

Pollution Prevention in Hospitals and Medical Facilities

Waste Reduction, Recycling, and Litter Control Program
Washington State Department of Ecology

June 1993
Publication No. 93-39



Printed on Recycled Paper

Introduction

The State of Washington has a legislatively mandated goal of reducing the generation of hazardous waste fifty percent by 1995 and recycling fifty percent of the solid waste stream by 1995. To reach this goal, the Department of Ecology is preparing technical assistance manuals for specific industries to identify ways to reduce the amount of waste generated. This guide is specifically for hospitals and other medical facilities. The goal of this guide is to address solid and hazardous waste, not infectious or radioactive wastes.

This manual is not intended to be a hazardous waste regulatory guidance document. For up to date information regarding regulatory questions, call the Department of Ecology's Solid and Hazardous Waste program in your region.

Eastern Regional Office
N 4601 Monroe, Suite 100
Spokane, WA 99205-1295
(509)456-2926

Central Regional Office
106 S Sixth Ave
Yakima, WA 98902-3387
(509)575-2490

Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008
(206)649-7000

Southwest Regional Office
7272 Cleanwater Lane
Mail Stop LU-11
Olympia, WA 98504-6811
(206)753-2353

DISCLAIMER

The vendors, products and businesses presented in this booklet are included for the information of the reader. This does not represent an endorsement by the Department of Ecology. Alternative procedures and materials should be examined closely to determine the usefulness and compliance with applicable environmental regulations for each particular application.

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WHY REDUCE WASTE?

Lower disposal costs - The most immediate benefit of waste reduction is lower disposal costs. With less solid waste going in the dumpster and less hazardous waste being generated, disposal fees will decrease.

Increased profits - Waste reduction improves efficiency, reduces raw materials costs, avoids disposal costs, and reduces insurance liabilities.

Reduced liability - Generators of hazardous waste are responsible for the proper management of their waste. Enlightened waste management practices can result in lower insurance premiums. Some regulatory requirements can be reduced when regulated wastes are reduced.

Public relations - Environmental protection through waste reduction is a positive program to implement. Waste reduction and recycling programs project a positive image to employees and the community and can be used as a marketing tool.

Employee and patient safety - Waste reduction reduces employee, patient and community exposure to industrial waste, both during the use of the substance and after disposal. The health and safety of patients and employees are improved.

Health advocacy - Hospitals, as leading voices in health concerns, can promote awareness and action regarding the health effects of hazardous waste and the benefits of waste reduction. As a community service, hospitals can be leaders in environmental protection for the health of the community.

GETTING STARTED

Get a commitment from management - Start at the top. A successful Waste Reduction/Recycling (WR/R) program begins with the administration and management making a commitment to the program. A corporate commitment gives priority and authority for a WR/R program. If there is not visible support from management, employees will have little incentive to look for waste reduction opportunities.

Find a “champion” to head up the program - The person in charge should be committed to WR/R. Select a person with enthusiasm, creativity and the ability to coordinate details. Give this person the authority necessary to implement a program.

Form a team - Include someone from purchasing, housekeeping, the person responsible for proper management and disposal of hazardous waste and someone familiar with the processes that use or generate hazardous substances.

Set waste minimization goals - It is important to choose goals that are realistic and achievable. Develop a plan that is meaningful for your facility. Develop cost-effective solutions. Employee incentive programs, such as awards for waste reduction ideas, can help foster awareness of policies, goals and benefits.

Conduct annual waste audits - Survey the materials entering your waste stream. Determine which materials can be recycled, reduced or eliminated from the waste stream. Determine the source of these materials. Allocate waste management costs to operations that generate waste. Conduct cost accounting of all waste streams. Encourage those who are generating these materials to participate in finding a waste reduction solution.

Give the program adequate financial and technical resources - A waste reduction program can save money in the long run through lower disposal costs and savings in raw materials purchases. However, a good program needs the commitment of some resources to get started.

Communicate - The progress, goals and rationale of the program should be shared with employees at all levels. Education will be necessary to teach employees the “new” methods of materials handling, ordering and disposal.

GENERAL RECOMMENDATIONS

- * Determine waste generator status. How much hazardous waste do you generate each month? Are you a regulated generator or a conditionally exempt small quantity generator? (Assistance regarding waste designation should be directed to the solid and hazardous waste sections in the regional offices listed in the introduction)
- * Provide employee training in hazardous materials management and waste minimization. This will reduce the likelihood of excess waste being generated and increase the safety of employees.
- * Clearly identify all chemicals and waste containers. Keep containers closed except when chemicals or wastes are being added or removed.
- * Isolate liquid wastes from solid wastes. Never mix different types of waste together. Mixing wastes may make recycling impossible, or make waste disposal much more expensive. If non-hazardous waste becomes contaminated with a hazardous waste, it must all be disposed of as a hazardous waste. Often times wastes can be recycled only if they have been kept segregated.
- * Minimize the amount of each waste being generated at its source of generation. Identify the source of hazardous materials generated and determine the best method of reduction.
- * Recycle all wastes where practical. Identify the source of all recyclable materials, then provide conveniently located containers for these recyclables.
- * Tighten inventory control. Inventory all substances. Rotate stock to reduce chances of outdated material, Avoid over-purchasing by instituting “just in time” purchasing. Benefits include less waste, more efficient supply procedures and ready access to stored goods.
- * Substitute less hazardous or nonhazardous chemicals for hazardous chemicals wherever possible. *See Appendix A.*
- * Implement an institution-wide waste reduction program. Form a waste reduction team to conduct annual waste audits.
- * Dispose of obsolete and surplus stock. Investigate waste exchange or sale of surplus goods.
- * Apportion waste management costs to the departments that generate the wastes. Allow disposal savings from the WR/R programs to be used to support the WR/R effort.
- * Recycle batteries, use rechargeable batteries.
- * Investigate more efficient silver recovery methods.
- * Use latex or water based paints for safer application, storage and disposal.

SPECIFIC RECOMMENDATIONS HAZARDOUS WASTE

SOLVENTS

Segregate solvent wastes from each other so that they can be recycled.
Substitute less hazardous cleaning agents.
Substitute aqueous-based solvents for chemical solvents.
Substitute non-halogenated solvents for halogenated solvents.
Substitute simple alcohols and ketones for petroleum hydrocarbons.
Use ultra-sonic or steam cleaning rather than solvent-based cleaning.
Use pre-mixed containerized kits for tests involving solvent fixation.
Use sensitive analytical equipment to reduce analyte volume requirements.
Use calibrated solvent dispensers for routine tests.
Use on-site or off-site distillation for the recovery of solvents.
Use micro-scale analytical analysis.
Investigate waste exchange. *See Appendix B.*

PHOTOGRAPHIC CHEMICALS

Determine which wastes are hazardous.
Return off-spec developer to manufacturer.
Cover chemical tanks to reduce evaporation.
Recover silver efficiently. Use a two-stage system.
Recycle waste film and paper. *See Appendix D.*
Use squeegees to reduce bath losses.
Determine if chemicals are actually spent before replenishing them.
Test expired materials for usefulness before discarding.
Find out if chemical vendor will accept unused products or wastes.

CHEMOTHERAPY and ANTINEOPLASTICS

Return outdated drugs to the manufacturer.
Centralize chemotherapy compounding location.
Provide spill clean up kits.
Segregate chemotherapy wastes from other wastes.
Minimize the cleaning frequency and volume of gauze material used for the compound hood. (OSHA publication 8-1.1, January 1986)
Purchase drug containers in sizes that reduce generation of residues that must be disposed.
Fill Sharps containers for chemotherapy wastes to at least 75% capacity.
In chemotherapy drug handling training, include units devoted to waste minimization.

FORMALDEHYDE

- Minimize strength of formaldehyde solutions.
- Use reverse osmosis waste treatment to reduce dialysis cleaning demands.
- Capture waste formaldehyde.
- Investigate reuse in pathology, autopsy labs.

MERCURY

- Provide spill cleanup kits and personnel training.
- Recycle uncontaminated mercury wastes using a commercial recycler. See *Appendix C*.
- Substitute electronic piezometric sensing devices for mercury-containing devices.
- Completely drain all residual mercury from thermometers, blood pressure reservoirs, and other devices.

TOXICS and CORROSIVES

- Substitute less toxic compounds and cleaning agents.
- Reduce volumes used in experiments.
- Return containers for reuse, use recyclable drums.
- Neutralize acid waste with basic waste. Designate resultant waste.
- Use mechanical handling aids for drums to reduce spills.
- Use automated systems for laundry chemicals.
- Use physical instead of chemical cleaning methods.
- Replace benzoyl peroxide with 30% hydrogen peroxide.

Solid Waste Recycling

Recycling markets vary in each community, so it is best to find out what recycling services are available before starting your program.

Office Paper Recycling

White office paper is readily recyclable in most communities. It must be kept separate from other paper waste. This is easily done by providing a container (as simple as a cardboard box), at locations where the most paper is generated. Likely sites include next to the copier and by computer printers. A larger, central collection container may also be necessary. Collection containers should be labeled and list which paper is acceptable to recycle.

Since colored paper is not as easy to recycle as white, you should take steps to limit the use of colored paper. Contaminants such as paper clips, post-it notes, mailing labels and plastic must be removed before recycling paper.

Cardboard Recycling

Most corrugated cardboard containers can be recycled. Contact your local recycler for details. The boxes will probably have to be flattened and must be kept clean and dry. If you have a very large amount of cardboard, it may be cost effective to purchase a baler. When corrugated cardboard is removed from the waste stream, there are usually substantial savings in garbage fees.

Aluminum cans

Aluminum cans are probably the most easily recycled item and they are often a source of revenue. Provide a container for cans next to pop machines, in the lunch room and wherever cans are generated.

Glass

Clean container glass, sorted by color, may be recyclable in your community. Check with your local recycler. This includes food and beverage containers only. Other glass items are generally not recyclable.

Metals

Most metal is recyclable as long as it is not contaminated with oil or chemicals. Some metals, like copper and aluminum, are very valuable when segregated. Contact your local recycler for details.

Oil

Used oil, such as motor oil, is recyclable when segregated from other liquids.. There is usually a fee charged to recycle used oil. Contact your local recycler for details.

Batteries

All lead-acid batteries are recyclable through your battery supplier or authorized recycler. There is a \$1000 fine in Washington for improper disposal of a lead-acid battery. Lead acid batteries are exempt from hazardous regulations if recycled.

Alkaline and other household batteries should never be disposed of in an incinerator or dumpster. Many communities have collection programs for household hazardous waste, contact your local solid waste management department to find out about local waste collection for businesses. For more information in Washington state, call 1-800-RECYCLE for details.

Plastics

Some communities have recycling programs that include plastics recycling. A pilot project involving plastic recycling in five hospitals in Portland and three hospitals in the Puget Sound area began in 1992. For more information contact Linda Glasier, Department of Ecology, (206)664-8030.

X-ray film

Silver is recovered from x-ray film. See *Appendix D*. The lead foil from x-ray film can also be recycled at your local metal recycling company.

If you don't know who to call in your community for recycling information, call 1-800-RECYCLE (Washington only).

Solid Waste Reduction

General Recommendations

- * To reduce solid waste, eliminate disposable products wherever possible.
- * Recharge laser printer cartridges.
- * Provide employees with ceramic coffee mugs to eliminate disposable cups.
- * Use rechargeable batteries.
- * Return or reuse wooden pallets.
- * Substitute non-aerosol products when possible.
- * Use energy efficient lighting.
- * Donate used or discarded goods and equipment to charitable organizations.
- * Some hospital instruments are battery powered, one use only, and disposable, (e.g. battery powered cauterizers). These can't be sanitized for reuse, but the batteries do not have to be disposed of after one use. They can be retrieved for hospital or personal use depending upon hospital policy.

Office Paper Reduction

- * Reduce the use of paper by making double-sided copies.
- * Reuse single sided paper for draft copies.
- * Circulate information rather than making several copies.
- * Use electronic mail messages.
- * Reuse envelopes, boxes and file folders.
- * Centralize files.
- * Store documents on floppy disk rather than making paper copies.

Cardboard Reduction

- * Request that deliveries be shipped in returnable containers.
- * Reuse boxes for shipping goods.

Success stories

Yale University REMEDY, donating unused medical supplies to charity

Yale University School of Medicine, Department of Anesthesiology recovers medical supplies for use in developing countries in a program they call REMEDY (Recovered Medical Equipment for the Developing World). The program's goal is to transfer discarded but usable medical equipment to countries where medical supplies are in short supply and high demand. All items collected for reuse undergo ethylene oxide sterilization. The recovered materials are then sorted into general categories and distributed to established charities within the United States. The charities then distribute the medical supplies where they are most needed.

At Yale University, these medical supplies would have been discarded as a regulated waste, not solid waste. The reduction in disposal fees is significant. It cost the hospital about \$200/year to sterilize the supplies. The result is a donation of \$200,000 worth of medical supplies to charities. Even though the amount of waste reduced is only 1% of the hospital waste stream, the charitable benefits are tremendous. These supplies are generally unavailable at any cost in the countries where they are sent.

The program has become a daily routine in the operating room. It has made the nurses and other staff more aware of waste in general.

REMEDY has the approval of the Yale-New Haven Hospital attorneys. Although hospitals cannot protect themselves 100% from liability, these charities have been taking such donations for more than 30 years without a lawsuit.

The Journal of American Medical Association printed an article September 16, 1992, describing this program. Hospital personnel are welcome to contact Dr. Rosenblatt c/o Department of Anesthesiology, TMP-3, 330 Cedar Street, New Haven, CT 06510, (203)785-2802. See Appendix E for list of local charities to contact about unused medical supplies.

Solid waste reduction success story

Itasca Medical Center waste reduction

The Itasca Medical Center in Grand Rapids, Minnesota reduced its solid waste stream by 60%) saving \$16,270 annually by implementing the following waste reduction practices. All changes took place without additions to hospital staff. In fact, after implementing their integrated waste management program the hospital eliminated two staff positions in the maintenance department.

Switched from single use plates to reusable plates in the cafeteria.

Switched to rechargeable batteries.

Switched to fluorescent bulbs in exit signs.

Replaced incandescent floodlights with fluorescent.

Switched from single use to reusable pitchers on patient floors.

Switched from disposable to reusable underpads.

Installed efficient flow shower heads.

Switched to non-toxic "T2" x-ray developer solution.

Replaced 4 straight light tubes for 1 circular tube in x-ray view boxes.

Eliminated Styrofoam cups.

Switched to bulk milk dispenser.

Switched from milk cartons to milk pouches.

Switched to reusable decubitus care mattresses.

The hospital also uses reusable bed pans, reusable emesis basins, reusable male urinal basins, reusable patient eating utensils, reusable sterilization trays, double sided photocopying, reusable isolation and surgical gowns.

The hospital has identified the following as steps to further reduction: reusable diapers, reusable soup bowls, reink printer ribbons, recycling old electronic equipment.

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- Environmental Protection Agency, Selected Hospital Waste Streams, Guide to Pollution Prevention. United States, June 1990, EPA/625/7-90/009.
- Minnesota Hospital Association, The Minnesota Hospital Association Recycling and Conservation Guide, 1991.
- Minnesota Office of Waste Management, Waste Source Reduction. A Hospital Case Study. Itasca Medical Center, April 1992.
- Rosenblatt, William H., MD and Silverman, David G., MD, "Recovery, Resterilization, and Donation of Unused Surgical Supplies", Journal of the American Medical Association, pp 1441-1443, September 16, 1992 Volume 268.
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- Washington State Department of Ecology, Waste Reduction, Recycling and Litter Control Program, Commercial Waste Reduction and Recycling Manual, September 1990.

Appendix A
Solvent substitutes

The following companies are vendors of solvent substitutes. This listing does not represent an endorsement by the Department of Ecology. Alternative procedures and materials should be examined closely to determine the usefulness and compliance with applicable environmental regulations for each particular application.

Van Waters & Rogers
P O BOX 3541
Seattle, WA 98124
(206)872-5000

Wonderack Distributing Inc
P O BOX 2775
Pasco, WA 99302
(509)582-5181

Van Waters & Rogers
P O BOX 2767
Spokane, WA 99220
(509)534-0405

Inland Technologies
2612 Pacific Highway E
Tacoma, WA 98243
(800)522-3100

Safety Kleen
3210 C St NE
Auburn, WA 98002
(206)939-2022

Safety Kleen
814 E Ainsworth
Pasco, WA 99031
(509)4547-8771

Safety Kleen
E 9516 Montgomery
Spokane, WA 99212
(509)928-8353

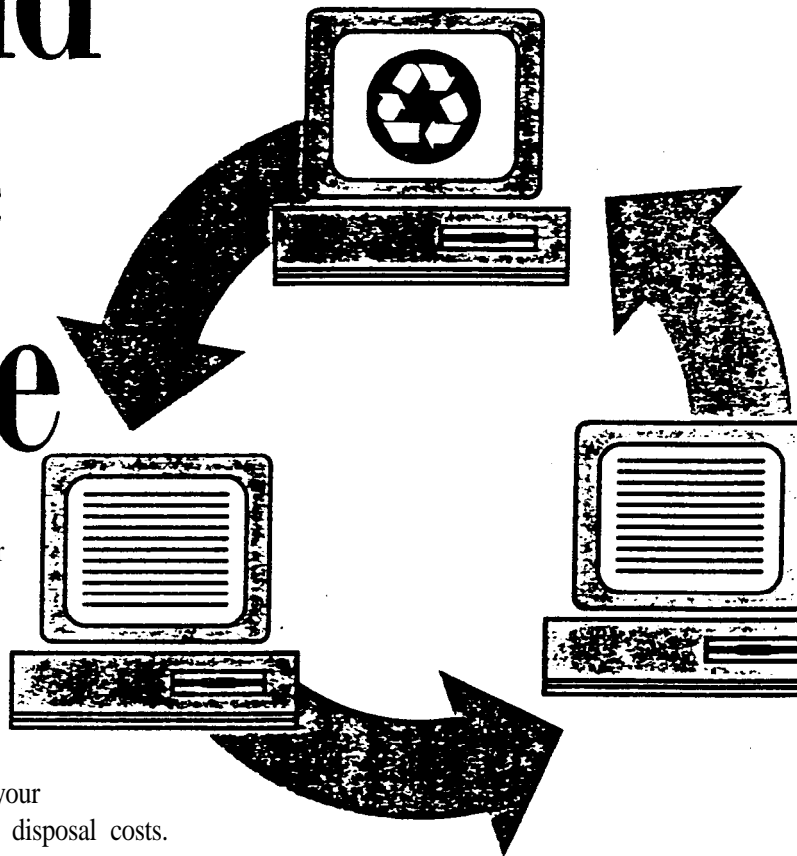
Safety Kleen
6303 212th St SW
Lynnwood, WA 98036
(206)775-7030

Appendix B
Waste Exchanges

Pacific Materials Exchange
1522 N Washington, Suite 202
Spokane, WA 99201-2454
(509)325-0551
Modem Computer access:
1-800-858-6625

Imex
172 20th Ave
Seattle, WA 98122
(206)296-4899

List and Locate On-line



Industrial waste exchange just got easier and faster. Now, list or locate feedstock materials, electronically across town or across the country.

Introducing the National Materials Exchange Network. A partnership of industrial waste exchanges to increase your recycling opportunities and reduce your disposal costs.

Instant access is as close as your computer and modem. What's more it's easy, free, and available 24 hours a day

- Free with participation in your local exchange.
- Simple to navigate.
- Up to 2400 baud modem linked to virtually any computer.

Get continually updated information on: waste by-product, off-spec overstock, obsolete, and damaged materials: used and virgin, solid and hazardous.

For computer modem access, dial: 1-800-858-4625
For more information or assistance, call: 509-325-0507

Be part of the solution.

Appendix C
Mercury Recyclers

Remlinger DJ
(gold, silver, & amalgam)
P O BOX 75597
Seattle, WA 98125-0597
(206)525-7451

Mercury Refining Co.
790 Watervliet-Shaker Rd
Latham, NY 12110
800-833-3505

Quicksilver Products Inc.
200 Valley Dr #1
Brisbane, CA 94005
(415)468-2000

Appendix D
Photographic Waste Recyclers

AGCO Metalex
3701 South Road
Lynnwood, WA 98037
(206)743-7886

Momentum Graphics
355 Treck Dr
Seattle, WA
98188
(206)575-9494

CMX Corporation
P O BOX 58088
Seattle WA 98139-1088
(206)656-1CMX

Pacific X-ray Corp.
649 Industry Dr
Seattle, WA 98188
(206)575-0202

Hallmark Refining Corp
P O BOX 1446
Mount Vernon, WA 98273
1-800-255-1895

Pegasus Environmental
30250 SW Parkway, Suite 1
Wilsonville, OR 97070
(503)682-5808

Image Control Systems, Inc.
P O BOX 9305
Seattle, WA 98109-0305
(206)624-2646

Prolab
123 NW 36th st
Seattle, WA 98107

M2 Refining
P O BOX 1049
Woodinville, WA 98072
(206)483-9199

Standard X-Ray, Inc.
W 1915 5th Ave
Spokane, WA 99204
(509)838-8335

Appendix E
Charities

It is essential that you contact these organizations before sending any supplies or equipment.

REMEDY Receiving Charities List

Americares
161 Cherry Street
New Canaan, CT 06840
1-800-666-HOPE

Direct Relief International
P O BOX 30820
Santa Barbara, CA 92130-0820

Health Services Program
Pan American Development
Foundation
1889 F Street NW
Washington, D C 20006-4499
(202)458-6155

Hunger Relief and Development Inc
P O BOX 9002
New Haven, CT 06532-0002
(203)481-5721

Mexican Indian Training Center
625 Market Street
P O BOX 422
Shreveport, LA 71162-0422
(318)424-9380

Salvadoran American Foundation, Inc
8282 NW 14th Street
Miami, FL 33126
(305)470-2206
1-800-992-8858

Agency for Development of
Bangladesh
51-60 Van Kleek Street, Apt 7A
Elmhurst, New York 11371
(718)830-1515

Other Charities
Interplast, Inc.
2458 Embarcadero Way
Palo Alto, CA 94303
(415)424-0123

Medical Benevolence Foundation
1412 N. Sam Houston Pkwy E # 120
Houston, TX 77032-2946
(713)590-3591

Mercy Corps International
3030 SW First Ave
Portland, OR 97201
(503) 242-1032

Program for Appropriate Technology
in Health (PATH)
4 Nickerson St
Seattle, WA 98109
(206)285-3500

World Concern Development
Organization (WCDO)
Box 33000
Seattle, WA 98133
(206)546-7201

Appendix F - Definitions

Solid waste as defined in RCW 70.95.030, means all putrescible and nonputrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, demolition and construction wastes, abandoned vehicles or parts thereof, and recyclable materials. NOTE: Treated biomedical waste or medical waste defined as biomedical waste shall be considered to be solid waste. Woodwaste is also considered solid waste.

Recyclable materials means those solid wastes that are separated for recycling or reuse, such as papers, metals, and glass, that are identified as recyclable material pursuant to local comprehensive solid waste plan, adopted pursuant to 70.95.110.

WAC 173-304-100

Medical waste means all the infectious, and injurious waste originating from a medical, veterinary, or intermediate care facility.

RCW 70.105.010

(5) **Dangerous wastes** means any discarded, useless, unwanted or abandoned substances, including but not limited to certain pesticides, or any residues or containers of such substances which are disposed of in such quantity or concentration as to pose a substantial present or potential hazard to human health, wildlife, or the environment because such wastes or constitutes or combinations of such wastes:

(a) Have short-lived, toxic properties that may cause death, injury, or illness or have mutagenic, teratogenic, carcinogenic properties; or

(b) Are corrosive, explosive, flammable, or may generate pressure through decomposition or other means.

(6) **Extremely hazardous waste** means any dangerous waste which

(a) will persist in a hazardous form for several years or more at a disposal site and which in its persistent form:

(i) presents a significant environmental hazard, may be concentrated by living organisms through a chain or may affect the genetic make-up of man or wildlife, and

(ii) is highly toxic to man or wildlife

(b) if disposed of at a disposal site in such quantity as would present an extreme hazard to man or the environment.

(14) **Hazardous substance** means any liquid, solid, gas, sludge, including any material, substance, product, commodity, waste, regardless of quantity, that exhibits any of the characteristics or criteria of hazardous waste as described in rules adopted in RCW 70.105.

Hazardous waste means and includes all dangerous and extremely hazardous waste, including substances composed of radioactive and hazardous components.

