MINISTRY OF HEALTH

HEALTH CARE WASTE MANAGEMENT

Incinerator Operator Manual

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FOREWORD

The Ministry of Public Health and Sanitation recognizes the importance of safeguarding health workers and the community at large from risks associated with improper disposal of the health care waste. The Ministry in collaboration with development partners, John Snow Inc. WHO, UNICEF has installed and/or rehabilitated small scale auto combustion incinerators at health facilities in many districts around the country. This is in order to ensure safe and environmentally friendly management of health care waste. However, for these incinerators to function optimally, they need to be operated by skilled attendants. It is against this background that it is imperative to develop a training manual for use by both the health care waste managers and incinerator operators.

This manual has been developed through wide consultation and extensive review of available literature and publications on the operation and maintenance of small scale incinerators. It is intended for use during training of incinerator operators as well as a quick reference for health care waste managers.

Knowing that the amount of time and energy that has been put to this task has been enormous, I would like to pass my sincere gratitude and appreciation to all those who contributed in one way or the other in the development of this manual.

I also wish to thank all our development partners, in particular, John Snow Inc. through the Making Medical Injections Safer (MMIS) Project Program on Appropriate technology in Health (PATH) for the expertise, time and resources they provided in the process of developing this manual. I cannot forget to mention CDC, WHO and others who contributed immensely towards this exercise.

Finally, I call upon all the stakeholders to make good use of the manual in our endeavour to meet the goal of improving the overall management of health care waste within the health care facilities in this country.

Mr. Kepha Ombacho,

Chief Public Health Officer,

Ministry of Public Health and Sanitation

Table of Contents

Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
HCW	Health Care Waste
HCWM	Health Care Waste Management
HIV	Human Immunodeficiency Virus
JSI	John Snow, Incorporated
MMIS	Making Medical Injections Safer (Project)
MOH	Ministry of Health
NEMA	National Environment Management Authority
PATH	Program for Appropriate Technology in Health
PEP	Post Exposure Prophylaxis
PPE	Personal Protective Equipment
WDU	Waste Disposal Unit
WHO	World Health Organization

Preface

The government has seen the need to protect waste handlers, health care workers, and the community from the dangers presented by health care waste. This manual has therefore been written to aid health care waste handlers—specifically incinerator operators—in the safety and efficiency of their duties. It is designed for use during day-to-day operation and while carrying out routine maintenance.

This Incinerator Operator Manual provides guidelines and explanations on the use of incinerators for operators. It describes the components of the small scale DeMontfort incinerator, the tasks and decisions facing the operator, the procedures for loading and burning the waste, and the requirements for record keeping. It also stresses best practices to ensure the safety of operators, other personnel, and the community at large, and to minimize emissions from the incinerator that are harmful to the environment. This manual will also be useful for health facility managers and supervisors of health care waste management (HCWM), and may be used as part of the training resource material for HCWM.

How to Use the Manual

The manual is divided into five chapters that cover introduction to health care waste, safety of the operator, incineration process, maintenance, and recording. The material contained in this manual is primarily focused on what the operator should do to perform his tasks.

Section 1 briefly introduces health care waste (HCW) including classes of HCW and handling and segregation of waste.

Section 2 briefly covers the basics of an incinerator—its various parts, components, and how it functions.

Section 3 covers various aspects of occupational health, safety, and security at the incinerator site including personal protective equipment, safety measures, and what to do in case of a needlestick injury. It also touches on emergency response protocol in case of accidental spillage of infectious waste and security at the WDS.

Section 4 covers incinerator operation including responsibilities of the incinerator operator and the incineration process (preparation for incineration, cleaning the incinerator, receiving the waste, lighting and warming up the incinerator, loading the incinerator with waste, attending to the burning of waste, and the burn down/cool down process).

Section 5 discusses maintenance of the incinerator including daily, weekly, monthly, and annual maintenance.

Section 6 briefly covers the importance of recording, types of recording tools, recording and reporting accidents, and the recording responsibilities of the operator.

Additional material is presented with the following symbols:

Boxed text indicates important additional information that is useful to remember

! This is used next to cautionary information

1.0 Introduction to Health Care Waste (HCW)

This chapter defines health care waste, explains the importance of proper waste disposal, and describes the categories of waste. It also lists the steps involved in waste management.

1.1 Definition of HCW

According to the World Health Organization (WHO), HCW is the total waste stream from a healthcare or research facility and includes both potential-risk waste and non-risk waste materials. The National Environmental Management Authority (NEMA) defines biomedical waste as "any waste which is generated during the diagnosis, treatment or immunization of human beings." The term "health care waste" is used interchangeably with "biomedical waste," "clinical waste," and "hospital waste."

1.2 Importance of proper HCW disposal

Proper health care waste disposal reduces the spread of bloodborne infections such as Hepatitis B, Hepatitis C, and HIV. It also reduces the risk of accidental injury to health care workers, patients, and the community.

1.3 Categories of HCW

The categories of HCW are:

- **Infectious waste:** This waste has been in contact with human blood or bodily fluid and has the ability to spread disease. Examples include gauze, cotton, dressings, and gloves.
- **Highly infectious waste (pathological):** Examples include laboratory cultures, IV fluid lines, anatomical waste and placentas, specimen containers, and blood containers.
- **Sharps waste:** This waste has the potential to puncture the skin and cause injury. Examples include needles, infusion sets, scalpels, knives, blades, lancets, and broken glass.
- **Non-infectious waste:** This is general waste that presents no risk to persons that may handle it. Examples include paper, packaging materials, office supplies, drink containers, hand towels, cartons, unbroken glass, plastic bottles, and food remains.
- **Chemical and pharmaceutical waste:** This waste includes drugs and related waste.
- **Radioactive waste:** See Annex 1for the NEMA categories of waste.

1.4 Use of color coding to Segregate HCW

Health care waste should be segregated according to the color codes recommended by the Ministry of Health and the National Environmental Management Authority (NEMA) as shown in Figure 1 below.

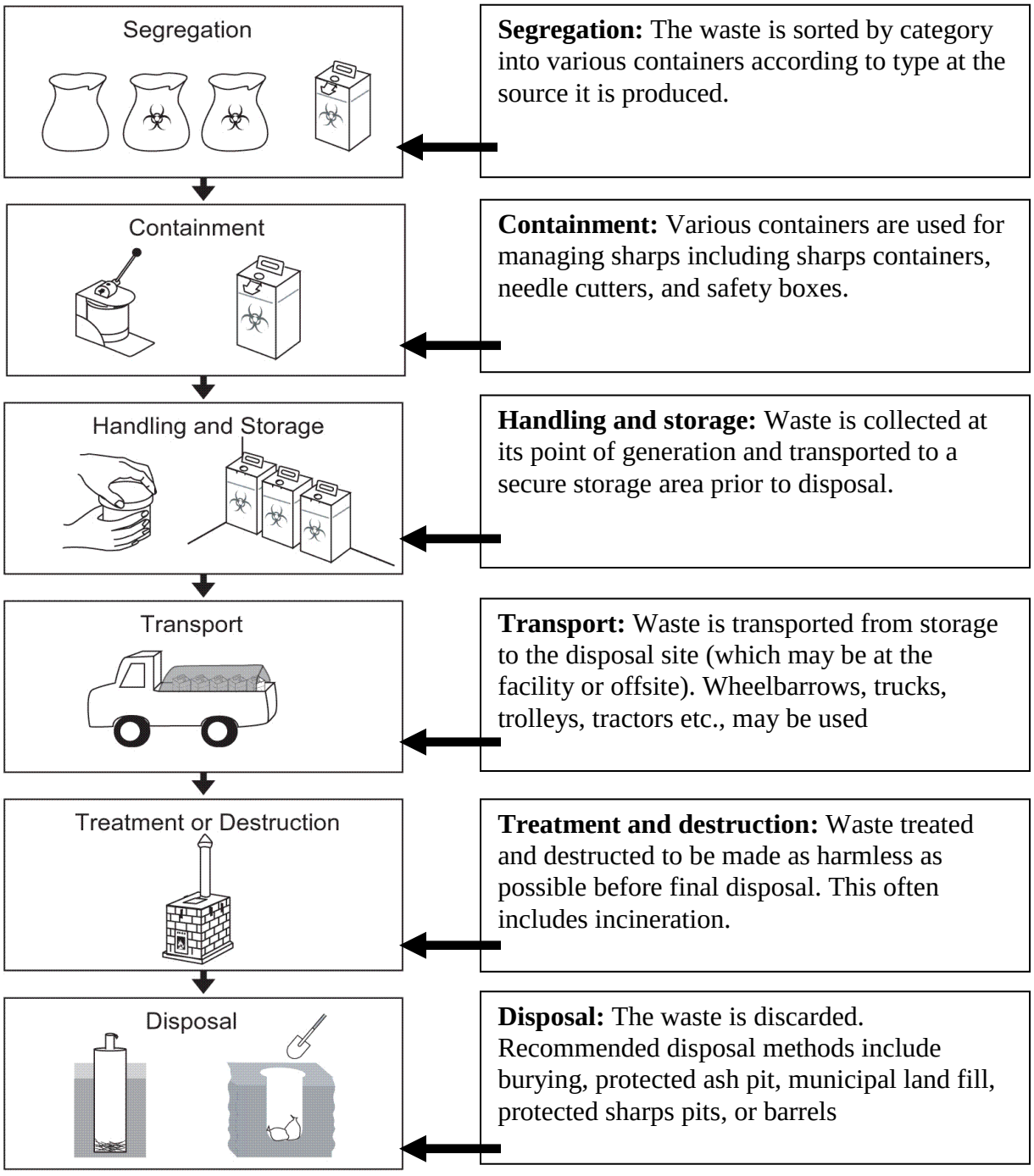
Figure 1: Color-Coding for Health Care Waste

Some facilities may have additional categories with different colors for waste such as food remains, plastics, etc.

1.5 Key Steps in Health Care Waste Management

Figure 2 provides a detailed description of the key steps involved in the management of HCW from the point of generation up to disposal.

Figure 2: Steps in Health Care Waste Management



2.0 Incineration

Incineration is one method of treatment of HCW—by high-temperature burning—prior to final disposal. It reduces the volume of the waste and eliminates pathogens. It is more efficient than open-air burning, and is preferable if a good quality incinerator is available with a well-trained operator.

2.1 What is an incinerator?

An incinerator is an enclosed structure used for burning and reducing the volume of waste under controlled temperatures of over 600°C. Types include diesel-powered and small-scale incinerators. This manual is designed to support the use of small-scale incinerators. De Montfort and Waste Disposal Units (WDU) are types of small-scale incinerators.

2.2 The parts of an incinerator (DeMontfort)

This type of incinerator is made of firebricks and pre-fabricated metal components which can either be manufactured locally or imported. The structure is assembled and built at the site using refractory cement to bond the firebricks and ordinary Portland cement for other works. No specialized tools are required. The incinerators comprises of two combustion chambers.

2.2.1 Primary chamber

The burning zone of the primary chamber is accessible through a door at the front of the incinerator. The door lets air in and allows the operator to light the fire and remove the ash. The health care waste is dropped in through a loading door above the primary chamber.

2.2.2 Secondary chamber

The secondary chamber, which is inaccessible to the operator, is separated from the primary chamber by a brick column with an opening at the bottom to induce a cross-draft during operation. Additional air is drawn into the secondary chamber through a small opening in the lower section of the rear wall of the secondary chamber. The air mixes with the partially burnt flue gas from the primary chamber and causes secondary combustion.

2.2.3 Stovepipe/chimney

. A high chimney mounted above the secondary combustion chamber releases the flue gases into the atmosphere. A stovepipe thermocouple mounted at the neck of the chimney indicates the temperature inside the secondary chamber and is a useful guide for the operator as to when to when health care waste should be loaded.

Figure 3: DeMontfort Incinerator

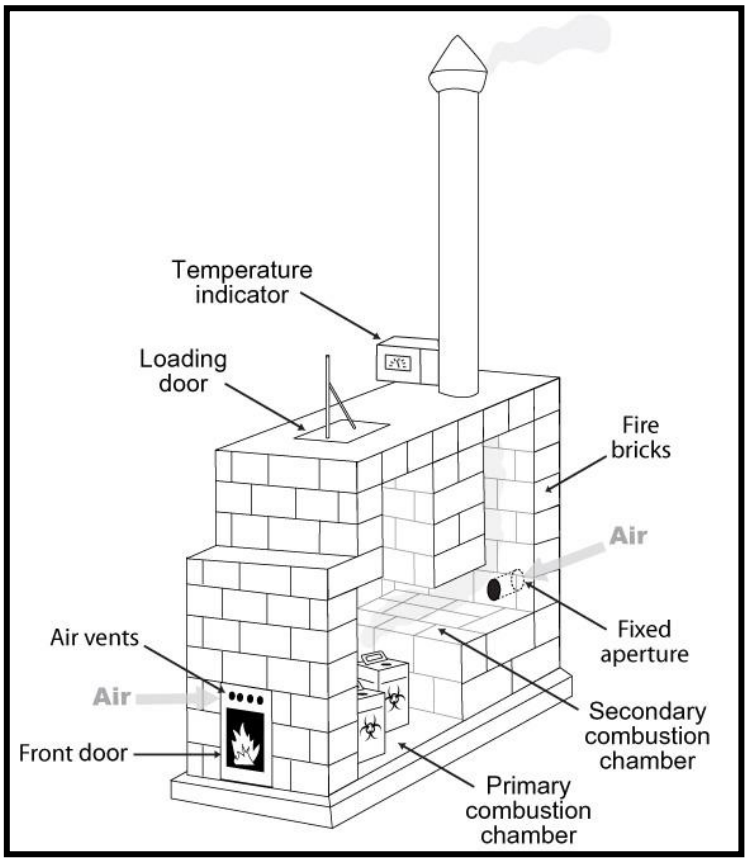


Diagram: courtesy of PATH

2.4 How the DeMontfort incinerator works

The incinerator comprises primary and secondary combustion chambers. The burning zone of the primary chamber is accessible through a door at the front which lets in air and allows the operator to light the fire and remove the ash.

The medical waste is dropped in through a loading door above the primary chamber. The secondary chamber, which is inaccessible to the operator, is separated from the primary chamber by a brick column with an opening at the bottom to induce a cross-draft during operation. Additional air is drawn into the secondary chamber through a small opening in the lower section of the rear wall of the secondary chamber. This air mixes with the partially burnt flue gas from the primary chamber and causes secondary combustion.

A self-adjusting draught control for regulating heat output and burn time is mounted at the base of the chimney and controls the flue gases in the chimney. A stove pipe thermometer mounted at the neck of the chimney indicates when the medical waste should be loaded. A four-meter high

chimney mounted above the secondary combustion chamber releases the flue gases into the atmosphere (Figure 3).

2.5 Components of an optimal waste disposal site

The incinerator is just one of the components of a health care waste disposal site (WDS). The other components are equally useful and should always be provided for at the design and construction stage. These include:

Ash pit – where ash and other residues from the incineration process are disposed off. It is considered the final disposal point of HCW. The ash pit should be lined to prevent contamination of underground water. It should also be covered and secured with a lock to prevent access to unauthorized persons and avoid accidents.

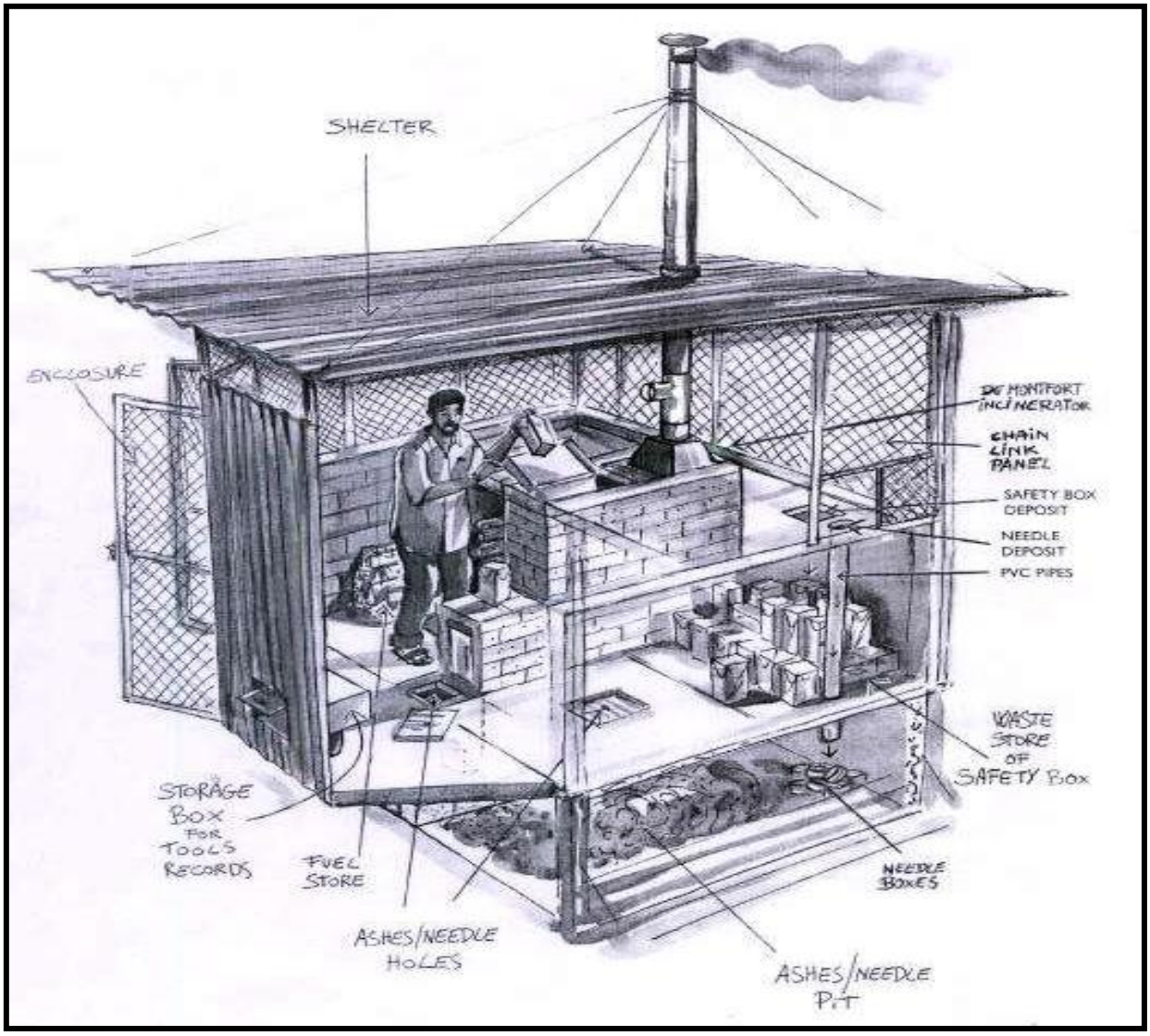
Storage area – storage space should be provided for safety boxes awaiting incineration. The area should be secured to prevent unauthorized access and covered to keep the safety boxes dry. Storage should also be provided for tools, records, personal protective equipment and fuel (both kerosene and firewood).

- **A shelter An enclosure with a lockable door to prevent access by children and unauthorized persons, as well as scavenging animals and birds.**
- to provide protection from the weather, particularly rain, for the incinerator, the operator, and the waste to be incinerated. The shelter should also protect the fuel, the operator's tools, protective clothing, and records.
- A WDU is an example of an ideal waste disposal site (Figure 4).

2.3 Incinerator operator

An incinerator operator is a skilled attendant assigned the duties of ensuring that the waste has been properly burned and the ash properly disposed.

Figure 4: Components of a Waste Disposal Site incorporating the DeMontfort Incinerator



From Guidelines on How to Construct, Use, and Maintain a Waste Disposal Unit; WHO, 2004

3.0 Occupational Health and Safety

This chapter covers various aspects of occupational health, safety, and security at the incinerator site including personal protective equipment, safety measures, and what to do in case of needlestick injury.

3.1 Personal Protective Equipment

The operator should always have adequate personal protective equipment (PPE). This equipment must be worn at all times when working with health care waste. It is also important the equipment is properly maintained and kept clean. The equipment should not be taken home; it must remain at the health facility to avoid possible spread of infection to the community. See Figure 5 for a representation of incinerator operator PPE.

Standard PPE generally includes:

1. **Gloves:** Always wear gloves when handling health care waste.

Puncture-resistant gloves should be used when handling sharps containers or bags with unknown contents. Heat-resistant gloves should be worn when operating the incinerator.

2. **Boots:** Safety boots or leather shoes provide extra protection to the feet from injury by sharps or heavy items that may accidentally fall. Boots must be kept clean.
3. **Overalls:** Overalls should be worn at all times.
4. **Aprons:** Heat-resistant aprons should be worn when operating the incinerator**.**

! Do not use rubber or plastic aprons; they provide a protective, waterproof barrier to the body but are not suitable for incinerating operations

5. **Goggles:** Clear, heat-resistant goggles can protect the eyes from accidental splashes or other injury.
6. **Mouth respirators**
7. **Helmet:** Helmets protect the head from injury and should be worn at all times during the incineration process.

3.2 Health worker safety measures

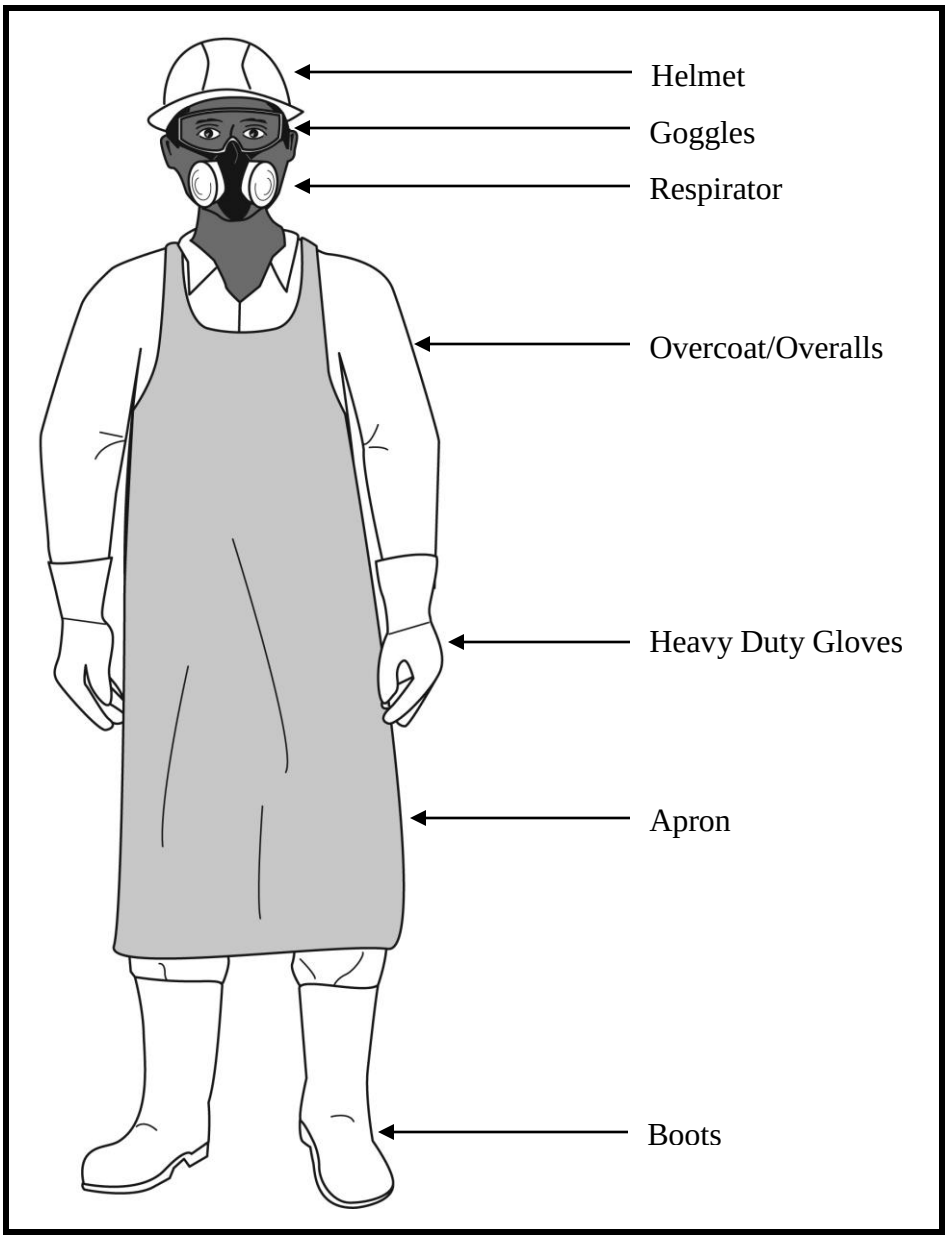
3.2.1 Hand hygiene

Having clean hands, along with the hand washing accessories to ensure clean hands, is one of the oldest, most well known methods of preventing disease transmission. Incinerator operators should always clean their hands after handling the.

3.2.2 Medical examinations

The incinerator operator should be medically examined prior to initial employment and undergo regular medical examinations every 6 months. The operator should also be immunized for Tetanus and Hepatitis B

Figure 5: Personal Protective Equipment for Incinerator Operators



3.2.3 What to do in the case of a needlestick injury[1]

The operator should always:

1. Allow the wound to bleed for a few seconds.
2. Wash the injury and any exposed skin with soap and water.
3. Use antiseptic to clean the wound.

[1] Adapted from: WHO information sheet on Post Exposure Prophylaxis for administrators. (Available at www.who.int/hiv/topics/prophylaxis/en/index.html) and the WHO Injection Safety Tool Kit

4. Immediately report the injury to their supervisor.
5. Go to the appropriate source to receive Post-Exposure Prophylactic treatment.

The supervisor should always:

1. Refer the exposed health care worker or operator for further medical attention.
2. Investigate the incident, identify, and implement remedial action to prevent similar incidents in the future.
3. Ensure that all records of injury are kept confidential.

3.3 Emergency response

3.3.1 Fire safety

Proper fire safety equipment should be provided at the incinerator site. Types of safety equipment recommended include standard fire extinguishers, sand buckets, and water. The operator should read and understand the procedures on the fire extinguisher and use them in the event of a fire. Flammable material should be safely stored away from the incinerator. A protective cover should be present at the spigot (lower part of chimney) to protect the operator from burns from the high heat generated at this point. Operators should secure the fire chamber door and waste loading door so they do not accidentally open and allow the fire to spew out.

! No smoking, no eating, and no drinking is allowed at the WDS

3.3.2 Steps to follow in case of accidental spillage of infectious waste

1. Determine the nature of the spill.
2. Limit the spread of the spill.
3. Secure the area to prevent exposure of additional individuals.
4. Provide first aid and medical care to injured individuals.
5. Decontaminate the eyes and skin of exposed personnel immediately.
6. Report the spill to the designated person (usually the Waste Management Officer), who should coordinate the necessary actions.
7. Provide adequate protective clothing to personnel involved in cleaning up.
8. Neutralize or disinfect the spilled or contaminated material if indicated.
9. Collect all spilled and contaminated material. Sharps should never be picked up by hand; brushes and pans or other suitable tools should be used.
10. Decontaminate or disinfect the area, wiping up with an absorbent cloth. Rinse the area and wipe dry with absorbent cloth. The type of disinfectant recommended is Sodium Hypochlorite (Jik). The Jik should be diluted using the following formula: (available strength/desired strength) – 1
    - Decontaminate or disinfect any tools that were used.

- Spilled material and disposable contaminated items used for cleaning should be placed in the appropriate waste bags or containers.
- Remove protective clothing and decontaminate or disinfect it if necessary.
- Seek medical attention if exposure to hazardous material has occurred during the operation.

Remember, to reduce risk:

- Wash hands after working with waste or infected material.
- Handle all waste with care to minimize needlestick injury.
- Do not sort waste or open waste containers to sort waste.
- Know the procedures for treatment of injuries and cleaning of contaminated areas.
- Report sharps injuries to the appropriate personnel.
- Injuries should be followed up by PEP.
- Anyone handling sharps should be vaccinated with a full course of vaccination to provide protection from the hepatitis B virus and tetanus.

3.3.3 Security at the waste disposal site

1. Entry to the WDS site should be restricted.
2. Keep the incinerator site locked at all times.
3. Do not allow unauthorized persons to enter the incinerator area during periods of incineration.
4. Immediately report any vandalism, theft, or unauthorized entry to the waste-management supervisor.

4.0 Incinerator Operation

This chapter describes the steps to be followed when incinerating waste. It also contains cautions to be taken during the procedure.

4.1 Roles and responsibilities of the incinerator operator

4.1.1 Responsibilities of the incinerator operator

The incinerator operator should:

1. Follow the incinerator operations procedure.
2. Use protective equipment when handling waste.
3. Ensure an adequate supply of fuel is available.
4. Record the weight and type of waste received.
5. Follow the regular maintenance schedule for incinerator.

4.1.2 Responsibilities of the supervisor

The supervisor should:

1. Provide monthly supervision to incinerator operators using the supervisor's checklist (Annex 3).
2. Ensure that there is adequate equipment, tools, and fuel for the incineration process.
3. Allocate duties and schedules for incineration to the operators.
4. Ensure that waste and ash is disposed of properly.
5. Ensure relevant records are up to date.

4.2 The incineration process

Step 1: Prepare for incineration

Conditions for incinerating waste

Operate the incinerator only when:

- Enough safety boxes and waste have been deposited.
- The wind is not blowing towards the health facility or other buildings near the incinerator.
- No large groups of people are present in the immediate area.

Start up

Prior to start-up:

- Make sure that there is adequate fuel (wood, coconut shells or other combustible agro waste, and kerosene) available at the incinerator.
- Make sure that the health care waste stored in the incinerator is dry. If it is wet, place it in a well-ventilated spot inside the WDS to dry.

Types of waste not for incineration include:

- Mercury thermometers
- Batteries
- X-ray or photographic materials
- Aerosol cans or gas containers, PVC plastics (this includes blood bags and IV lines), non-combustible waste
- Glass vials which can explode if uncapped (they also melt and could block the incinerator grate)

- Ensure that all tools and equipment are in working order
- Wear personal protective equipment (gloves, goggles, overalls, and masks).

Step 2: Clean the incinerator

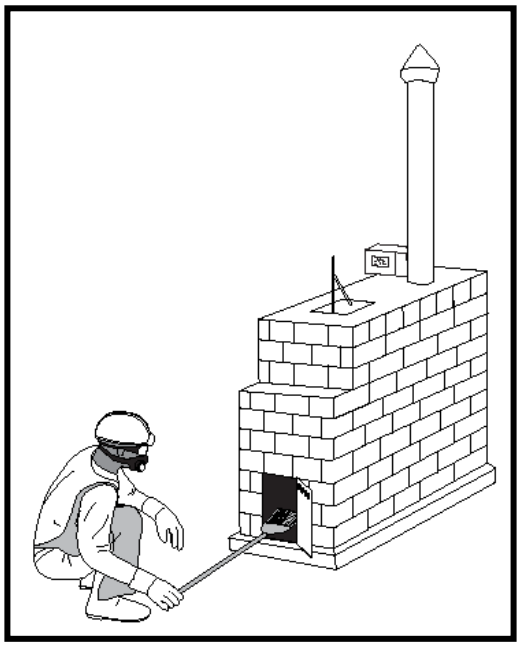
When cleaning the incinerator

- Remove the ash from the incinerator (See Figure 6)
- Empty the ash into the ash residue pit. Be sure to wipe the ashtray off any residue ash with a brush.
- After cleaning, return the ashtray back into the incinerator.
- Clean the lower inside of the incinerator with a brush and dustpan.

During incinerator cleaning

- Wear gloves and a facemask when removing the ash.
- Rake the ash and other noncombustible waste directly into the ash pit.
- Replace the trap door of the ash pit to avoid accidents.
- From time-to-time, distribute the ash evenly within the pit.

Figure 6: Removing the Ash



Step 3: Receive the waste

- Inspect the waste and ensure that is properly packaged (i.e., categories of health care waste in appropriate waste bags).
- Weigh or count the waste bags and count the safety boxes. Record these quantities in the Waste-Disposal Record (see Annex 2).
- Store the waste temporarily in the designated storage area and always store the safety boxes upright.
- Report any problems to the supervisor.

Figure 7: Receiving Waste

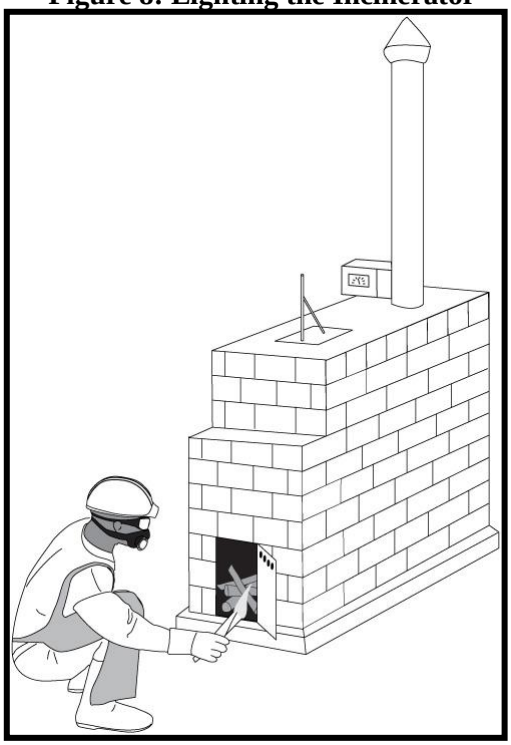
! DO NOT OPEN THE LINER BAGS OR SORT THROUGH THE WASTE

Step 4: Light and warm up the incinerator

Light the incinerator

- Open the ash door wide, keep the loading door closed.
- Place firewood or other readily combustible materials on the grate.
- Pour a small quantity of kerosene (app ½ litre) over the materials if necessary.
- Light the fire through the ash door (See Fig. 8).
- Avoid looking directly into the grate when lighting the fire in case any explosive or volatile gas remains in the primary combustion chamber.
- Use a taper of burning paper rather than a match or cigarette lighter.
- After steady burn is achieved (approximately 5 minutes), add more combustible material (not health care waste) to the burning fire through the ash door.
- Repeat this procedure until the temperature gauge displays a temperature of at least 600°C and then close the ash door.

Figure 8: Lighting the Incinerator



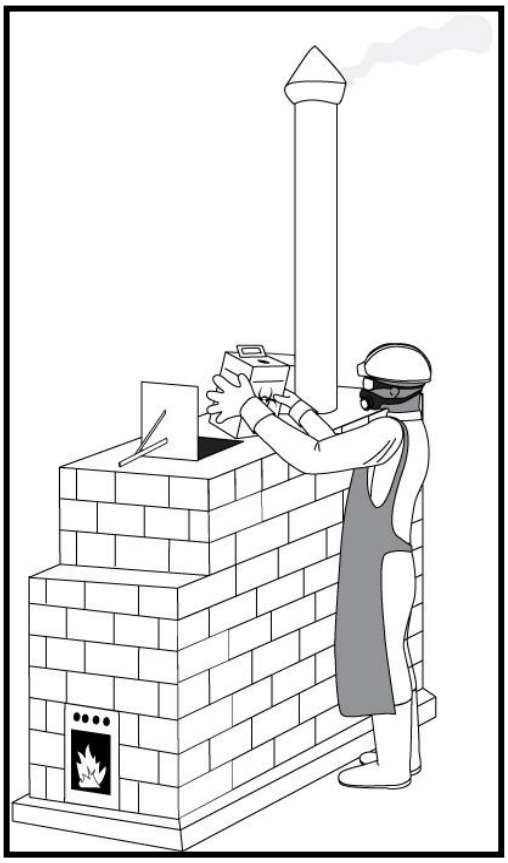
- Observe the temperature gauge mounted on the chimney until the temperature stabilizes. (Refer to the visual guide instructions below if you have no temperature gauge.)

! NEVER use petrol or diesel to light the fire

Step 5: Load and burn the waste

- Attend to the incinerator at all times during the loading and burning process.
- Open the loading door (see Fig. 9)
- Load the waste – one safety box at a time
- Close the loading door.
- Load safety boxes (or wood, coconut husks, etc.) when the temperature drops below 600°C;
- Load health-care waste when the temperature is above 600°C;
- Do not load very wet safety boxes or bags of waste.
- Place them in a dry, well-ventilated, warm place to dry.
- Burn safety boxes and bags of non-sharps waste alternately if both types of waste are available.
- Ensure complete combustion of the waste by use of a poker to continuously agitate the fire when necessary.

Figure 9: Loading the Waste



Visual guide to judging temperature:

- If a good strong flame is visible through the secondary air hole, the temperature should be more than 600°C at this point.
- If the smoke is dense white, grey, or black, poor combustion is occurring because the temperature is below 600°C.
- If the temperature is too high, the chimney glows red.
- As a rule: Burn safety boxes in order to increase temperatures in the incinerator; burn bags of other waste in order to reduce temperatures in the incinerator.

Step 6: Burn down/cool down

- To end the burning process, load a safety box and allow it to burn completely.
- After 10 minutes, add wood and allow it to burn completely.
- Do not leave the incinerator until the temperature on the gauge falls below 400°C or the flames have completely burnt down.

- Let the incinerator cool down overnight after use.
- Remove the ash the next morning.

5.0 Maintenance

As with any type of equipment, there is a need to perform regular maintenance to ensure that the incinerator will continue to work properly and to prolong its life span. Each step of the incineration process should have an inspection/maintenance checklist.

5.1 Daily maintenance

The incinerator operator should inspect the incinerator daily and do the following:

- Check for evidence of cracks on the brickwork.
- Perform simple repairs but avoid makeshift solutions.
- Keep the area clean and disinfected.
- Carefully sweep the area around the incinerator to ensure that all the needles and noncombustible waste are placed in the ash pit.
- Clean tools and equipment.
- Store safety boxes and other health care waste in an orderly manner in the incinerator waste store.
- Maintain fuel stock levels for the incinerator (kerosene, wood etc).
- Keep tools, records, and protective clothing in the storage room or box provided at the WDS.
- Immediately report to the waste-management supervisor any damage to the incinerator that affects operation or performance.

5.2 Weekly maintenance

- Clean the chimney and remove the soot.
- Remove lumps of melted glass/plastics and clean grates (to improve aeration).
- Clean the filters/jets (for diesel operated incinerators).
- Properly install the grates.
- Maintain good housekeeping of the WDS by clearing the grass around the incinerator.

5.3 Monthly maintenance

- Ensure the fence of the WDS site is intact.
- Check the vertical fixings of the chimney and the support plate for corrosion and reset or repair any holes or weak points.
- Check the top sand seals and top up with fresh sand.

- Check the external brickwork for evidence of thermal damage to the bricks.
- Check the cement seal to brickwork. If there is missing cement, reseal with refractory cement.
- Check the ash door for corrosion, damaged hinges, and latch blockage in the doorframe and repair and clean as necessary.
- Take an inventory of the condition of tools and equipment and replace or repair as necessary.

Monthly maintenance does not indicate maintenance the end of each month but rather signifies the issue requires attention at least once during the month.

5.4 Yearly maintenance

- Inspect and replace metal parts, bricks and consumable parts where necessary.
- Inspect and replace stay wire/guy ropes to anchor the chimney where necessary.
- Overhaul the incinerator or its components where necessary.
- Check the status of the ash pit. Empty it when full or decommission it.
- Perform annual audit/inspection of all the components and equipment.
- Report when incinerator is no longer effective and/or the ash pit(s) is (are) full, and take appropriate action.

6.0 Record Keeping

This chapter briefly covers the importance of recording, types of recording tools, recording and reporting accidents, and the responsibility of the operator in recording.

6.1 Importance of records

Records help to plan for events and expansion; budget for the incineration, monitoring, and evaluation of the incineration process; and for organizing waste audits.

6.2 Records

The following records/tracking document will be kept:

1. Waste Incineration Log (Annex 2). This documents the amount of waste incinerated and events (i.e., failure of equipment, accidents/injuries) and records visitors.
2. Supervisor's checklist.
3. Additional records as required.

6.3 Recording and reporting accidents

Accidents, including near-misses, spillages, damaged containers, inappropriate segregation, and any incidents involving sharps should be reported to the immediate supervisor or to another responsible person. The report should include details of:

- The nature of the accident or incident.
- The place and time of the accident or incident.
- The staff who were directly involved.
- Any other relevant circumstances.

6.4 Responsibility of the operator in recording

The operator is responsible for maintaining the records and to ensure that these records are always available for inspection at the site.

6.5 Responsibility of the supervisor in recording

The supervisor is responsible for ensuring the records are maintained correctly. The supervisor should also ensure that he/she duly fills in the supervision checklists as required.

Annex 1: Categories and Color-Coding of Health Care Waste

The table below is adapted from the Eighth Schedule of the Environmental Management and Coordination (Waste Management) Regulations, 2006, and indicates the categorization of health care waste as per WHO classification.

Type of Waste	Color and Markings	Type of Container
Infectious	Yellow	Strong leak-proof plastic bag or bin with biohazard symbol.
Pathological	Red	Strong leak-proof plastic bag or bin with biohazard symbol.
Sharps	Yellow (marked sharps)	Puncture proof containers.
Chemical and pharmaceutical	Brown	Plastic bag or container.
Noninfectious/non-hazardous (non-clinical)	Black	Plastic bag or container.
Radioactive waste		Lead box, labeled with radioactive symbol.

Source: Adapted from Regulation 39, Eighth Schedule, Waste Management Regulations, 2006

NB: Infectious, pathological, and sharp waste should also be marked with the international biohazard symbol shown below.

Annex 2: Waste Incineration Log

Record for waste incinerated							
Health facility: ***Langata***			Month/Year: ***November 2008***				
Type of incinerator: ***De Montfort***			Name of incinerator operator: ***John Hussein***				
Date	Sharps (No.)	Nonin-fectious waste (kg or no.)	Infec-tious waste (kg, or no.)	Amount of fuel used		Duration	
				Fuel	Qty.	Start	Finish
02/09/08	***4***	***22***	***15***	***Kerosene, wood***	***1 lt 5 kg***	***10:05 am***	***2:20 pm***
04/09/08	***2***	***25***	***17***	***Kerosene, wood***	***1 lt 5 kg***	***9:30 am***	***1:50 pm***
TOTAL							
Waste problems or accidents:							
Equipment problems:							
Comments:							

NB: To be totaled monthly

Annex 3: Supervision Checklist

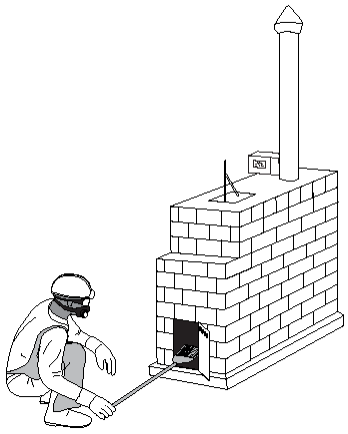
Health facility:		Date:		
Type of incinerator:				
	Activity	**Yes**	**No**	**Remarks**
A	**Safety**			
1	Is there adequate personal protective equipment (PPE)?			
2	Is the PPE being used?			
3	Is the PPE in good condition?			
4	Is there restricted entry to the waste disposal site?			
5	Is there functional fire safety equipment?			
6	Do the operators know how to use the equipment?			
7	Is there adequate first aid kit?			
8	Are the operators conversant with use of the kit?			
9	Is flammable material stored away from the incinerator?			
10	Are the operators medical examined?			
11	Are they immunized against hepatitis B?			
12	Are they immunized against tetanus?			
13	Is there adequate water at the WDS?			
14	Are warning signs distinctly displayed?			
Additional comments on safety:				
B	**Operation**			
	Activity	**Yes**	**No**	**Remarks**
1	Is there a sufficient supply of fuel wood?			
2	Is the procedure for preparation for incineration being followed?			
3	Is the incinerator clean?			
4	Is the waste weighed upon reception?			
5	Is the waste temporarily stored neatly?			
6	Is the loading of the incinerator done in the right way?			
7	Is the temperature regulated adequately during the burn?			
8	Is the incinerator allowed to burn down and cool before being cleaned?			
9	Is the ash properly disposed into the ash pit?			

10	Are the following tools and equipment available?			
a.	Ash rakes			
b.	Shovel			
c.	Hand brush/dustpan			
d.	Hard broom			
e.	Wheel barrow			
f.	Chimney cleaning brush and cord			
g.	Weighing scales			
h.	Sand bucket			
i.	Fire retardant gloves			
j.	Eye protection/face mask			
k.	Overalls or suitable clothing to cover the upper body, including the lower arms			
l.	Safety first aid kit			
Additional comments on operation:				
C	**Maintenance**			
	Activity	**Yes**	**No**	**Remarks**
1	Is there evidence of cracks?			
2	Is there general good housekeeping?			
3	Is the status of the ash pit good?			
Additional comments on maintenance:				
D	**Records**			
	Activity	**Yes**	**No**	**Remarks**
1	Are the relevant forms available?			
2	Are the forms filled accurately and completely?			
3	Are needle pricks and other accidents recorded?			
4	Are reports of the waste incinerated done on time?			
Additional comments on records:				

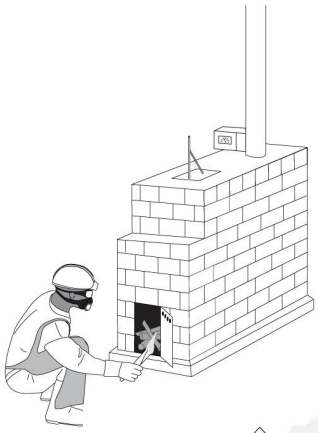
Name of supervisor:	Signature:	Designation:

Annex 4: Job Aid— Incinerator Operator Guidelines

1. **Wear personal protective equipment—helmet, goggles, respirator, overcoat/overalls, heavy duty gloves, apron, and boots.**
2. **Ensure fuel is available for operating the incinerator and that the waste to be incinerated is dry.**
3. **Record the number of safety boxes and bags to be burned.**



4. **Clean the incinerator.**
   - Remove the ash and deposit it safely in the ash pit.
   - Place the grate/tray back in the incinerator.
5. **Preheat the incinerator.**
   - Place firewood or other material in the incinerator.
   - Light the wood or other material.
   - After 5 minutes of a steady burn, add more wood.
   - Continue this process every 5 minutes for 20 minutes total (4 cycles).

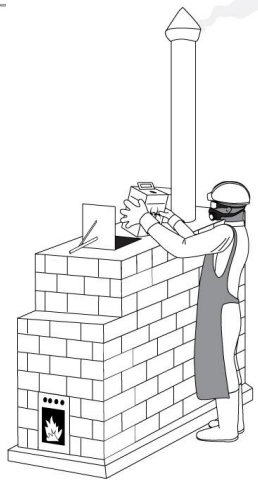


6. **Load and burn the waste.**
   - Load 1 safety box every 8–10 minutes.
   - Alternate loading bags of waste with loading safety boxes.
   - If the temperature drops, load combustable material such as paper.

     ! If you see smoke the temperature is too low

   - If the temperature gets too high, add a bag of waste.

     ! If you see fire in the chimney the temperature is too high



7. **Burn down the waste.**
   - Load the last safety box.
   - Wait 10 minutes and add firewood to maintain the fire and ensure the waste is completely burned. This may take up to 30 minutes.
   - When the waste is completely burned, allow the fire to die out.
   - Do not leave the incinerator until the fire has burned down to embers.

Annex 5: Job Aid—Incinerator Maintenance Checklist

Daily Maintenance

- ✓ Check for evidence of cracks on the brickwork.
- ✓ Perform simple repairs but avoid makeshift solutions.
- ✓ Keep the area clean and disinfected.
- ✓ Carefully sweep the area around the incinerator.
- ✓ Clean tools and equipment.
- ✓ Store safety boxes and other health care waste in an orderly manner.
- ✓ Maintain fuel stock levels.

Weekly Maintenance

- ✓ Clean the chimney and remove the soot.
- ✓ Remove lumps of melted glass/plastics and clean grates.
- ✓ Properly reinstall the grates after cleaning.
- ✓ Maintain good housekeeping of the waste disposal site.
- ✓ Ensure the fencing to the WDS is intact.
- ✓ Check the cement seal to brickwork.

Monthly Maintenance Checklist

- ✓ Ensure the fence of the WDS site is intact.
- ✓ Check the vertical fixings of the chimney.
- ✓ Check the top sand seals.
- ✓ Check the external brickwork for evidence of thermal damage.
- ✓ Check the cement seal to brickwork.
- ✓ Check the ash door for corrosion.
- ✓ Check the ash door for damaged hinges.
- ✓ Check the ash door for latch blockage in the doorframe.
- ✓ Take an inventory of condition of tools and equipment.

Yearly Maintenance Checklist

- ✓ Inspect and replace metal parts, bricks and consumable parts.
- ✓ Inspect and replace stay wire/guy ropes.
- ✓ Overhaul the incinerator.
- ✓ Check the status of the ash pit.
- ✓ Perform annual audit.
- ✓ Ensure environmental audits and licenses are obtained.

Further Reading

1. JSI/MMIS, MOH-ROK "DO NO HARM": Injection Safety in the Context of Infection Prevention and Control; Trainers of Trainers Facilitation Guide. JSI-MMIS, 2006
2. JSI/MMIS, MOH-ROK "DO NO HARM": Injection Safety in the Context of Infection Prevention and Control; Participants' Handbook. JSI-MMIS, October, 2006
3. Pruess, A.E, Giroult, P. Rushbrook, editors, Safe Management of waste from health care activities, WHO, Geneva, Switzerland, 1999.
4. Republic of Kenya, Environmental Management and Coordination Act 1999, Waste Management Regulations, 2006 (NEMA)
5. World Health Organization (WHO) "Managing Health care Waste Disposal: Guidelines on How to construct, Use and Maintain a Waste Disposal Unit. WHO, February 2005.
6. World Health Organization (WHO) Management of Solid Health Care Waste at Primary Health Centres, A Decision-Making Guide, WHO, Geneva 2005
7. World Health Organization (WHO) Operator's Manual, How to use the waste disposal unit (incorporating the De Montfort incinerator). WHO February 2005

Websites

1. www.healthcarewaste.org
2. www.who.int/healthcarewaste
3. www.path.org