

Training on Medical Waste Management

**in Collaboration with
Al-Essa Medical & Scientific Equipment Co. W.L.L**

WHO Definitions of Waste



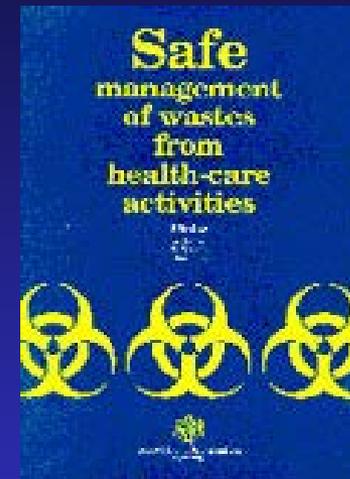
**Kuwait University
Health Science Center
29 January – 1 February, 2012**

Safe Management of Wastes from Health-Care activities

WHO European Centre
for
Environment and Health
Rome, Italy

World Health Organization
Geneva
1999

(Being updated for 2012)



Definitions

Health-care waste

Total waste stream from HCW generators
(major and scattered sources)

Hazardous health-care waste

75 - 90% of general waste (similar to domestic waste)
10 - 25% is hazardous (infectious, toxic etc.)



Health-care activities

Health-care activities (for humans) generating waste include:

- Diagnosis
- Treatment
- Prevention of diseases
- Alleviation of disablement
- Associated research



Hazardous health-care waste

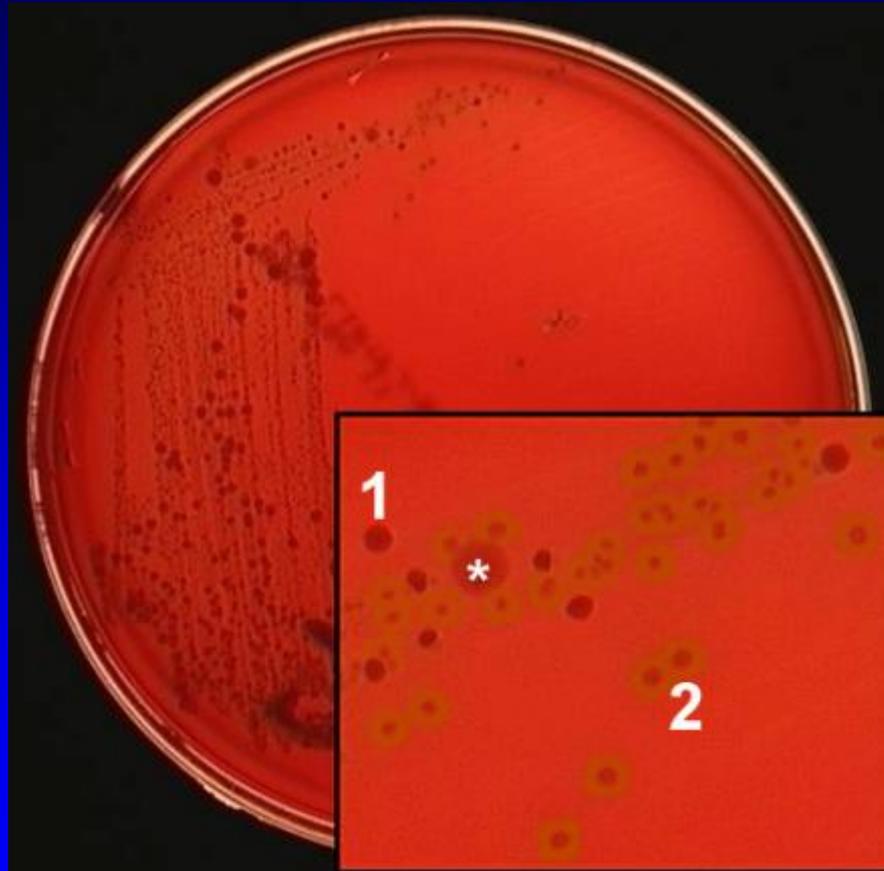
- Infectious
- Pathological
- Sharps
- Pharmaceutical
- Genotoxic
- Chemical
- Heavy metals
- Pressurized containers
- Radioactive



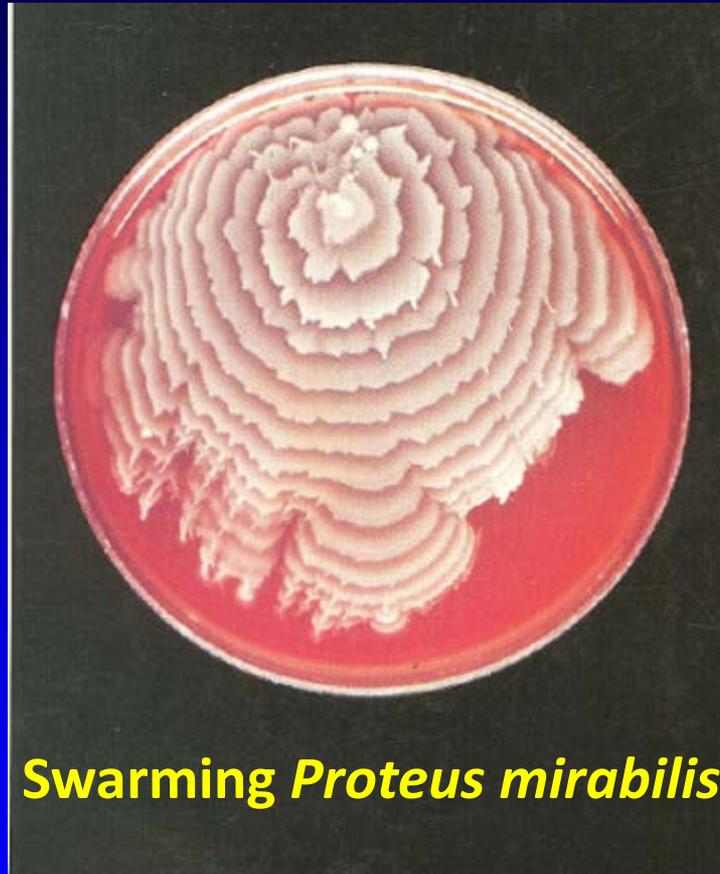
Categories of health-care waste

Waste category	Description and examples
Infectious waste	Waste suspected to contain pathogens e.g. laboratory cultures; waste from isolation wards; tissues (swabs), materials, or equipment that have been in contact with infected patients; excreta
Pathological waste	Human tissues or fluids e.g. body parts; blood and other body fluids; fetuses
Sharps	Sharp waste e.g. needles; infusion sets; scalpels; knives; blades; broken glass
Pharmaceutical waste	Waste containing pharmaceuticals e.g. pharmaceuticals that are expired or no longer needed; items contaminated by or containing pharmaceuticals (bottles, boxes)
Genotoxic waste	Waste containing substances with genotoxic properties e.g. waste containing cytostatic drugs (often used in cancer therapy); genotoxic chemicals
Chemical waste	Waste containing chemical substances e.g. laboratory reagents; film developer; disinfectants that are expired or no longer needed; solvents
Wastes with high content of heavy metals	Batteries; broken thermometers; blood-pressure gauges; etc.
Pressurized containers	Gas cylinders; gas cartridges; aerosol cans
Radioactive waste	Waste containing radioactive substances e.g. unused liquids from radiotherapy or laboratory research; contaminated glassware, packages, or absorbent paper; urine and excreta from patients treated or tested with unsealed radionuclides; sealed sources

Infectious - Cultures and Stocks



Infectious - Cultures and Stocks



Swarming *Proteus mirabilis*

Infectious Human Blood and Blood Products

This waste shall include:

(I) discarded waste human blood, discarded blood components (e.g. serum and plasma), containers with free flowing blood or blood components or discarded saturated material containing free flowing blood or blood components; and

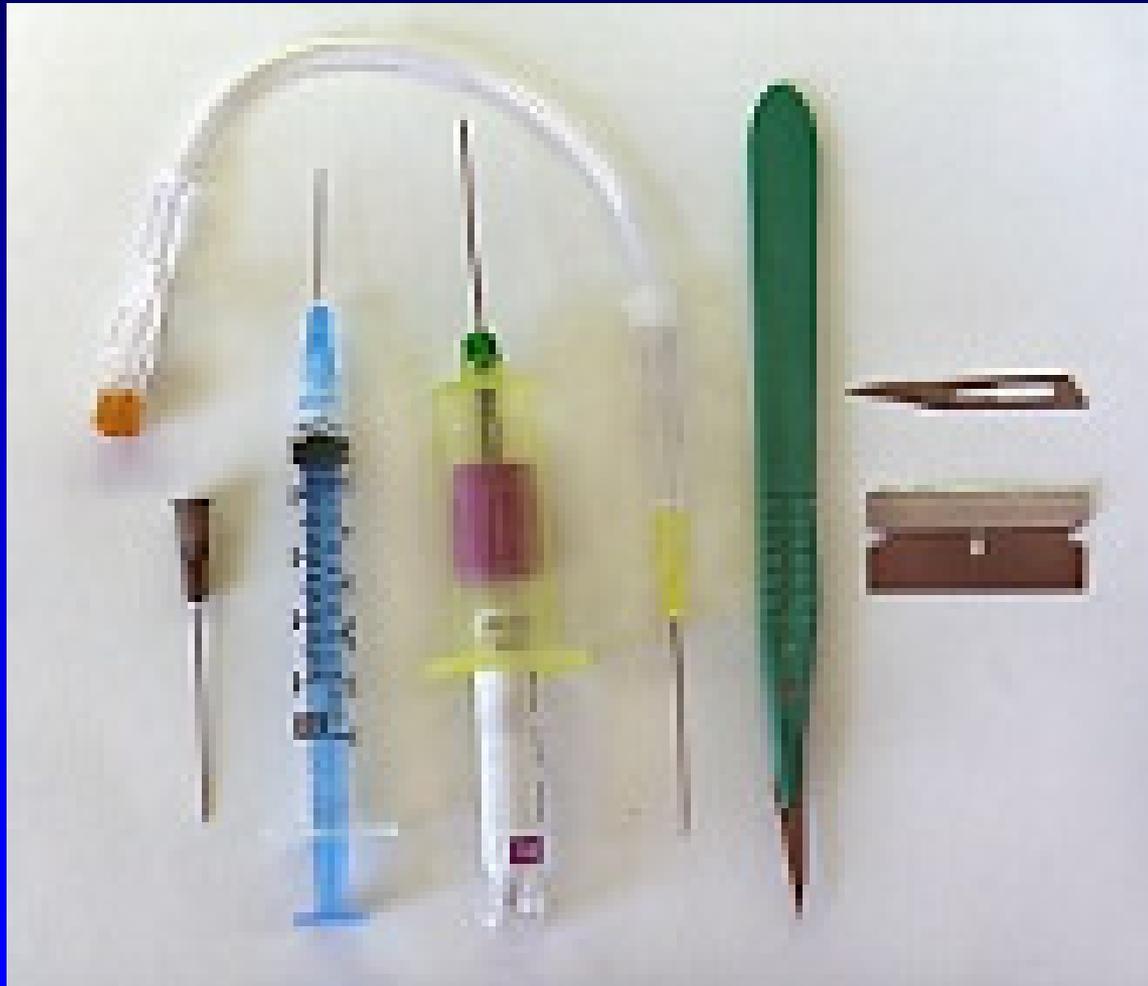
(II) materials saturated with blood or blood products.



Pathological Wastes



Sharps – Needles, Syringes, Tubes of Blood, Scalpel Blades.



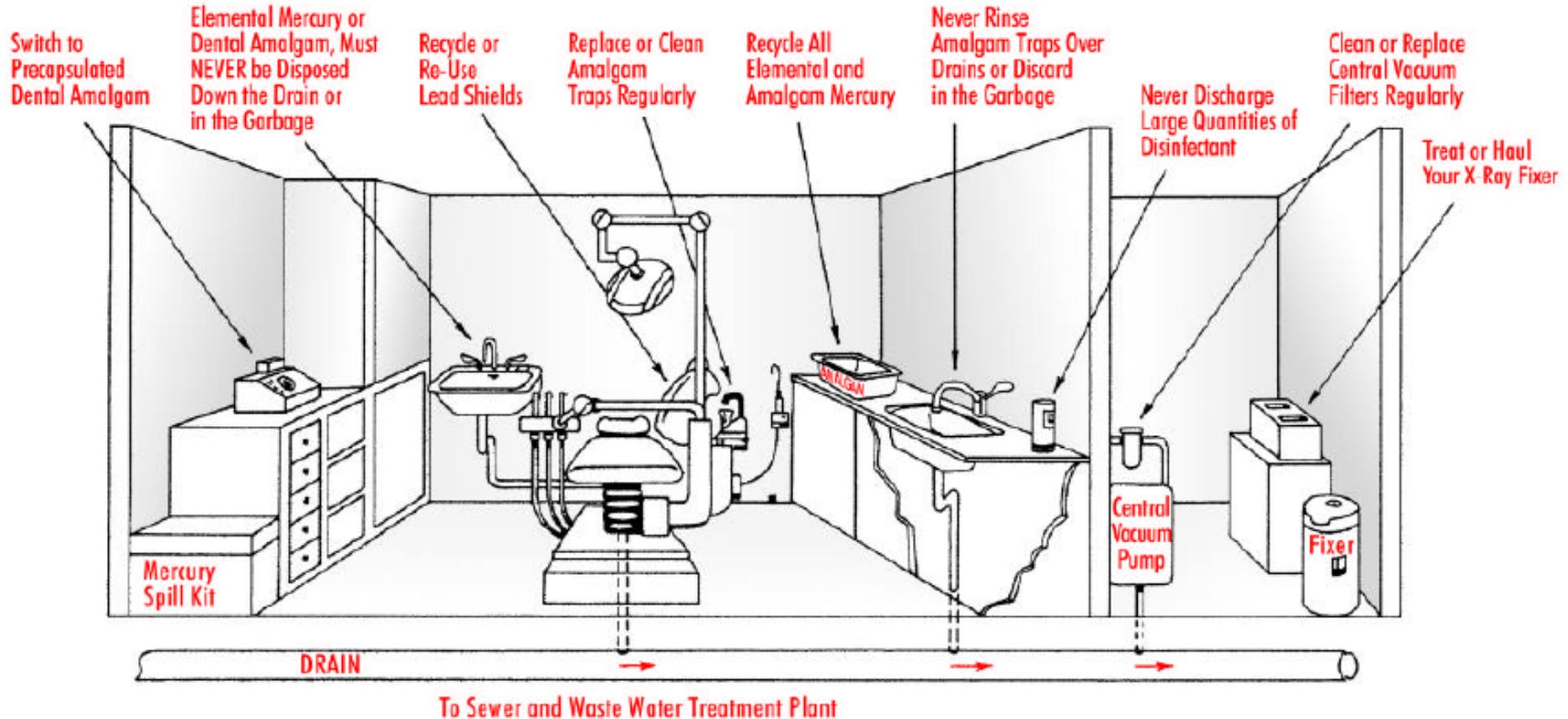




Animal Waste and Animal Bedding



Management of Dental Wastes



Typical Laboratory Hazardous Wastes

Which are hazardous?



What is RCRA?

RCRA is the Resource Conservation and Recovery Act, which was enacted by Congress in 1976.

RCRA's primary goals are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner.

RCRA mandated regulations are found in the Code of Federal Regulations at Title 40 (40 CFR)

www.gpo.gov CFR...Title 40...Parts 260-280

RCRA Hazardous Waste / Hazardous Drug Categories

Two Categories of RCRA Hazardous Waste:

- Listed Waste

 - P – Listed (Acutely Hazardous) Includes 1 Chemo Agent

 - U – Listed (Chemotherapy Drugs)

- Characteristic Waste - 4 characteristics

 - Ignitability, Corrosively, Reactivity, Toxicity

- Hazardous Waste is Compatible or Non-Compatible

 - Compatible – can be placed in a container without danger of reaction

 - Non-Compatible – potential for chemical reaction if co-mingled

Characteristic Hazardous Waste (D Number)

Ignitability - Aqueous Solution containing 24% alcohol or more by volume & flash point <140° F., D001 Waste.

Corrosivity - An aqueous solution having a pH <= 2 or >= to 12.5, D002 Waste.

Reactivity - Must meet eight separate criteria identifying certain explosive and water reactive wastes. D003 waste. Nitroglycerin formulations are excluded federally from the P081 listing as non-reactive as of August 14, 2001 under FR: May 16, 2001. Some states have adopted the exclusion.

Toxicity - Approximately 40 chemicals which meet specific leaching concentrations. Examples of potential toxic pharmaceuticals: Arsenic, Barium, Mercury, Cadmium, Chloroform, Selenium, Chromium, Silver (Specific D Numbers)

Characteristic Hazardous Waste (D Number)

- D004 - Arsenic
- D005 - Barium
- D006 - Cadmium
- D007 - Chromium
- D008 - Lead
- D009 - Mercury
- D010 - Selenium
- D011 - Silver

Toxicity =
Heavy Metals

Examples of P - Listed Pharmaceutical Waste

- **Arsenic trioxide** **P012**
- **Epinephrine** **P042**
- **Nicotine** **P075**
- **Nitroglycerin** **P081**
- **Phentermine (CIV)** **P046**
- **Physostigmine** **P204**
- **Physostigmine Salicylate** **P188**
- **Warfarin >0.3%** **P001**

Examples of U – Listed Pharmaceutical Waste

- | | | | |
|------------------------|------|--------------------|------|
| • Chloral Hydrate(CIV) | U034 | • Streptozotocin | U206 |
| • Chlorambucil | U035 | • Lindane | U129 |
| • Cyclophosphamide | U058 | • Saccharin | U202 |
| • Daunomycin | U059 | • Selenium Sulfide | U205 |
| • Melphalan | U150 | • Uracil Mustard | U237 |
| • Mitomycin C | U010 | • Warfarin<0.3% | U248 |

Common Chemo / Genotoxic Wastes

Common Chemotherapeutic / Antineoplastic Wastes

- Chlorambucil [Leukeran] U035
- Cyclophosphamide [Cytosan, CTX, Neosar] U058
- Daunomycin [Daunorubicin, Cerubidine] U059
- Melphalan [Alkeran, L-PAM] U150
- Mitomycin C [Mitomycin, Mutamycin] U010
- Streptozotocin, Chlornaphazine [Zanosar] U206
- Uracil Mustard U237
- Ethyl Carbamate U238
- Azaserine U015
- 3-Methylcholanthrene U157
- Arsenic Trioxide (Trisenox) P012
- Bevacizumab (Avastin) Non-RCRA Hazardous
- Carmustine (Bicnu) Non-RCRA Hazardous
- Irinotecan Hydrochloride (Campostar) Non-RCRA Hazardous
- Doxorubicin Hydrochloride (Doxil) Non-RCRA Hazardous
- Oxaliplatin (Eloxatin) Non-RCRA Hazardous

What Percentage of Drugs are RCRA Hazardous?*

• Federal hazardous	4,686	4%
• Risk Management Hazardous	10,973	10%
• “Non-Hazardous”	99,240	86%
• Total Products	114,899	
• Total Hazardous Products	15,659	14%
• Total Products containing mercury	482	0.4%

*Based on PharmEcology Wizard data as of March 18th, 2004

P Listed Waste

- **Acutely Hazardous**
- **Includes Epinephrine, Nicotine, Nitroglycerin, Phentermine, Physostigmine, Warfarin, Arsenic trioxide (chemo drug)**
- **Empty containers (except for used syringes) are hazardous waste – not RMW**
- **P-listed waste containers are not “RCRA empty”, unless they are triple rinsed (resulting rinsate must be discarded as hazardous waste).**

U-Listed Hazardous Waste

- Toxic
- Chemo Drugs
- Empty U-listed drug containers can be disposed of as RMW if:
 - ✓ All contents have been removed using normal means
 - AND
 - ✓ No more than 3% by weight remains
- If BOTH conditions are not met, empty U-listed drug containers must be treated as hazardous waste.

Typical Laboratory Hazardous Wastes

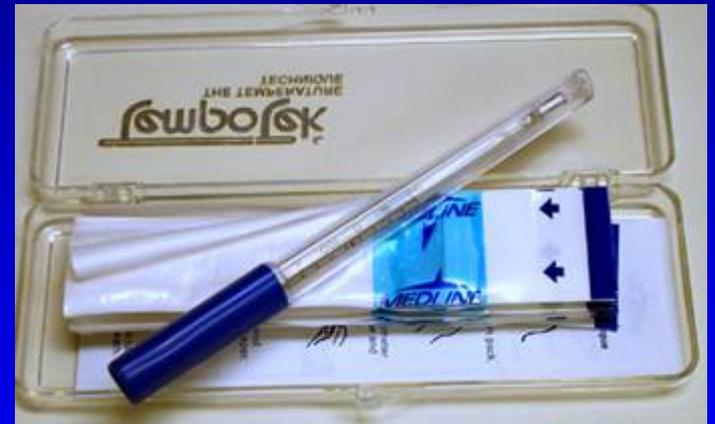
Which are hazardous?







Mercury



Laboratory Thermometers



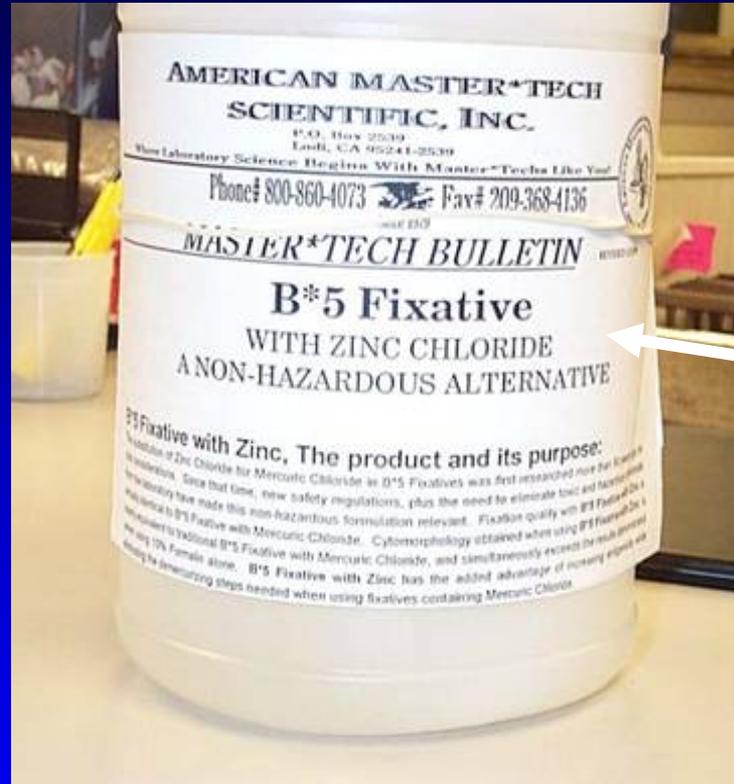


More Laboratory Thermometers



NIST- Traceable Thermometer

Chemicals in the Laboratory



With
this

Replace

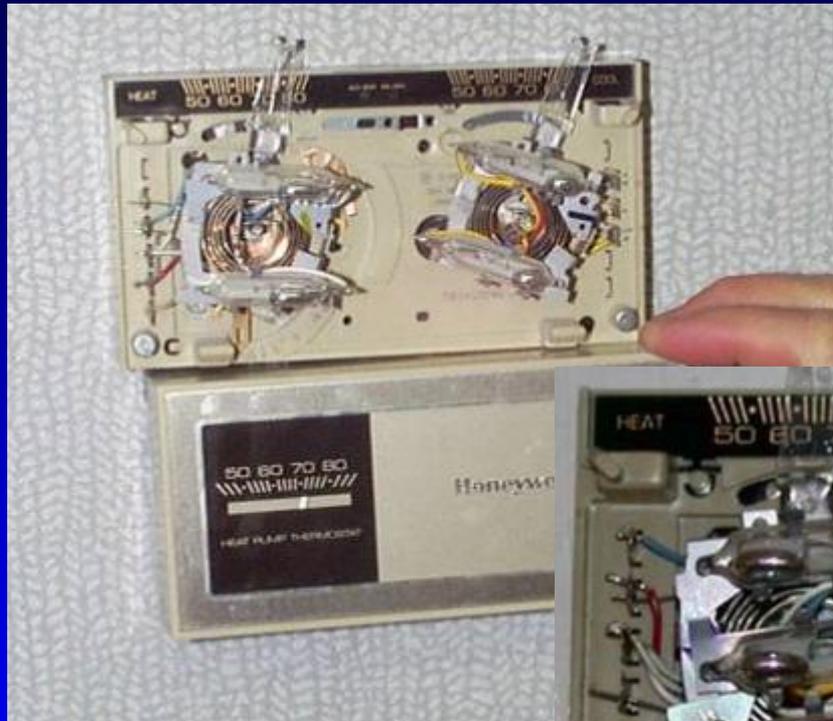
Zinc Chloride can cause irritation of the nose and throat and conjunctivitis

Mercuric Chloride is **highly toxic**

Switches

- **Vacuum System Barostats**
- **Boiler Barostats**
- **Boiler Water Level Switch**
- **Mercury Room Thermostat**
- **Sump Pump Switch**
- **X-Ray Tube**

Thermostats containing Mercury



Non-Mercury Thermostat



Fluorescent Lighting

- Fluorescent Tubes
- Bilirubin Lights



Batteries

Battery Type	Description	Format	Use	Remarks
Alkaline and Carbon Zinc	<ul style="list-style-type: none">• Small• Sealed• Non-rechargeable• Labeled general purpose or heavy duty	<ul style="list-style-type: none">• AA• AAA• D-cell• C-cell• 9V• Button cells	<ul style="list-style-type: none">• Camera• Handheld electronics	<ul style="list-style-type: none">• Can leak with age• Non-toxic• Non-spillable
Hybrid Automotive	<ul style="list-style-type: none">• Large• Most common: NiMH & Li-ion	<ul style="list-style-type: none">• Large pack of small cells	<ul style="list-style-type: none">• Hybrid automobile	<ul style="list-style-type: none">• Non-spillable

	<ul style="list-style-type: none"> Sealed Rechargeable 			
Lead Acid Gel	<ul style="list-style-type: none"> Small to medium Sealed Rechargeable 	<ul style="list-style-type: none"> Rectangular Custom sizes in hard plastic case 	<ul style="list-style-type: none"> Wheel chairs Portable tools and instruments 	<ul style="list-style-type: none"> Non-spillable gelled electrolyte Toxic Can cause fire if short-circuited
Lithium (Primary)	<ul style="list-style-type: none"> Small Sealed Non-rechargeable 	<ul style="list-style-type: none"> Button cells AA AAA 9V Small-cylinder Custom sizes 	<ul style="list-style-type: none"> Camera Handheld Electronics Alarms Memory backup High-temperature applications Pacemakers 	<ul style="list-style-type: none"> Non-spill-able Non-toxic Can overheat or explode if short-circuited
Lithium-ion (Li-ion)	<ul style="list-style-type: none"> Small Sealed Rechargeable 	<ul style="list-style-type: none"> Custom sizes in hard plastic case Small-cylinder Button cells 	<ul style="list-style-type: none"> Laptop computers Power tools Hybrid automobiles Video camera Handheld electronics 	<ul style="list-style-type: none"> Non-spillable Non-toxic
Mercury	<ul style="list-style-type: none"> Small Sealed Non-rechargeable 	<ul style="list-style-type: none"> AA 9V Small-cylinder Custom sizes 	<ul style="list-style-type: none"> Camera Medical devices 	<ul style="list-style-type: none"> Non-spillable, Toxic Never incinerate Produces highly toxic vapors
Nickel-Cadmium (NiCd)	<ul style="list-style-type: none"> Small Sealed Non-rechargeable 	<ul style="list-style-type: none"> AA AAA C-cell D-cell Small-cylinder Poly-wrapped cell packs Custom sizes in hard plastic case 	<ul style="list-style-type: none"> Laptop computers Power tools Handheld electronics Medical equipment 	<ul style="list-style-type: none"> Non-spillable, Toxic Never incinerate Produces highly toxic vapors
Nickel Metal Hydride (NiMH)	<ul style="list-style-type: none"> Small Sealed Rechargeable 	<ul style="list-style-type: none"> AA AAA C-cell D-cell Poly-wrapped cell packs Small-cylinder Custom sizes 	<ul style="list-style-type: none"> Laptop computers Power tools Hybrid automobile Camera Handheld electronics 	<ul style="list-style-type: none"> Non-spillable Non-toxic
Silver Oxide	<ul style="list-style-type: none"> Small Sealed Rechargeable 	<ul style="list-style-type: none"> Button cells High-voltage Small-cylinder Large Custom sizes 	<ul style="list-style-type: none"> Hearing aids Camera 	<ul style="list-style-type: none"> Non-spillable Non-toxic
Zinc Air	<ul style="list-style-type: none"> Small Sealed Non-rechargeable 	<ul style="list-style-type: none"> Button cells 9V Custom sizes 	<ul style="list-style-type: none"> Hearing aids Mechanically Recharged Electric vehicles 	<ul style="list-style-type: none"> Non-spillable Non-toxic

Radionuclides or radioisotopes that are commonly used for medical/clinical res grouped into 3 groups as shown below (Table 1).

	Class A	Class B	Class C
Nature	- Long-lived - α emitters	- Long-lived - β or γ emitters	- Short-lived - β or γ emitters
Examples	- ^{22}Na - ^{24}Na - ^{60}Co - ^{65}Zn - ^{124}Sb - ^{192}Ir - ^{182}Ta	- ^{74}As - ^{59}Fe - ^{111}In - ^{46}Sc - ^{85}Sr - ^{198}Au - ^{67}Ga - $^{114\text{m}}\text{In}$ - ^{75}Se - ^{90}Sr - ^{82}Br - ^{153}Gd - ^{95}Nb - ^{153}Sm - ^{58}Co - ^{203}Hg - ^{84}Rb - ^{113}Sn - ^{18}F - ^{131}I - ^{86}Rb - ^{123}Sn - ^{14}C - ^3H	- $^{195\text{m}}\text{Au}$ - ^{36}Cl - ^{81}Kr - ^{188}Re - ^{201}Tl - ^{57}Co - ^{98}Nb - ^{103}Ru - ^{127}Xe - ^{45}Ca - ^{51}Cr - ^{63}Ni - ^{35}S - ^{133}Xe - ^{109}Cd - ^{32}P - ^{89}Sr - ^{90}Y - ^{133}Ce - ^{123}I - ^{33}P - ^{99}Tc - ^{169}Yb - ^{144}Ce - ^{125}I - ^{186}Re - $^{99\text{m}}\text{Tc}$

Radioactive Waste

^{14}C -Urea Breath Test

^{14}C -Urea Breath Test for
Presence of *H. pylori*



**User's
Guide**

Radiation Safety

What is the risk from the ^{14}C ?

The ^{14}C -urea breath test gives a maximum Effective Dose Equivalent (EDE) to the patient of 0.3 mrem. This is approximately the same radiation dose as 24 hours of normal background radiation.

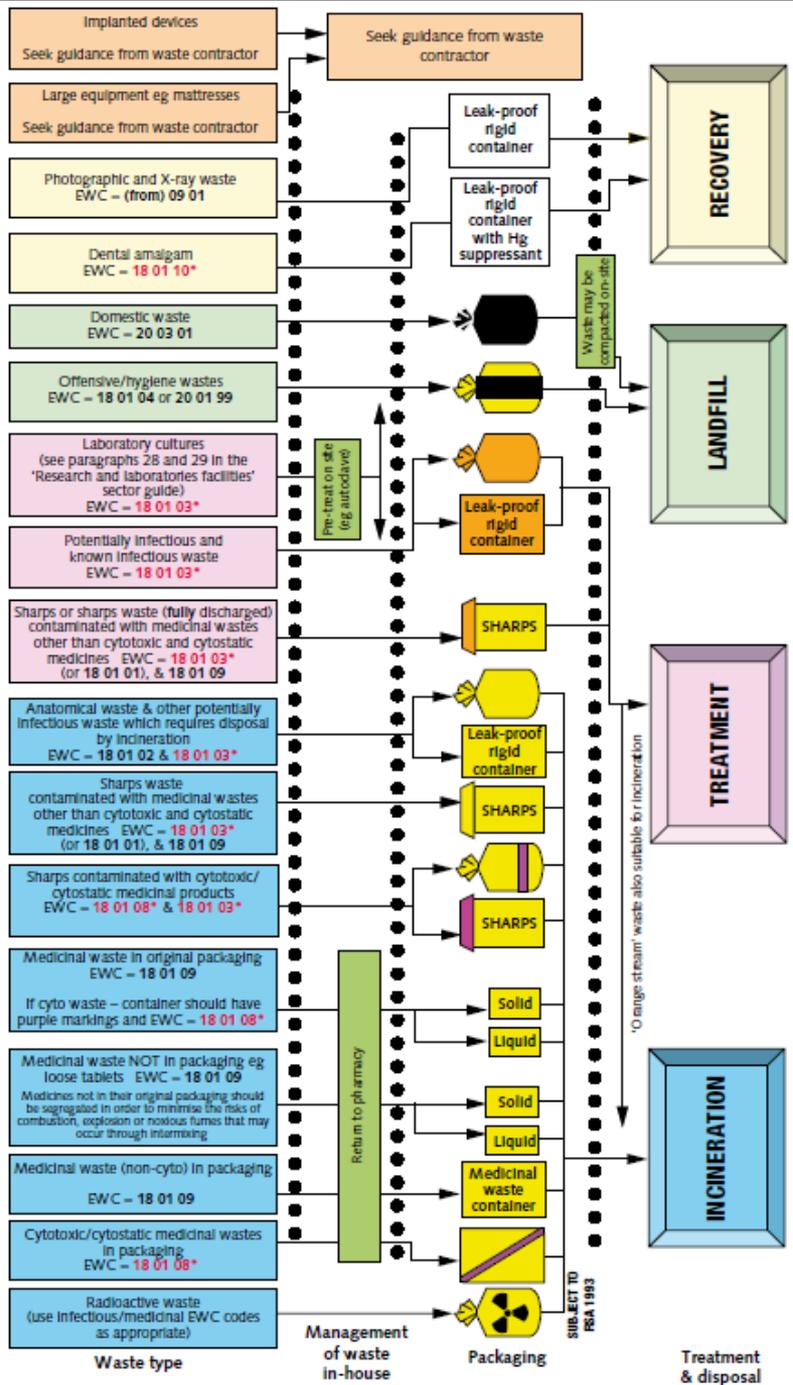
What is the dose to the people performing the test? Are they at risk?

The Nuclear Regulatory Commission (NRC) has performed an analysis of the radiation dose estimates for personnel working the ^{14}C -urea breath test and concluded that the risks to those performing the test is insignificant. The NRC has exempted the performance of this test from their regulations.

Waste Disposal

What do I do with the packaging considering it was used with radioactive material?

All references to radioactive material and the radiation symbol should be defaced prior to disposing in the regular trash.



Final Note:

HTM 07-01 NHS UK

Is this what it really looks like???