (416) 960-1025
   (800) 263-2849
   Fax: (416) 960-8053

3. Ministry of Environment and Energy
   135 St. Clair Ave West
   Toronto, Ontario
   M4V 1P5
   Phone: (416) 323-4321
   Fax: (416) 323-4643

4. Global Action Plan (G.A.P.)
   R.R.#4, 6080 Durham Road 23
   Uxbridge, Ontario
   L4P 1K4
   Phone: (416) 852-4786
   Fax: (416) 852-4786

5. Ontario Hydro
   Speakers Bureau
   700 University Avenue
   Toronto, Ontario
   M5G 1X6
   Phone: (416) 592-2322
   (800) 668-8500

6. Pollution Probe
   12 Madison Avenue
   Toronto, Ontario
   M4K 1K1
   Phone: (416) 465-7478
   Fax: (416) 926-1601

Resources (cont.)

Speakers (cont.)

7. Metropolitan Toronto and Regional Conservation Authority
   Water Resources Branch
   5 Shoreham Dr.
   Downsview, Ontario
   M3N 1S4
   Phone: (416) 661-6600
   Fax: (416) 661-6898

8. Greenpeace
   185 Spadina Avenue, 6th Floor
   Toronto, Ontario
   M6G 1K1
   Phone: (416) 345-8408
   Fax: (416) 345-8422

End Notes

[1]Ministry of the Environment and Energy, Regulation 347, Ministry of Government Services, Publications Ontario, 88 Bay Street, Toronto, Ontario N7A 1N8, 1-800-668-9938

[2]Ministry of the Environment and Energy, Household Hazardous Waste Guidelines, Ministry of Government Services, Publications Ontario, 88 Bay Street, Toronto, Ontario N7A 1N8, 1-800-668-9938

[3]Transportation of Dangerous Goods Act, Transport Canada, Canadian Communication Group Publishing, Ottawa, Ontario K1A 0S9, 819-956-4802

[4]Ministry of the Environment and Energy, Pesticide Act, Ministry of Government Services, Publications Ontario, 88 Bay Street, Toronto, Ontario N7A 1N8, 1-800-668-9938

[5]Transportation of Dangerous Goods, See note 3.

[6]World Health Organization (WHO), Avenue Appia, CH-1211, Geneva 27, Switzerland

[7]Workplace Hazardous Materials Information System (W.H.M.I.S.), Canadian Communication Group Publishing, Ottawa, Ontario K1A 0S9, 819-956-4802

[8]Workplace Hazardous Materials Information System (W.H.M.I.S.), Part IV Controlled Products Regulations, Transport Canada, Canadian Communication Group Publishing, Ottawa, Ontario K1A 0S9, 819-956-4802

To order copies of discussion papers published by the Ministry of the Environment and Energy, call the automated phone line at 1-800-268-3747, and ask for area code 416 and phone number 323-4643.

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Personal Notes