Republic of Zambia

MINISTRY OF HEALTH

NATIONAL HEALTH-CARE WASTE MANAGEMENT PLAN
2019 – 2024

Revised November, 2019
Foreword

This document has been developed as a guide to all institutions producing Health Care Waste in planning and Implementation of Interventions that will reduce mismanagement of hazardous waste in Zambia.

The National Health-Care Waste Management Plan for 2019 to 2024 provides an overview of the situation analysis the proposed activities and the health care facility waste generating processes in Zambia. It presents options for minimizing health-care Waste generation through source reduction. The hazardous wastes generated by health care facilities are a challenge in Zambia as handling, storage, transportation and final disposal leaves much to be desired.

There is need for concerted efforts to involve the local Authority and Zambia Environmental Management Agency (ZEMA) in the management of Health Care Waste in Zambia. This will enhance waste reduction, recycling, transportation and adequate final disposal of Health Care Waste. The Ministry of Health and other stakeholders should put Health Care Waste Management (HWCM) as a priority to safe guard the staff and community from infections, injuries and ill health arising from poor Health Care Waste Management. This document is a resource for planning, implementing and monitoring Health Care Waste in Zambia.

Dr. Kennedy Malama
Permanent Secretary (TS)
MINISTRY OF HEALTH
Acknowledgements

This Document is a product of many individuals and stakeholders whose contributions have provided the technical, financial and material support that made it possible to come up with the National Health Care Waste Management Plan for 2019 to 2024.

Ministry of Health is grateful to the World Bank for its commitment and financial support towards the review of this document. The Ministry further wishes to acknowledge the technical contributions from the Zambia Environment Management Agency (ZEMA), the University of Zambia School of Medicine, Zambia National Public Health Institute (ZNPHI), Health Professionals Council of Zambia (HPCZ), Ministry of Local Government, Lusaka City Council and ZITHA Consulting.

I am grateful to the technical and editorial team for their time, commitment and experience contributed to this important document. These took time to review and edit this document therefore, individuals and institutions are hereby commended.

Dr. Abel N. Kabalo
Director - Health Promotion Environment and Social Determinants
MINISTRY OF HEALTH
TABLE OF CONTENT

Foreword .................................................................................................................................................. 1
Acknowledgements .................................................................................................................................... 2
List of Tables ............................................................................................................................................. 7
List of Figures ........................................................................................................................................... 7
Abbreviations / Acronyms ......................................................................................................................... 8
Definition of Terms .................................................................................................................................. 9
Executive Summary .................................................................................................................................... 10

BACKGROUND INFORMATION .............................................................................................................. 11

1.0. Introduction ...................................................................................................................................... 11

1.1 Vision, Mission and Objectives ........................................................................................................... 13
1.2 Classification of HCW .......................................................................................................................... 14
1.3. Non-risk HCW ...................................................................................................................................... 15
1.4 Biomedical and health-care waste requiring special attention ............................................................. 15
1.5 Infectious waste .................................................................................................................................... 17
1.6 Other hazardous waste .......................................................................................................................... 18
1.6.1 Radioactive HCW .............................................................................................................................. 19
1.6.2. Veterinary Health Care Waste ......................................................................................................... 19

CHAPTER TWO .......................................................................................................................................... 21

SITUATION ANALYSIS .............................................................................................................................. 21

2.1. Introduction ....................................................................................................................................... 21
2.2.1 Management of Healthcare Waste ................................................................................................... 21
2.3. Legal and Regulatory Framework ...................................................................................................... 23
2.3.1. The Public Health Act, Cap 295 of 1995 ......................................................................................... 23
2.3.2. The Environmental Management Act No. 12 of 2011 ................................................................. 24
2.3.3. Environmental Management (licensing) Regulation (Statutory Instruments No. 112 of 2013) ......................... 24

a) Infectious substances .............................................................................................................................. 24
b) Toxic (Delayed or chronic) .................................................................................................................. 24

2.3.4. Medicines and Allied Substances Act No. 3 of 2013 ................................................................. 25

2.3.5. Ionizing Radiation Protection Act No. 16 of 2005 as amended by Act No.19 of 2011. 25

2.3.6. Local Government Act No 2 of 2019 ......................................................................................... 25

2.3.8. National Strategic Plan for Infection Prevention and Control .................................................. 26

2.3.9. International Conventions ........................................................................................................ 26

2.3.10. Local surveys on HCWM practices ......................................................................................... 27

2.3.10.1. Auditor General’s Report Findings ....................................................................................... 27

2.3.10.2. MoH Baseline Survey on HCWM Practices ........................................................................ 28

CHAPTER THREE ....................................................................................................................................... 32

FRAMEWORK FOR STRENGTHENING HEALTH CARE WASTE MANAGEMENT .......... 32

3.1. Introduction ........................................................................................................................................ 32

3.2. Strengthening the institutional capacities for HCWM ................................................................. 32

3.3. National WASH in Health Facilities ............................................................................................ 33

3.3.1 Composition ............................................................................................................................... 33

3.4. Provincial Health Office ................................................................................................................ 33

3.5. Central and General Hospitals ........................................................................................................ 34

3.6. District Health Office ..................................................................................................................... 34

3.7. First Level/District Hospitals ......................................................................................................... 35

3.8 Health Centers (Urban and Rural) ................................................................................................. 36

3.9 Continuous capacity building and information on health and safety ........................................ 37

3.9.1 Hospital Administrator ............................................................................................................... 37

3.9.2 Departmental Heads .................................................................................................................. 37

3.9.3 Pharmacist in-Charge ................................................................................................................ 37

3.9.4 Radiation Safety Officer or Protection Officer ........................................................................... 38

3.9.5 Laboratory in-Charge ............................................................................................................... 38

3.9.5 Procurement Officer/Department ............................................................................................... 38

3.9.6 Infection Prevention and Control Focal Point Unit (IPCFPU) .................................................. 39

3.10 Standardizing health care delivery and HCWM practices ............................................................ 39

3.10.1 Internal storage.......................................................................................................................... 39
3.10.2. On-site transport

3.10.3. External Transport

3.11 Technologies for treatment and disposal of HCW

3.11.1. Assessment of Waste Parameters for Incineration

3.11.2. Non Incineration Treatment Options

3.12 POTENTIAL RISKS AND MITIGATION MEASURES

3.14 Training strategy for Health Care Personnel

3.14.1. Personnel to be trained

3.14.2. Training Package for HCWM

3.15 INSTITUTIONAL FRAMEWORK ON TRAINING AND CAPACITY BUILDING

CHAPTER FOUR

NATIONAL PLAN OF ACTION

4.1. Introduction

4.2. Strategy for the implementation of the plan

4.3. Setting up financing mechanism for HCWM systems

4.4. HCWM Financing

5. References

6.0. Annexes

Annex 2. Capacity and characteristics for technologies recommended at each level

Annex 3. Biohazard symbols

Annex 4. List of individuals and organisations consulted during HCWM development and validation

Annex 5. Health Care Waste Management Training Plan

Annex 6. Pictures of health care waste equipment

Annex 8. Breakdown of funding for National level

Annex 9. Colour coding guide

Annex 10. Minimum specifications for HCW incinerators

Annex 11. National HCWM policy schedule of development

ANNEX 12: ZAMBIA WASTE MANAGEMENT GUIDANCE FOR EBOLA VIRUS DISEASE (EVD) AND OTHER HIGHLY INFECTIOUS DISEASES
1. Introduction .................................................................................................................. 112
2. Waste Generation ....................................................................................................... 112
3. Waste Storage ............................................................................................................. 113
4. Waste Transportation ................................................................................................. 113
5. Waste treatment and management ........................................................................ 113
   5.1 Solid medical waste ............................................................................................. 114
   5.2 Sharps waste disposal .......................................................................................... 114
   5.3 Biological infectious waste: .................................................................................. 114
   5.4 Infectious excretes: .............................................................................................. 114
   5.5 Mattresses: ........................................................................................................... 114
   5.6 Patient’s clothes: ................................................................................................... 114
   5.7 Reusable medical equipment and PPE (i.e. boots, goggles, aprons, etc.): .......... 115
   5.8 Outreach waste: .................................................................................................... 115
   5.9 Cadaver and corpse burial: .................................................................................... 115
   5.10. Incinerator Selection ......................................................................................... 115
5.10 Combustion ........................................................................................................... 116
6.0 Smoke and Solid Particle Emissions ................................................................. 116
7.0 Final disposal of treated waste .............................................................................. 116
8.0 Training .................................................................................................................... 116
9.0 References ............................................................................................................... 117
List of Tables

- Table 1: Health Service Delivery System In Zambia ........................................... ERROR! BOOKMARK NOT DEFINED.
- Table 2: Estimate Of Waste Generation In Hcf ................................................. ERROR! BOOKMARK NOT DEFINED.
- Table 3: Refers To Categories Of Hcwm ........................................................................ 41
- Table 4: Refers To Incineration Technologies And Related Type Of Waste .................. 45
- Table 5: Hcwm Monitoring And Evaluation Framework ........................................... 51
- Table 6: Monitoring And Evaluation: Monitoring And Evaluation ............................. 59
- Table 7: Risks/Assumptions Analysis And Risk Mitigation Measures For Hcwm .......... 62
- Table 8: Potential Risk And Mitigation Measures .................................................... 65
- Table 9: Summary Of Types Of Treatment And Disposal Methods For Hcw .............. 66
- Table 10: Action Plan Showing Activities, Responsible Unit, Time Frame And Cost ......... 72

List of Figures

- FIGURE 1: CLASSIFICATION OF HCW (WHO, 2002) ......................................................... 15
- FIGURE 2: OPEN PIT WITH MEDICAL WASTE AT A HOSPITAL ............................... 29
- FIGURE 3: MACRO BURN INCINERATOR AT A HOSPITAL ............................................ 30
- FIGURE 4: COMMINGLED WASTE FROM PRIVATE HCF FOR INCINERATION ......... 30
- FIGURE 5: MACRO BURN INCINERATOR AT A HOSPITAL ............................................ 30
- FIGURE 6: DISPOSAL OF PLACENTAS .......................................................................... 31
- FIGURE 7: FINAL DISPOSAL SITE AT A HOSPITAL ..................................................... 31
- FIGURE 8: ORGANOGRAM FOR HCWM .................................................................... 32
Abbreviations / Acronyms

CEHO - G  Chief Environmental Health Officer-General
CBOH  Central Board of Health
CHW  Community Health Worker
CMEO  Chief Medical Equipment Officer
CPs  Cooperating Partners
DC  District Commissioner
DCMO  District Community Medical Officer
DDCC  District Development Coordinating Committee
DDDSC&R–EOH  Deputy Director Diseases Surveillance Control and Research- Environmental Health
ECZ  Environmental Council of Zambia
EVD  Ebola Virus Disease
EMA  Environmental Management Act
EPPCA  Environmental Protection and Pollution Control Act
HBV  Hepatitis B virus
HC  Health Centre
HCF  Health Centre Facility
HCV  Hepatitis C Virus
HCW  Health Care Waste
HCWM  Health Care Waste Management
HIV  Human Immune Deficiency Virus
HMIS  Health Management Information System
HP  Health Post
IAEA  International Atomic Energy Agency
IP  Infection Prevention
LDC  Less Developed Countries
MLGH  Ministry of Local Government and Housing
MLNREP  Ministry of Lands, Natural Resources and Environment Protection
MoH  Ministry of Health
NHC  Neighbourhood Health Committees
NHCWP  National Health Care Waste Plan
PHO  Provincial Health Office
POPs  Persistent Organic Pollutants
PPP  Public Private Partnership
SI  Statutory Instrument
SMS  Senior Medical Superintendent
SOPs  Standard Operating Procedures
TBAs  Traditional Birth Attendants
WB  World Bank
WHO  World Health Organization
ZEMA  Zambia Environmental Management Agency
Definition of Terms

Health facility: Any location where Healthcare is provided, it includes health post, Rural health centre, Urban health centre, Level 1 hospital, Level 2 hospital and Level 3 hospital.

Health Care Waste: Waste generated from pathological and pharmaceutical activities and other solid wastes generated by other healthcare establishments, healthcare research facilities and healthcare laboratories including waste generated in the course of health care undertaken in the home, and presents hazardous characteristics as defined in the Basel Convention on the control of transboundary movement of hazardous waste and their disposal.

Health Worker: A person whose job is to protect and improve the health of the communities. He may provide preventive, curative, promotional or rehabilitative at a health facility.

General Public: Ordinary people in society, rather than people who are considered to be important or who belong to a particular group: who may be directly or indirectly be affected by improper HCWM.

Hazard: A situation that poses a level of threat to life, health, property, or environment arising from improper HCWM.

Risk: A probability or threat of damage, injury, liability, loss, or any other negative occurrence that may result due to exposure to improper HCWM.

Environmental pollution: The introduction of contaminants in natural environment that may cause adverse change and may be unhealthy to live or work in. The contamination could result from improper HCWM.

Safety: The condition of being protected from or unlikely to cause danger, risk, injury, harm and other non-desirable outcomes such as improper HCWM.

Infectious prevention: Infection control is the discipline concerned with preventing nosocomial or healthcare-associated infection, a practical.

Systems: A set of principles or procedures according to which something is done; an organized scheme or method, a set of things working together as parts of a mechanism or an interconnecting network; a complex whole.
**Executive Summary**

The National Health Care Waste Management Plan (HCWMP) describes pertinent Health Care Waste Management (HCWM) issues existing in the country. It gives guidance on HCWM while providing a collection of activities that need to be implemented at all levels of the healthcare system in the Ministry of Health (MoH) and all institutions involved in waste management.

Although several attempts have been made to improve HCWM in some medical institutions in Zambia, this has remained below minimum national and international standards which, has resulted into significant risks to healthcare providers and the public. The hygiene conditions linked to the handling, storage, transportation and disposal of HCW cannot guarantee a satisfactory control on the transmission of nosocomial and hepatitis infections within the Health Care Facilities (HCFs).

This plan is therefore intended for use by health facility staff and it is responsive to the private sector, academic and research institutions in trying to promote sustainable healthcare waste management systems. It further provides guidance in planning, implementation, monitoring and evaluation of activities of HCWM in health facilities through regular assessments and use of indicators.

The overall objective of the plan is to develop a National Health-Care Waste Management Plan (NHCWP) that will mobilize resources and build capacity for reducing health risks in a sustained manner, while at the same time being open to technological options that promote sustainable development.

The budget to implement the HCMP is ...............US$ 35,547,228.55.
CHAPTER ONE

BACKGROUND INFORMATION

1.0. Introduction

The National Health Care Waste Management Plan (NHCWP) for 2019 to 2024 is a roadmap that aims at putting in place a sustainable Health Care Waste Management (HCWM) system in Zambia. The plan recommends safe, efficient, sustainable, affordable and culturally acceptable methods for the treatment and disposal of Health-Care Waste (HCW), both within and outside health-care facilities. The plan is based on the principles of the National Solid Waste Management Strategy (NSWMS) for Zambia (2004); Environmental Management Act (EMA) No. 12 of 2011, Public Health Act Cap 295 (PHA Cap 295), Occupational Health and Safety Act No. 36 of 2010 and Solid Waste Regulation and Management Act No. 20 of 2018.

According to three comprehensive studies on HCWM that were conducted in Zambia by World Bank (2006); Auditor General Office (2009); and Ministry of Health (2013); demonstrated that the country requires well-funded sustainable strategies and safe systems that support the development agenda for appropriate HCWM.

According to the study conducted in Luapula, Muchinga, Northern, North-Western and Western Provinces by Ministry of Health (2019), 63.5% of respondents used closed bins with bin liners whilst 22.1% used closed bins without liners and 7.9% used open containers. Further, 87.6% of respondents disposed of waste within 24 hours and only 11.4% take more than 24 hours to dispose of their waste. Storage of infectious waste in yellow bags accounted for 45.9% of respondents, 14.7% for red bags and 5.6% in black bags. Labelled infectious waste accounted for 3.1% of the study respondents while 7.6% was infectious waste mixed with other hospital waste.

Inadequate health care waste management in health facilities poses direct and indirect health impacts on those working in health facilities, patients, public, surrounding communities and the environment. During the handling of HCW, health providers and general workers can be injured due to improperly stored waste. Sharps are considered as one of the most dangerous category of waste despite comprising a smaller proportion of infectious waste. Unintentional injuries may occur due to exposure of improperly discarded sharps leading to life-threatening infections such as; Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and Human Immune Virus (HIV) (World Bank, 2018; DHS, 2019).

There is substantial evidence that indiscriminate HCWM impacts negatively on the environment as well. HCW which contains polyvinyl chloride - plastics (PVC), if incinerated at low temperatures (less than 800°C), Dioxins and Furans and other toxic air pollutants [e.g.
co-planar Polychlorinatedbiphenyls (PCBs)] are produced as air emissions or end up as solid residues in the bottom or disperse in the air contributing to climate change (WHO, 2011). Additionally, mercury spills and the breakage/disposal of mercury-containing devices, such as thermometers and sphygmomanometers, are some of the principal ways by which mercury from health facilities enters the environment.

The World Health Organization (WHO, 2018) estimates that 85% of generated waste is non-infectious while 15% is infectious or hazardous waste. The composition of infectious waste in a waste stream is as follows; Sharps 1%, body parts 1%, chemical or pharmaceutical 3% and radioactive and cytotoxic waste or broken thermometers less than 1% (WHO, 2011). An assessment conducted by WHO in 22 developing countries revealed that 18% to 64% health care facilities do not use proper waste disposal methods (WHO, 2002).

To address minimal exposure to HCW, attention is paid to basic processes and technologies, though sophisticated or advanced methods are often addressed in less detail. It is recommended that health centers in remote locations or with very limited resources may wish to confine to options that are suitable for them. The selected practices should ensure that health and safety requirements are met, and acceptable levels of hazard protection are achieved. However, the recommendations should not be viewed as a substitute for ideal procedures for HCWM in large health institutions.

Due to inadequate resources, health facilities have often struggled to maintain good HCWM practices. Under adverse circumstances where resources (financial, human and material) are limited, planning is hampered and health facilities resort to using inappropriate methods to manage waste. In addition, health care providers work without personal protective equipment in treatment and waste disposal.

To ensure that the standards for HCWM is raised in Zambia, there is need for a significant budget allocation for capacity building, procurement, maintenance and repair of equipment. Further, involvement of private public partnerships and technical support would be key to the successful implementation of the HCWM system. Additionally, HCWM will be strengthened through multisectoral coordination anchored into the coordinating committee on WASH in Health care facilities.

Zambia has adopted HCWM recommendations from different resources such as Centre for Disease Control and Prevention (CDC), World Health Organization (WHO), United Nations Children’s Emergency Fund (UNICEF) and Médecins Sans Frontières (MSF). This has contributed to the development of the HCWM guidelines in line with the EMA No.12 of 2011 by the Zambia Environmental Management Agency (ZEMA) in collaboration with MoH.

The development of this plan therefore, was based on the assessment done in previous evaluation by WHO (2011), Auditor General’s Office and MoH (2009) assessment (2013). The aim of this plan is to provide both long- and short-term goals for safe HCWM. Broadly, this plan suggests that funding be mobilized under the treasury to comprehensively resolve
the problems of planning and resource allocation. The implementation of this plan will require the involvement of key stakeholders namely; private sector, Cooperating Partners such as UNICEF, World Bank (WB), WHO, line ministries such as Ministry of Local Government and Ministry of Fisheries and Livestock and other institutions such as ZEMA

1.1 Vision, Mission and Objectives

Vision
A Nation of Healthy and Productive People living in a safe and healthy environment.

Mission
To provide appropriate standards of Health Care Waste Management in Zambia in order to reduce the risk of exposure to infections, hazards and pollution for the safety of the people and the environment.

Goal:
To strengthen Health Care Waste Management Systems in Zambia.

Strategic Priorities

1. Review and revise policies, guidelines and standards.
2. Improve infrastructure, commodities and equipment supply.
3. Mainstream gender and include specific needs of people with disabilities in the provision of HCWM services.
4. Build capacity in HCWM.
5. Advocacy for and promotion of best practices in HCWM.
6. Enhance health promotion in HCWM.
7. Increase resource allocation for HCWM Systems.
8. Strengthen monitoring and evaluation, and operational research in HCWM.

Objectives

The objectives of the plan are to:

1. Strengthen policy, regulatory structure and mechanism for HCWM;
2. Provide infrastructure, commodity supplies and equipment for system strengthening in HCWM;
3. Build capacity among health staff in HCWM;
4. Create awareness and advocacy on Health Care waste management among Health workers and policy makers;
5. Prioritise Health Care Waste Management in the planning process;
6. Develop M&E framework plan and tools for HCWM; and
7. Mainstream gender and include specific needs of people with disabilities in the provision of HCWM services.

1.2 Classification of HCW

According to WHO, HCW is classified into five main categories. These include:
A. Non-risk HCW;
B. HCW requiring special attention;
C. Infectious and highly infectious waste;
D. Other hazardous waste; and
E. Radioactive waste.

The classification is shown in the diagram below.

A: Non-risk
   - A1: Recyclable waste
   - A2: Biodegradable waste
   - A3: Other non-risk waste

B: HCW requiring special attention
   - B1: Human Anatomical waste
   - B2: Sharps
   - B3: Pharmaceutical waste
     - B3.1: Non-hazardous Pharmaceutical waste
     - B3.2: Potentially hazardous Pharmaceutical waste
     - B3.3: Hazardous Pharmaceutical waste
   - B4: Cyto-toxic Pharmaceutical waste
   - B5: Blood and body fluids
1.3. Non-risk HCW

Non-risk HCW includes all the waste that has not been infected such as general office waste, packaging or leftover food. They are similar to normal household or municipal waste and can be managed by the municipal waste services. They represent between 75% to 90% of the total amount of HCW generated by HCF (WHO, 2009). These fall in three categories:

a) **A1: Recyclable waste**: It includes paper, cardboard, non-contaminated plastic or metal, cans or glass that can be recycled.

b) **A2: Biodegradable HCW**: This waste comprises putriscible or compostable materials e.g. leftover food or garden waste.

c) **A3: Other non-risk waste**: These include all the non-risk waste that do not belong to categories A1 and A2.

1.4 Biomedical and health-care waste requiring special attention

i. **B1: Pathological and anatomical waste**

This category of waste comprises infectious pathological and anatomical waste e.g body parts, organs, tissues and blood bags. This waste may not be infectious unless the status is known, it is treated as though it were. This excludes animal parts that are duly certified for human consumption arising from food processing plants (WHO, 2003).

**Examples of such wastes**: tissue waste, removed organs, amputated body parts, placentas, etc…

ii. **B2: Sharps**

Sharps are all objects and materials that are closely linked with health-care activities and pose a potential risk of injury and infection due to their puncture or cut property. For this reason,
sharps are considered as one of the most hazardous waste generated in the HCF and they must be managed with the utmost care.

**Examples of such wastes:** all types of needles, broken glassware, ampoules, scalpel blades, lancets, vials without content

iii. **B3: Pharmaceutical waste**

The term "pharmaceutical" embraces a multitude of active ingredients and types of preparations. The spectrum ranges from teas through heavy metal containing disinfectants to highly specific medicines. Waste management therefore requires the use of a differentiated approach. This category of waste comprises expired pharmaceuticals or pharmaceuticals that are unusable for other reasons (e.g. call-back campaign). Pharmaceutical wastes are divided into three classes as follows:

a. **B 3.1: Non-hazardous pharmaceutical waste**

This class includes pharmaceuticals such as camomile tea or cough syrup that pose no hazard during intermediate storage, collection, transportation and disposal. They are not considered hazardous wastes and should be managed jointly with municipal waste.

b. **B 3.2: Potentially hazardous pharmaceutical waste**

This class embraces pharmaceuticals that pose a potential hazard when used improperly. They are considered as hazardous wastes and their management must take place in an appropriate waste disposal facility.

c. **B 3.3: Hazardous pharmaceutical waste**

Pharmaceutical waste comprises heavy metal containing and unidentifiable pharmaceuticals as well as heavy metal containing disinfectants, which owing to their composition require special management. They must be considered as hazardous wastes and their management must take place in an appropriate waste disposal facility.

iv. **B4: Cytotoxic pharmaceutical waste**

Cytotoxic pharmaceutical wastes are wastes that can arise by use of (administration to patients), manufacture and preparation of pharmaceuticals with a cytotoxic (antineoplastic) effect. These chemical substances can be subdivided into six main groups: alkylated substances, antimetabolites, antibiotics, plant alkaloids, hormones, and others. A potential health risk to persons who handle cytotoxic pharmaceuticals results above all from the mutagenic, carcinogenic and teratogenic properties of these substances. Consequently, these wastes pose a hazard, and the measures to be taken must also include those required by occupational health and safety provisions.
Examples of such wastes: Discernible liquid residues of cytotoxic concentrates, post-expiration-date cytotoxic pharmaceuticals and materials proven to be visibly contaminated by cytotoxic pharmaceuticals must be disposed of as cytotoxic pharmaceutical waste.

v. B5: Blood and body fluids waste

It includes wastes that are not categorised as infectious waste but are contaminated with human or animal blood, secretions and excretions. It is warranted to assume that these wastes might be contaminated with pathogens.

Examples of such wastes: Dressing material, swabs, syringes without needle, infusion equipment without spike, bandages, waste from postmortem activities and among many other clinical wastes.

1.5 Infectious waste

Infectious waste according to the basal convention (class 6.2) are substances or waste containing viable microorganisms or their toxins which are known or suspected to cause disease in animals or humans. Special requirements regarding the management of infectious wastes must be imposed whenever waste is known or – based on medical experience – expected to be contaminated by causative agents of diseases and when this contamination gives cause for concern that the disease might spread. In this category two groups can be considered depending on the degree of infectiousness that is expected.

i. C1: Infectious waste

Infectious waste is suspected to contain pathogens (bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. This category includes:

- cultures and stocks of infectious agents from laboratory work;
- waste from surgery and autopsies on patients with infectious diseases (e.g. tissues, and materials or equipment that have been in contact with blood or other body fluids);
- waste from infected patients in isolation wards (e.g. excreta, dressings from infected or surgical wounds, clothes heavily soiled with human blood or other body fluids);
- waste that has been in contact with infected patients undergoing haemodialysis (e.g. dialysis equipment such as tubing and filters, disposable towels, gowns, aprons, gloves, and laboratory coats);
- infected animals, carcasses as well as litter and animal faeces from animal test laboratories, if transmission of diseases is to be expected.

- any other instruments or materials that have been in contact with infected persons or animals.
Note: Infected “sharps” are a subcategory of infectious waste but are dealt with separately in this plan (see section 2.1.4).

**Examples of such wastes:** Blood from patients with HIV, viral hepatitis, brucellosis, Q fever. Faeces from patients infected with typhoid fever, enteritis, cholera. Respiratory tract secretions from patients infected with TB, anthrax, rabies, poliomyelitis…

**ii. C2: Highly infectious waste**

Highly infectious waste is suspected to contain pathogens in concentrations likely to cause life-threatening illness and presents a serious hazard in healthcare settings and in the community to persons coming into contact with it.

It includes:

- Cultures and stocks of highly infectious agents, waste from autopsies, animal bodies, and other waste items that have been inoculated, infected, or in contact with such agents, including dishes and devices used to transfer, inoculate and mix cultures of infectious agents and infected animals from laboratories.
- Waste from highly infectious wards or isolation centres such as Ebola virus disease, SARs, anthrax, yellow fever and polio treatment centres.

They are generated in institutes working in the fields of hygiene, microbiology and virology as well as in medical laboratories, medical and animal health practices and similar establishments;

**Examples of such wastes:** Body fluids from patients with Ebola Virus Disease (EVD), Sputum cultures of TB laboratories, contaminated blood clots and glassware material generated in the medical analysis laboratories, high concentrated microbiological cultures carried out in medical analysis laboratories.

**1.6 Other hazardous waste**

This category of waste is not exclusive to the health-care sector. They include: gaseous, liquid and solid chemicals, waste with high contents of heavy metals such as batteries, pressurized containers, etc.

Chemical waste consists of discarded chemicals that are generated during disinfecting procedures or cleaning processes. They have toxic, corrosive, flammable, reactive, explosive, shock sensitive, cyto- or genotoxic properties. They must be used and disposed of according to the specifications provided with each type of chemical.
Waste with high contents of heavy metals and derivatives are potentially highly toxic. They are considered as a sub-group of chemical waste but should be treated specifically.

Pressurised containers consist of full or emptied containers or aerosol cans with pressurised liquids, gas or powdered materials.

**Examples of such wastes:** thermometers, blood-pressure gauges, photographic fixing and developing solutions in X-ray departments, halogenated or non-halogenated solvents, organic and in-organic chemicals.

### 1.6.1 Radioactive HCW

Radioactive wastes are materials contaminated with radionuclides. They are produced as a result of procedures such as in-vitro analysis of body tissue and fluid, in vivo organ imaging and tumour localization, and various investigative and therapeutic practices.

Radionuclides used in health care are in either unsealed (or open) sources or sealed sources. Unsealed sources are usually liquids that are applied directly, while sealed sources are radioactive substances contained in parts of equipment or encapsulated in unbreakable or impervious objects, such as pins, “seeds” or needles.

Radioactive health-care waste often contains radionuclides with short half-lives (i.e. half of the radionuclide content decays in hours or a few days); consequently, the waste loses its radioactivity relatively quickly. However, certain specialized therapeutic procedures use radionuclides with longer half-lives; these are usually in the form of small objects placed on or in the body and may be reused on other patients after sterilization. Waste in the form of sealed sources may have a relatively high radioactivity but is only generated in low volumes from larger medical and research laboratories.

**Note:** Sealed sources are generally returned to the supplier and should not enter the waste stream.

**Examples of such wastes:** Radioactive waste includes sealed sources, spent radionuclide generators, low-level solid waste, residues from shipments of radioactive material and unwanted solutions of radionuclides intended for diagnostic or therapeutic use, liquid immiscible with water, waste from spills and from decontamination of radioactive spills, excreta from patients treated or tested with unsealed radionuclides, low-level liquid waste, gases and exhausts from stores and fume cupboards.

### 1.6.2. Veterinary Health Care Waste

As in other healthcare facilities, most of the waste from the Veterinary is non-hazardous and can be disposed of as regular office trash (municipal solid waste). But there are also
biological materials and stuff contaminated with animal fluids which must be classified as “infectious waste” and stored on site, and transported off-site for treatment, separately. Veterinary practices establish the following waste categories: Bio (infectious and pathological waste), Sharps, General, Radioactive and Hazardous.

The livestock farming community is a large generator of health care waste since livestock farmers often carry out extensive, therapeutic and prophylactic activities on their own under the supervision of a veterinary professional.
CHAPTER TWO

SITUATION ANALYSIS

2.1. Introduction

This chapter has identified levels of HCWM that are relevant in helping implement and enforce environmentally sound, technically feasible, economically viable and culturally acceptable systems in Zambia. In tackling this subject, literature review was conducted on organisation of health system, the legal and administrative frameworks that govern both local and global HCWM.

2.2.1 Management of Healthcare Waste

HCWM depends on the commitment of both managerial and technical staff within a health care facility (HCF) through policy and HCWM guidelines. Due to lack of policy and revised guidelines on HCWM, hospitals and other health care establishments are using the provisions of the laws (Public Health Act - Cap 295, Environmental Management Act, No. 12 of 2011) to establish HCWM in their facilities to ensure that there are no adverse health and environmental impacts during the generation, handling, storage, collection, pre-treatment, transportation and final disposal of HCW.

The introduction of improved HCWM such as segregating waste within the HCF and bin colour coding could result in reduction of substantial amount of waste requiring special treatment and disposal costs. The common method for disposal of hazardous HCW is incineration. The use of incinerators has several challenges. As often observed, the HCFs are not able to operate and maintain the equipment due to high costs and therefore non incineration methods are being considered in this plan. Through this plan, health care establishments and other institutions that generate HCW will be able to institute more appropriate waste management systems that could provide such benefits.

With increasing global threats of highly infectious diseases such as EVD, entails that stringent measures are enhanced at all levels of care to ensure that waste management is strengthened for Infection Prevention and Control (IPC) (see Health Care Waste Management Guidelines).
1.2.2. Organisation of the health system

Zambia has a well-developed private and public health care system which provides specialized medical services such as diagnostic and curative. Health systems in Zambia are classified into three major categories:

- First Level comprising of Health Posts, Health Centres and District Hospitals, where primary health care and preventive health services are provided.
- Second Level comprising the provincial and general hospitals, which provide the curative care
- Tertiary level comprising Central hospitals and the National University teaching Hospitals which provide specialized care.

The arrangement of health services is along the same administrative lines with the district as the main focus of service delivery, the provincial as the secondary level and Tertiary Hospitals as national level.

Table 1: Summary of Health Institutions in Zambia

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>No of Units</th>
<th>Total No of Inpatient Beds</th>
<th>Maternity Beds</th>
<th>Number of Facilities owned by</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Government</td>
<td>Private</td>
</tr>
<tr>
<td>Central 3rd Level</td>
<td>11</td>
<td>4,545</td>
<td>520</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>General 2nd Level</td>
<td>27</td>
<td>4,845</td>
<td>739</td>
<td>21</td>
<td>1</td>
</tr>
<tr>
<td>District 1st Level</td>
<td>105</td>
<td>7,238</td>
<td>1,449</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Health Post Rural</td>
<td>916</td>
<td>1,629</td>
<td>1,335</td>
<td>907</td>
<td>4</td>
</tr>
<tr>
<td>Health Posts- Urban</td>
<td>82</td>
<td>108</td>
<td>53</td>
<td>75</td>
<td>3</td>
</tr>
<tr>
<td>Rural Health Centre</td>
<td>1,080</td>
<td>8,001</td>
<td>2,861</td>
<td>1,030</td>
<td>6</td>
</tr>
<tr>
<td>Urban Health Centre</td>
<td>258</td>
<td>1,978</td>
<td>1,349</td>
<td>245</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>2,479</td>
<td>28,344</td>
<td>8,306</td>
<td>2,369</td>
<td>19</td>
</tr>
</tbody>
</table>

*Source: MoH, 2019*

**Health Posts:** Intended to cater for populations of 500 households (3,500 people) in rural areas and 1,000 households (7,000 people) in the urban areas.
Health Centres: These facilities include Urban Health Centres (UHC), which are intended to serve a catchment population of 30,000 to 50,000 people, and Rural Health Centres (RHC) servicing a catchment area of 29 km radius or with a population of 10,000.

First Level or Referral Hospitals: These are found in most districts and are intended to serve a population of between 80,000 and 200,000 with medical, surgical, obstetric and diagnostic services, including all clinical services to support referrals from lower levels.

Second Level Hospitals: These are general hospitals at provincial level and are intended to cater for a catchment area of 200,000 to 800,000 people, with services in internal medicine, general surgery, paediatrics, obstetrics and gynaecology, dental, psychiatry and intensive care services. These hospitals are also referral centres for the first level institutions, including the provision of technical back-up and training functions.

Third Level Hospitals: These are central and specialist hospitals for catchment populations of above 800,000. They have sub-specializations in internal medicine, surgery, paediatrics, obstetrics, gynaecology, intensive care, psychiatry, training and research. These hospitals are referral centres for second level hospitals.

2.3. Legal and Regulatory Framework

The current Zambian legal provision regarding management of HCW are provided according to the sector of application and control as listed below:

2.3.1. The Public Health Act, Cap 295 of 1995

The Public Health Act Cap 295, Part IX deals with control of infectious diseases, sanitation and housing. This Act places responsibility on MoH, Local Authorities and other sectors that deal with HCW to take measures and maintain their areas in a clean and sanitary condition. It also prevents the occurrence of nuisances and aspires to remedy them or other conditions liable to be injurious or dangerous to health. In addition, Section 67 defines a nuisance as one, which includes any accumulation or deposit of refuse which is offensive, or which is injurious or dangerous to health.

It is instructive that the provisions in Public Health Act do not explicitly deal with health care waste. However, these provisions address the conditions, which render premises dangerous to
health. There are circumstances in which the danger to health arises from the handling of infectious health care waste, in which case the provisions of the Public Health Act can be enforced.

2.3.2. The Environmental Management Act No. 12 of 2011
The principal law on Environmental Management is EMA No. 12 of 2011 of the Laws of Zambia. The Act empowers ZEMA inter alia to:

- Formulate and provide standards and regulations for the sound management of waste;
- Enforce the provisions of the Environmental Management Act, 2011 and subsidiary legislation.

2.3.3. Environmental Management (licensing) Regulation (Statutory Instruments No. 112 of 2013)
Part IV of this Statutory Instrument has been promulgated to amplify the provisions of the EMA. These regulations control and monitor the generation, collection, storage, transportation, pre-treatment, treatment, disposal, and trans-boundary movement of hazardous waste.

In these regulations hazardous waste includes;

- Waste from pharmaceuticals
- Waste from clinics and other related wastes (medical, veterinary, investigations and research). It excludes office and kitchen wastes and has the following characteristics:

  a) **Infectious substances**
  These are substances or wastes containing viable micro-organisms or their toxins which are known or suspected to be capable of causing disease in humans and animals.

  b) **Toxic (Delayed or chronic)**
  These are substances or waste which, if inhaled. Ingested or penetrate the skin, may cause delayed or chronic effects, including carcinogenicity.

The Fifth and Sixth Schedules prescribe the type of waste which is regulated and includes the following:

- **Waste Streams:** Clinical waste from hospitals, health centres, clinics and includes pharmaceutical waste.
Part III of SI 112 of 2013 governs the reclamation, reuse, recovery, recycling, transport, disposal and transboundary movement of industrial, commercial, domestic waste which is non-hazardous.

2.3.4. Medicines and Allied Substances Act No. 3 of 2013
This Act provides for licensing of Medicines and allied substances Act in relation to the registration of Pharmacists, Agro veterinary shops and health shops. The provisions of these guidelines describe a series of steps that need to be followed in order to dispose unwanted pharmaceuticals. The steps required include; identification of pharmaceutical waste, sorting of pharmaceutical waste by category, filling the relevant forms to seeking authority from ZEMA and the Director General among other persons for disposal of such waste.

2.3.5. Ionizing Radiation Protection Act No. 16 of 2005 as amended by Act No.19 of 2011
The Ionizing Radiation Protection Act No. 16 of 2005 and its Amendment Act No. 19 of 2011 provides for the protection of the public, workers and the environment from hazards arising from the use of devices or materials capable of producing ionising radiation.

Under this Act, a license from the Radiation Protection Authority (RPA) is required to import, possess, mine, export, transport, use, store, disposal of, undertake any other activity relating to radioactive material or any other source of harmful ionising radiation.

The Act also mandates the effective monitoring and management of radioactive waste including Health Care Waste (HCW) contaminated with radionuclides.

2.3.6. Local Government Act No 2 of 2019
The Act provides for an integrated local government system, establishment of city, municipal, district, township councils and prescribes functions of various local governance actors and gives effect to the decentralisation of functions, responsibilities and services at all levels of local government to Local Authorities. The Act also provides for governance and empowers local authorities to issue and enforce by-laws.

2.3.7. Solid Waste Regulation and Management Act No. 20 of 2018
The Act provides for the sustainable regulation and management of solid waste services. It provides for the functions, sector coordination and governance to improve service delivery as well as protect the environment and enhance public health, by all actors in the Solid Waste Management value chain. The Act further provides for the regulation, operation, maintenance and construction of landfills and other disposal facilities. This law only applies to non-
hazardous waste.

2.3.8. National Strategic Plan for Infection Prevention and Control
The mission statement of this plan is to ensure safety of health workers, patients, and the community and to maintain a safe environment through the promotion of appropriate health care waste management.

The policy objectives spell out the need to advocate for support and implementation of proper management of HCW waste among others. Some of the guiding principles for the implementation of this policy include:

- The need for environmental protection through appropriate HCWM
- Minimization of risks to patients, health workers, communities and the environment through application of appropriate HCWM.
- Strengthening of the necessary human resource capacity through training and sensitization for safe handling of HCW.
- Develop logistic system that will address the sustained supplies and equipment of HCWM. This will require a commensurate investment to comply with HCWM requirements.

Therefore, a unique strategy is recommended for the advocacy of best waste management practices through behaviour change communication as a key element in the strategy.

2.3.9. International Conventions

a) The Stockholm convention on Persistent Organic Pollutants
The Stockholm Convention is an international environmental Treaty, signed in 2001 and became effective in May 2004. It aims to eliminate or restrict the production and use of Persistent Organic Pollutants (POPs). Key elements of the Convention include the requirement that developed countries provide new and additional financial resources and measures to eliminate production and use of intentionally produced POPs, eliminate unintentionally produced POPs where feasible, and manage and dispose of POPs wastes in an environmentally sound manner.

b) The Basel Convention
The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Disposal is an international Treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). It does not, however, address the movement of radioactive waste. The Convention is also intended to minimize the amount
and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to guide LDCs in sound management of hazardous and non-hazardous wastes.

In addition to conditions on the import and export of the above wastes, there are stringent requirements for notice, consent and tracking for movement of wastes across national boundaries. It is worth to note that the convention places a general prohibition on the exportation or importation of wastes between parties and non-parties.

c) **Minamata convention**

This is a new multilateral environmental agreement that addresses specific human activities that are contributing directly to mercury pollution. This convention was as result of deaths of many people in Minamata in Japan who had been exposed to Mercury from the mines which accumulated in the fish in the Minamata bay.

The convention resolved the following:

1. Reduce the use mercury in clinical thermometers and BP machines and other detecting devices
2. Reduction in mercury mining
3. Vaccines which use mercury as preservatives
4. Reduce the use of mercury batteries
5. Phase out mercury manufacturing and processes i.e. soaps, cosmetics, dental filings
6. Safe storage and disposal of all mercury related products after their removal from the market
7. Phase out or control mercury air emissions from coal fired power plants, industrial boilers, cement production etc.

2.3.10. **Local surveys on HCWM practices**

2.3.10.1. **Auditor General’s Report Findings**

The 2009 General Auditor’s report on medical waste management in the health institutions revealed serious weaknesses in the prevailing HCWM practices. It was observed that the following areas were not handled according to available laws of Zambia and the regulations; generation, handling, storage and transportation to the final disposal point. Notable findings included the following:

a) Most Health facilities did not maintain records of the quantities of waste generated contrary to ministry policy, legislation or regulations.

b) Colour coding and labelling not followed by some Health institutions.
c) Transportation and disposal not done according to ZEMA guidelines.
d) Improper and ineffective treatment of HCW
e) Lack of HCWMP
f) Most Health facilities did not orient members of staff in HCWM

2.3.10.2. MoH Baseline Survey on HCWM Practices

A national assessment was conducted in 2013 to assess legislative, institutional and infrastructural challenges, encountered in the field on HCWM in the country. The assessment was done in six provinces namely; Lusaka, Copperbelt, Southern, North-Western, Northern and Muchinga provinces. Two level III hospitals, six level II hospitals, three level I hospitals, thirteen health centres and one health post were sampled. This focused on generation, storage, and final disposal, knowledge gap for members of staff and expenditure on HCWM practices.

The study revealed that health facilities (1674/1882) generated approximately 30 tonnes of infectious health care waste per day. Furthermore, an estimated waste of 29,943.6 kg/day was generated per day. The table below shows a summary report of 1674 facilities visited in 6 out of 10 provinces, with estimated waste generation per level, per bed, per day.

Table 2: Estimate of Waste Generation in HCF

<table>
<thead>
<tr>
<th>Facility type</th>
<th>Health Facilities and Ownership</th>
<th>Number of Beds and Cots</th>
<th>Waste Generation / Day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GRZ</td>
<td>Private</td>
<td>Mission</td>
</tr>
<tr>
<td>CBHWs *</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Health Posts</td>
<td>161</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>HCs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Rural</td>
<td>913</td>
<td>53</td>
<td>6</td>
</tr>
<tr>
<td>b) Urban</td>
<td>252</td>
<td>22</td>
<td>77</td>
</tr>
<tr>
<td>1st Level hospital</td>
<td>39</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>2nd level hospital</td>
<td>13</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>3rd level hospital</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Summary of findings per province assessed are as follows:

i. The institutions had no HCWM committees in place.

ii. Most health facility action plans had no budget line specifically for HCWM

iii. Most Health Offices plans had budget lines only for maintenance of incinerators and other logistics such as bin and bin liners.

iv. It was further observed that the ordinary incinerator was commonly used compared to a micro burn due to operational cost (figure 1-7).

v. Most hospitals had no SoPs on HCWM. Members of staff were not trained in HCWM; doctors, nurses, clinical officers and support staff had little knowledge on HCWM. Although the Environmental Health staff adequate knowledge, they lacked support from management in HCWM.

vi. Generally, all the institutions visited had erratic supply Bins, bin liners and colour coding were not being implemented. Transportation of waste was mainly manual without aid.

vii. The average generation rate at hospital level was about 70kg per day for general hospitals. Capacity of most macro burn incinerators is inadequate to handle the waste.

Figure 2: Open pit with medical waste at a hospital
Figure 3: Macro burn incinerator at a hospital

Figure 4: Commingled waste from private HCF for incineration

Figure 5: Macro burn incinerator at a hospital
Figure 6: Disposal of placentas

Figure 7: Final disposal site at a hospital
CHAPTER THREE

FRAMEWORK FOR STRENGTHENING HEALTH CARE WASTE MANAGEMENT

3.1. Introduction
This chapter looks at the framework for strengthening Health Care Waste at all levels of health care. It highlights institutional capacities, composition of the National Steering Committee, Health Care Waste Committee and Terms of References.

3.2. Strengthening the institutional capacities for HCWM
In order to build capacity for HCWM, there is need to develop structures at all levels of health care starting with the national level. The following is the recommended organogram for HCWM.

![Organogram for HCWM](image-url)

Figure 8: Organogram for HCWM
3.3. National WASH in Health Facilities

3.3.1 Composition

Chairperson: Permanent Secretary (MoH)
Secretary (MoH): Director Health Promotion Environment and Social Determinants
Member: MLG
Member: MWDSEP
Member: Ministry of Livestock and Fisheries
Member: Ministry of National Development Planning
Member: Ministry of Tourism
Member: ZEMA
Member: RPA
Member: ZAMRA
Member: ZNPHI
Others: Cooperating Partners (WHO, UNICEF, ILO)
Member: Media

3.4. Provincial Health Office

The Provincial Health Director (PHD) will appoint the Chief Environmental Health Officer (CEHO) as a focal point person for HCWM in the Province. The focal point person shall coordinate HCWM issues in the province with line ministries, Cooperating Partners (CPs.) and the District Health Office. Duties of the focal point person are outlined in box 1 below.

**Box 1:** The duties among others shall include: CEHO - PHO

- To coordinate and support activities of HCWM in the Province.
- To convene meetings in liaison with PHO for partners, donors and other stakeholders, including the private sector.
- To facilitate preparation of the HCWM plans in health facilities and districts.
- To liaise with the MOH at national level on issues of HCWM implementation
- To disseminate HCWM guidelines (including written emergency procedures) to all stakeholders
- To support implementation of HCWM through the stakeholders.
- To offer technical support and conduct monitoring visits for HCWM implementation.
- To identify areas for operational research in waste management practices and treatment technologies.
- To advise on the installation and maintenance of waste treatment and storage facilities and handling equipment to comply with the specifications in the ZEMA standards
- Organize and train staff in HCWM.
- To perform any other duties as assigned by the PHD
- Enforce penalties in case of non-compliance to HCWM regulations as mandated by the Public Health Act CAP 295

### 3.5. Central and General Hospitals

The Senior Medical Superintendent (SMS)/Medical Superintendent will appoint the Principal Environmental Health Officer (PEHO) as a focal point person for the HCWM in the institution. The PEHO will in turn recommend HCWM officers for the institution. There shall be a Hospital HCWM committee administered by the focal point person. The HCWM committee shall drive the health care waste management issues in the facility and shall be constituted from heads of departments and other external stakeholders. The box 2 below shows the duties of the focal point person in detail.

**Box 2: The duties among others shall include:**

- To coordinate and support efforts of HCWM in the facility.
- To coordinate in liaison with SMS/MS the activities of the HCWM Committee.
- To convene meetings in liaison with SMS/MS for Departments and unit heads.
- To facilitate preparation of the HCWM plans for the facility.
- To liaise with all the departments that generates HCW.
- To disseminate HCWM guidelines to the facility.
- To support implementation of HCWM through unit heads.
- To offer technical support and conducting monitoring visits within the facility.
- To identify areas for operational research in waste management practices and treatment technologies.
- To be responsible for advising on installation and maintenance of waste treatment and storage facilities and handling equipment to comply with the specifications in the ZEMA standards.
- Organize and train staff in HCWM.
- To perform any other duties as assigned by the SMS.

### 3.6. District Health Office

The District Health Director (DHD) will appoint an Environmental Health Practitioner as a focal point person for HCWM for the District. The focal point person will in turn recommend HCWM officers for the district. The HCWM Committee shall drive the health care waste management issues in the district and shall be constituted from the District Development Coordinating Committee (DDCC). Refer to box 3 for duties of the focal point person.

**Box 3: The duties among others shall include:**

- To coordinate and support efforts of HCWM in the District.
• To coordinate in liaison with District Health Director the activities of the District Steering Committee on Health Care Waste management.
• To convene meetings in liaison with District Commissioner (DC) for partners, donors and other stakeholders, including the private sector.
• To facilitate preparation of the HCWM plans in health facilities and districts.
• To liaise with the Council Secretary or Town Clerks on issues of HCWM implementation in the district.
• To disseminate HCWM guidelines (including written emergency procedures) to all stakeholders and conduct assessments.
• To support implementation of HCWM through the stakeholders.
• To offer technical support and conduct monitoring visits for HCWMP implementation at 1st Level hospitals, Health Centres and health posts, including community.
• To monitor management of waste disposal sites in collaboration with Community leaders and Local Councils.
• To identify areas for operational research in waste management practices and treatment technologies.
• To create awareness on dangers/risks of improper HCWM practices.
• To be responsible for advising on installation and maintenance of waste treatment and storage facilities and handling equipment to comply with the specifications in the ZEMA standards.
• Organize and train staff in HCWM.
• To perform any other duties as assigned by the DHD.
• Enforce penalties in case of non-compliance to HCWM regulations as mandated by the Public Health Act CAP 295.
• Ensure that they put systems for separation of non-hazardous waste for the purpose of recycling.

3.7. First Level/District Hospitals
The Medical Officer/Superintendent in Charge will appoint the Principal/Senior Environmental Health Officer (PEHO/SEHO) as a focal point person for HCWM in the hospital. The PEHO/SEHO will in turn recommend HCWM officers for the hospital. There shall be a Hospital HCWM committee administered by the focal point person. The HCWM committee shall drive the health care waste management issues in the facility and shall be constituted from heads of departments and units. The duties for the focal point person are outlined in box 4.

Box 4: The duties among others shall include:
• To coordinate and support activities of HCWM in the facility.
• To coordinate in liaison with MS the activities of the HCWM Committee.
• To convene meetings through the office of the DHD for Departments and unit heads.
• To facilitate preparation of the HCWM plans for the facility
• To liaise with all the departments that generate HCW
• To disseminate HCWM guidelines (including written emergency procedures) to the facility
• To support implementation of HCWM through unit heads.
• To offer technical support and conduct monitoring visits within the facility.
• To identify areas for operational research in waste management practices and treatment technologies.
• To be responsible for advising on installation and maintenance of waste treatment and storage facilities and handling equipment to comply with the specifications in the ZEMA standards.
• Organise and train staff in HCWM
• To perform any other duties as assigned by the Medical Superintendent
• Ensure that they put systems for separation of non-hazardous waste for the purpose of recycling

3.8 Health Centres (Urban and Rural)
The District Health Director (DHD) will appoint the Environmental Health Practitioner as a focal point person for HCWM for the facility. There shall be a Health Centre HCWM committee administered by the focal point person. The HCWM committee shall drive the health care waste management issues in the facility and shall be constituted from all departments and other external stakeholders. Box 5 has the outlined duties in detail of the Focal person.

**Box 5:** The duties among others shall include:
• To coordinate and support activities of HCWM in the facility.
• To coordinate through the office of the officer In-charge for the activities of the HCWM Committee.
• To convene meetings in liaison with all Departments.
• To coordinate the preparation of the HCWM plans for the facility
• To liaise with all the departments that generates HCW
• To disseminate HCWM guidelines (including written emergency procedures) to the facility and the community
• To facilitate implementation of HCWM activities through unit heads.
• To offer technical support and conducting monitoring visits to the community.
• To identify areas for improvement of waste management practices and treatment technologies.
• To be responsible for advising on installation and maintenance of waste treatment and storage facilities and handling equipment to comply with the specifications in the Zambia Environmental Management Act standards.
• Organise and train staff in HCWM
• To perform any other duties as assigned by the DHD.
• Ensure that they put systems for separation of non-hazardous waste for the purpose of recycling

3.9 Continuous capacity building and information on health and safety
For staff training and information, the focal point person in the health facility should ensure that there is continuous capacity building to ensure that all staff performs their duties. The main duties are as follows:

3.9.1 Hospital Administrator
The Hospital Administrator should ensure that all members of staff are aware of their own responsibilities for HCWM

3.9.2 Departmental Heads
The Departmental Heads are responsible for the supervision of the segregation, storage, and removal of waste generated in their departments and stores the waste in an internal receptacle before being transported to an outside storage facility. They should ensure that all staff in the hospital/facility are aware of the segregation, storage and disposal procedures so that they comply with the established standards. Departmental heads should also work on the following:

• Continuously liaise with the Focal Point Person to monitor working practices for failures or mistakes;
• Ensure that key staff members in their departments are given training in waste segregation and disposal procedures;
• Encourage medical and nursing staff to be vigilant in ensuring that supportive staff always follow correct procedures.

3.9.3 Pharmacist in-Charge
The Pharmacist In-Charge is responsible for the sound management of stores and pharmaceutical waste management.
The duties are:
• Liaise with Departmental Heads, the Focal Point Person, the Nursing Officer, and the Hospital Administrator, giving advice, in accordance with the national policy and guidelines, on the appropriate procedures for pharmaceutical waste disposal;
• Coordinate continuous monitoring of procedures for the disposal of pharmaceutical waste;
• Ensure that personnel involved in pharmaceutical waste handling and disposal receive adequate training.
• Ensuring safe management of genotoxic waste.

3.9.4 Radiation Safety Officer or Protection Officer
The duties and responsibilities of the Radiation Safety Officer, Protection officer or radiographer are the same as those of the Pharmaceutical Officer but seemingly relate to radioactive waste guided by the relevant legislation in force.

3.9.5 Laboratory in-Charge
The Laboratory In-Charge officer is responsible for the sound management of stores and laboratory waste management.

The duties are:
• Liaise with the focal point persons for IPC and HCWM on the appropriate procedures for laboratory waste management;
• Coordinate continuous monitoring of procedures for the disposal of laboratory waste;
• Ensure that the Safety officer receives adequate training in HCWM;
• Ensure that all staff in the Laboratory are aware of the segregation, storage and disposal procedures of HCW.

3.9.5 Procurement Officer/Department
The Procurement Officer or department should liaise with the Focal Point Person to ensure a continuous supply of the items required for waste management (plastic bin liners in approved colours and containers of the right quality, spare parts for on-site health-care waste treatment equipment, purchase of waste transport tricycles, bin trolleys, hand-held thermometers, PPEs, etc.). These items should be procured and ordered in good time to ensure their availability to support sustainable mechanisms of managing waste. The Procurement Officer should endeavour where possible to liaise with technical officers in the HCWM Committee to practice green procurement.
3.9.6 Infection Prevention and Control Focal Point Unit (IPCFPU)

The focal point person for infection prevention and control should liaise with the focal person unit dealing with HCWM on a continuous basis in order to provide advice concerning the control of infection and the standards for waste disposal system.

Refer to box 6 duties.

Box 6: The duties of the incumbent officer are to:

- Identify training requirements according to staff grade and duties.
- Organize and supervise staff training courses on safe waste management infection prevention.
- Liaise with the Departmental Heads on infection prevention.
- Report and keep records of all incidences.
- Ensure that Personal Protective Equipment is available.
- Ensure that there is an effective occupational health Programme for immunization, post-exposure prophylaxis treatment, and medical surveillance established.

3.10 Standardizing health care delivery and HCWM practices

3.10.1 Internal storage

Box 7: Recommendations for storage facilities for Health-care waste

- The storage facility should be suitably sited, appropriately sign posted and kept secure at all times.
- All waste containers/ bags should be colour-coded according to national standards.
- The storage area should have an impermeable, hard-standing floor with good drainage; it should be easy to clean and disinfect.
- There should be water supply for cleaning purposes (running water).
- The storage area should afford easy access for staff in charge of handling the waste.
- The storage area should be robust and lockable to prevent injury to handlers and unauthorised persons entering.
- Easy access for waste-collection vehicles is essential.
- Sharps including retractable items/ sharps safety devices must be placed in a sharps container/ box.
- There should be protection from the sun.
- The storage area should be inaccessible for animals, insects, and birds.
- There should be good lighting and at least passive ventilation.
- The storage area should not be situated in the proximity of fresh food stores or food preparation areas.
- A supply of cleaning equipment, protective clothing, and waste bags or containers should be located conveniently close to the storage area.

Source: WHO (1999)
3.10.2. On-site transport
Health care waste should be transported within the hospital or other facility by means of wheeled trolleys, tricycle, containers, or carts that are not used for any other purpose and meet the following specifications:

- Easy to load and offload;
- No sharp edges that could damage waste bags or containers during loading and off loading
- Easy to clean.
- Vehicles should be cleaned and disinfected daily with an appropriate disinfectant.

3.10.3 External Transport
a) No person shall transport hazardous waste without a license from the competent authority.

b) Transportation of hazardous waste shall be allowed in:

- Approved routes
- Approved vehicles
- Approved labelling

c) Transportation of hazardous waste shall:

- Provide for security and an emergency procedure, guideline or plan.
- Specify the final destination of the transportation.
- Be undertaken according to approved times

d) The transporter of waste shall notify the competent Authority about the proposed transportation stating the licensed transporter or final licensed disposal facility/site.

3.11 Technologies for treatment and disposal of HCW

The following factors should be used in the selection of treatment methods;

- Types and quantities of waste for treatment and disposal
- Capability of the healthcare facility to handle the waste quantity
- Technological capabilities and requirements
- Availability of treatment options and technologies
- Capacity of systems.
- Treatment efficiency (microbial inactivation efficacy)
- Occupational health and safety factors
- Environmental releases (pollution)
- Volume and/or mass reduction
• Installation requirements
• Space available for equipment
• Operation and maintenance requirements
• Infrastructure requirements
• Skills needed for operating the technology
• Location and surroundings of the treatment and disposal sites (activities of the surrounding environment/compatibility)
• Options available for final disposal
• Public acceptability
• Regulatory requirements
• Capital cost of the equipment
• Operating and maintenance costs of the equipment
• Other costs including costs of shipping, customs duties, installation, commissioning / decommissioning, transport and disposal of residues.

3.11.1 Assessment of Waste Parameters for Incineration
Specific waste parameters should be assessed at the planning stage to determine the most suitable type and size of incinerator:
• Current extent of waste production and type of health care waste;
• Volume of waste;
• Estimated future waste production;
• All the physical parameters that determine the suitability of waste for incineration, such as low heating values and low moisture content.

Categories of HCW
Table 3: Refers to Categories of HCWM

<table>
<thead>
<tr>
<th>Type of Health Institution</th>
<th>Recommended Technology at Various Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Private</strong> health care facilities</td>
<td>• This will depend on the level and location of the institution i.e. clinic, health centre/ hospital and rural/urban setting</td>
</tr>
</tbody>
</table>
| **Health Post** | • HCW shall be safely transported to the nearest hospital/centre which has disposal facilities  
  • Land disposal of HCW shall be abolished and replaced with brick incinerator |
| **Health Centre:** Rural | • Land disposal of HCW should not be used but replaced with brick incinerator  
  • Where there is electricity, free-burn incinerators are recommended. |
| Health Centre: Urban | • Chemical disinfection  
  • Rotary kiln incinerator  
  • Where there is electricity, free-burn incinerators are recommended. |
|----------------------|------------------------------------------------------------------|
| First Level: District Hospital | • As for Urban Health Centre (dependent on the population)  
  • Pyrolytic incinerator  
  • Chemical disinfection  
  • Wet thermal or steam treatment  
  • Free-burn Incineration |
| Second Level: General Hospital | • Pyrolytic incinerator  
  • Chemical disinfection  
  • Wet thermal or steam treatment disinfecter  
  • Microwave irradiation for teaching hospital  
  • One waste collection vehicle per institution |
| Third Level: Central Hospital | • Pyrolytic incinerator  
  • Chemical disinfection  
  • Wet thermal or steam treatment disinfecter  
  • Microwave irradiation for teaching hospital  
  • One waste collection vehicle per institution |
| National Reference: University Teaching Hospital) | • As for third level, except the number of units will be twice  those at level three  
  • Two waste collection vehicles  
  • Free-burn Incineration  
  • Three at each station of either Pyrolytic incinerator or  incinerator 350 to 1000 LA  
  • Four waste collection and two utility vehicles per station  
  • Free-burn Incineration |
| Regional: Centralized waste disposal sites (Lusaka and Copperbelt provinces) | • As for third level, except the number of units will be twice  those at level three  
  • Two waste collection vehicles  
  • Free-burn Incineration  
  • Three at each station of either Pyrolytic incinerator or  incinerator 350 to 1000 LA  
  • Four waste collection and two utility vehicles per station  
  • Free-burn Incineration |

### 3.11.2. Non Incineration Treatment Options

The following basic processes are used for the non-incineration treatment of hazardous healthcare wastes, particularly sharps, infectious and pathological waste:

i) **Low heat Thermal**

Low-heat thermal processes use thermal energy at elevated temperatures (100°C and 180°C) high enough to destroy pathogens, but not sufficient to cause combustion or pyrolysis of waste. The treatment processes take place in two environments – moist or dry environment. In the former, steam is used to disinfect waste, commonly performed in an autoclave or other steam-based system; also referred to as a wet thermal process whilst in the later heat is used without the addition of water or steam.
ii) Chemical

Chemical Treatment Processes use chemical disinfectants such as dissolved chlorine dioxide, bleach (sodium hypochlorite), peracetic acid, lime solution, ozone gas, or dry inorganic chemicals. This process often involves shredding, grinding, or mixing to increase exposure of waste to the chemical agent and the treatment usually results in disinfection rather than sterilization. For liquid systems, wastes may go through a dewatering stage to remove and recycle the disinfectant.

iii) Irradiation

This is a process by which an object is exposed to radiation. The waste is treated using irradiation from electron beams, Cobalt-60, or ultraviolet sources to destroy pathogens. The effectiveness of pathogen destruction depends on absorbed dose by mass of waste. The operator is required to be shielded to prevent occupational exposure. This method is not commonly used for treating HCW because of the high investment cost.

iv) Biological

Specifically refers to the degradation of organic matter through processes occurring in nature. Examples include composting, vermiculture (digestion of organic wastes through the actions of worms), bio digestion, and natural decomposition through burial of cadavers, tissues and anatomical parts. In some cases, enzymes may be added to speed up decomposition of organic waste. Composting and vermiculture methods have been successfully used for placenta and hospital kitchen waste.

v) Mechanical

This method generally supplements other treatment methods and includes shredding, grinding, mixing, and compaction which reduce waste volume. This method is unable to destroy pathogens. The advantage of this method is that the rate of heat transfer is improved and the waste has more surface area for treatment.

vi) Inertisation (Stabilisation)

This process involves mixing waste with a mixture containing lime, cement and water in order to minimize the risk of toxic substances contained in the waste migrating into surface water or underground water. The mixture can be transported in liquid state to landfill. It is a suitable technology for disposing of pharmaceuticals and incineration ashes with a high metal content.

vii) Shredding
Shredders cut sharps into small pieces. This technology requires a worker skilled in the operation and maintenance of heavy-duty, rotating equipment. Simple shredders can be made from a manually operated grain mill. Due to the presence of workers during operation, only disinfected needles and syringes should be processed.

viii) Non Incineration

Non-incineration technologies are used to disinfect infectious health-care waste, while avoiding the formation and release of dioxins. Depending on the waste being treated, alternative treatment technologies may also render health-care waste unrecognizable, reduce its volume, eliminate the physical hazards of sharps, decompose pathological or anatomical waste and/or degrade chemotherapeutic waste. The current plan proposes to introduce the non-incineration of HCW under the UNDP project title “Reducing UPOP and Mercury from Releases from Health Sector in Africa”. The technology will be piloted in two (2) level one health facilities in order to assess social and ethical acceptability. Results from the pilot will provide policy direction.
### On site incineration technologies and related type of waste

Table 4: Refers to incineration technologies and related type of waste

<table>
<thead>
<tr>
<th>Non incineration process</th>
<th>Example of treatment technology</th>
<th>Type of waste to be treated and waste not to be treated</th>
<th>Capacities</th>
<th>Installation requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Heat Thermal</td>
<td>Autoclaves</td>
<td>Autoclaves are capable of treating a wide range of HCWs including cultures and stocks, sharps, materials contaminated with blood and body fluids, isolation and surgery waste, laboratory waste (excluding chemical waste) and ‘soft’ waste (including gauze, bandages, drapes, gowns and bedding) from patient care. With sufficient time and temperature, it is technically possible to treat small quantities of human tissue. Autoclaves are generally not used for large anatomical remains (body parts) since it is difficult to determine beforehand the time and temperature parameters needed. Volatile and semi-volatile organic compounds, cytotoxic waste, mercury, other hazardous chemical waste, and radioactive waste should not be treated in an autoclave Waste containing hazardous chemicals should not be treated by autoclave as low levels of alcohols, phenols, formaldehyde, and other organic compounds may be emitted in the air and pose health risks to the autoclave operators and...</td>
<td>• Waste treatment autoclave can range in size from about 20 liters to over 20,000 liters per cycle. • They operate in a batch mode. • Manufacturers ‘rates-d capacities range from 1 kg/hour to 2,700 kg/hour including the time needed for putting in the waste, steam exposure, and waste removal.</td>
<td>• Enclosure and foundation • Electrical connections • Water supply • Drains • Ventilation • Steam supply if the autoclave system does not include its own boiler or steam generator • Water softening system if needed.</td>
</tr>
<tr>
<td>Waste Treatment Systems</td>
<td>Capabilities</td>
<td>Requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------</td>
<td>--------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hybrid steam treatment systems</td>
<td>Can be used for anatomical waste or body parts. Wastes commonly treated in microwave systems are the same as those treated in autoclaves, such as sharps waste, materials contaminated with blood and body fluids, sharps, and laboratory wastes. Some microwave units are able to treat anatomical waste or body parts.</td>
<td>The sizes of hybrid autoclaves range from 38 liters to 21,800 liters. They operate in a batch mode. Manufacturer’s rated capacities range from 18 kg/hour to 3,300 kg/hour.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hybrid steam systems (Rotating autoclaves or rotoclaves, Autoclaves with internal shredders, Autoclaves with internal mixing arms)</td>
<td>Hybrid autoclaves are capable of treating cultures and stocks, sharps, materials contaminated with blood and body fluids, isolation and surgery waste, laboratory waste (excluding chemical waste) and ‘soft’ waste (including gauze, bandages, drapes, gowns and bedding) from patient care. Large and bulky bedding material and sealed heat-resistant containers are easily treated in these hybrid autoclaves. Rotating autoclaves can treat animal waste and pathological waste including anatomical parts.</td>
<td>Enclosure and foundation, Electrical connections, Water supply, Drains, Ventilation, Steam supply if the hybrid autoclave does not include its own boiler or steam generator, Water softening system if needed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous steam treatment systems</td>
<td>Capable of treating cultures and stocks, sharps, materials contaminated with blood and body fluids, isolation and surgery waste, laboratory waste (excluding chemical waste) and ‘soft’ waste (including gauze, bandages, drapes, gowns and bedding) from patient care. Large and bulky bedding material and</td>
<td>100 to over 1,000 kg/hour.</td>
<td>Enclosure and foundation, Electrical connections, Water supply, Drains, Ventilation, ISDN line with modem for remote computer service, Water softening system if needed.</td>
<td></td>
</tr>
<tr>
<td>Batch microwave systems</td>
<td>sealed heat-resistant containers are easily treated in continuous steam treatment systems. It is theoretically possible to treat pathological waste including anatomical parts in continuous steam treatment systems with internal shredders. Volatile and semi-volatile organic compounds, chemotherapeutic waste, mercury, other hazardous chemical waste, and radiological waste should not be treated in steam treatment systems.</td>
<td>• Manufacturers' rated capacities range from 30 to 210 kg/hour.</td>
<td>• Electrical connection and water supply.</td>
<td></td>
</tr>
</tbody>
</table>

Cultures and stocks, sharps, materials contaminated with blood and body fluids, isolation and surgery waste, laboratory waste (excluding chemical waste) and soft waste (e.g. gauze, bandages, drapes, gowns and bedding) from patient care.

Some microwave technologies are not recommended for tightly sealed glass bottles that contain fluid since the pressure inside could cause the bottles to burst. The problem is avoided by leaving glass bottles partially opened.

Needles and other sharp metal objects should be in puncture-safe needle containers. Sharps containers should not be hermetically sealed to allow steam penetration.

Volatile and semi-volatile organic compounds, bulk chemotherapeutic wastes, mercury, other hazardous chemical wastes, and radiological wastes should not be treated.
Continuous Microwave System

- Cultures and stocks, sharps, materials contaminated with blood and body fluids, isolation and surgery waste, laboratory waste (excluding chemical waste) and soft waste (e.g. gauze, bandages, drapes, gowns and bedding) from patient care.

- Because of the internal shredder and moist heat environment, tightly sealed glass vials and bottles containing fluids, as well as metal objects such as sharps, needles, blades, lancets, etc. can be treated without any difficulty by the continuous microwave technology.

- Microwave units with internal shredders, can theoretically be used for pathological waste, just like hybrid autoclaves and continuous steam treatment systems with internal shredders.

- Volatile and semi-volatile organic compounds, bulk chemotherapeutic wastes, mercury, other hazardous chemical wastes, and radiological wastes should not be treated in a microwave.

| Continuous Microwave System | Be treated in a microwave. | 100 to 250 kg/hour | - Foundation
- Electrical connections
- Water supply
- Steam supply unless an optional steam generator is included. |

Frictional Heat Treatment

- Infectious waste that can include cellulose (e.g., gauze and bandages), glass, plastics, metals (needles, lancets and other sharps waste), liquids, and pathological waste (including anatomical parts).

| Frictional Heat Treatment | 10 to 500 kg per hour | - Foundation
- Electrical connections
- Water supply
- Drain for wastewater discharge
- Exhaust vent for vapor discharge |

Dry Heat Treatment Systems

- Intended to treat sharps waste and small amounts of

| Dry Heat Treatment Systems | 0.2-0.3 kg/hour | - A small space and electric power supply. |
### Infectious Waste Management Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
<th>Capacity Range</th>
<th>Equipment and Safety Features</th>
</tr>
</thead>
</table>
| **Alkaline Hydrolysis** | Pathological waste, organs, tissues, cadavers, anatomical parts and contaminated animal carcasses. Can also treat biological stocks, cultures, liquid blood, body fluids, and other types of infectious waste. Process can degrade aldehydes, such as formaldehyde and glutaraldehyde waste which are commonly used in healthcare and research settings and may be found in pathological and animal wastes. Many chemotherapeutic agents, such as Cyclophosphamide, Chlorambucil, Melphalan, Uracil Mustard, Daunomycin, etc., are also destroyed by alkaline hydrolysis. The treatment system should not be used for wastes containing aluminum, tin, zinc, magnesium, copper, or galvanized iron (as these metals could react to form hydrogen gas), as well as concentrated acids, flammable liquids and organohalogen compounds (especially trichloroethylene), and nitromethane and other similar nitro compounds. | 15 to 4500 kg per load, with treatment cycles ranging from 3 to 8 hours depending on temperature, pressure, alkali concentration, and mixing efficiency | • Enclosure and foundation  
• Sewer  
• Water supply  
• Steam (unless an electric or gas-fired steam generator is used)  
• Electrical connections  
• Air |
| **Chemical**            | Dissolved chlorine dioxide, bleach, peracetic acid, lime solution, ozone gas, or dry inorganic chemicals | Liquid waste such as blood, urine, stools or hospital sewage. Infectious HCWs, including microbiological cultures and sharps, have also been disinfected chemically but using the proper concentration and ensuring contact | Capacities ranging from 40 kg/hour to 700 kg/hour. | • Adequate floor space and foundation  
• Electrical connections  
• Water supply  
• Drain to the sanitary sewer  
• Ventilation possibly including local exhaust |
| **Biological** | Composting, vermiculture, biodeposition, natural decomposition through burial | Cadavers, tissues and anatomical parts, placentas, kitchen waste | ventilation  
- Separate well-ventilated area for chemical storage  
- Eyewash station, sink, and safety shower as needed; storage area for personal protection equipment. |
| **Mechanical** | Shredding, grinding, mixing, and compaction |  |  |
| **Inertisation** | Mixing waste with a mixture containing lime, cement and water in order to minimize the risk of toxic substances | It is a suitable technology for disposing of pharmaceuticals and incineration ashes with a high metal content. |  |
### Table 5: HCWM monitoring and evaluation framework

#### 6.1 a) Review and harmonize legal, regulatory, policy and administrative framework of health care waste

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values</th>
<th>Frequency</th>
<th>Data Source/Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>YR1</td>
<td>YR2</td>
<td>YR3</td>
<td>YR4</td>
</tr>
<tr>
<td>Review HCW Guidelines</td>
<td></td>
<td># reviewed</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Advocating and creation of HCWM database in HMIS</td>
<td></td>
<td>Database created</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

#### b) To create community awareness on acceptable health care waste management

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values</th>
<th>Frequency</th>
<th>Data Source/Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>YR1</td>
<td>YR2</td>
<td>YR3</td>
<td>YR4</td>
</tr>
<tr>
<td>Advocacy on HCWM to parliamentarians</td>
<td></td>
<td># of meetings held</td>
<td>160</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Conducting quarterly collaborative meetings with line ministries and Stakeholders</td>
<td></td>
<td># of meetings held</td>
<td>0</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Designing, Printing and distribution of IEC Materials in HCWM</td>
<td></td>
<td>%</td>
<td>0</td>
<td>50</td>
<td>75</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Training 7360 health workers in HCWM country</td>
<td></td>
<td># trained</td>
<td>0</td>
<td>2000</td>
<td>3500</td>
<td>5000</td>
<td>6360</td>
</tr>
<tr>
<td>Activity</td>
<td># trained</td>
<td>0</td>
<td>750</td>
<td>1500</td>
<td>2250</td>
<td>2985</td>
<td>3715</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----------</td>
<td>----</td>
<td>-----</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Training of 3715 general workers in health facilities involved in waste handling</td>
<td># trained</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training of 20 medical equipment officers in maintenance and servicing new HCWM equipment</td>
<td># trained</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orientating 30 Medical Equipment Technicians in new HCWM equipment</td>
<td># trained</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conducting National Health Care Waste Risk Assessment annually</td>
<td># of HRA conducted</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Report writing for risk assessment and publication</td>
<td># of reports</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Holding Provincial quarterly HCWM Performance review meetings</td>
<td># of meetings held</td>
<td>0</td>
<td>40</td>
<td>80</td>
<td>120</td>
<td>160</td>
<td>200</td>
</tr>
<tr>
<td>Conducting short training course of 6 officers in Radiation Protection and Radioactive Waste Management- Cancer Hospital</td>
<td># trained</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
c) Procure and introduce alternative appropriate equipment and technologies for treatment of HCW

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values</th>
<th>Frequency</th>
<th>Data Source/Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procuring and installation of 106 incinerators with adequate capacity to handle Health Care Waste</td>
<td># procured</td>
<td>0</td>
<td>18</td>
<td>25</td>
<td>30</td>
<td>33</td>
<td>106</td>
</tr>
<tr>
<td>Procure Non-Incineration Treatment Options at pilot sites</td>
<td># procured</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Levy Hospital (Central location)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 3: Ndola Central Hospital</td>
<td>#tendered</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Level 2: Kabwe General Hospital</td>
<td>#tendered</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Level 1: Kapiri Mposhi and Kamchanga District Hospitals</td>
<td>#tendered</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Mukonchi Rural Health Center</td>
<td>#tendered</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Adverts, Evaluation and tendering the procurement of none incineration technologies</td>
<td># tendered</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Procure on site needle stick crushers</td>
<td># of needle sticks crushers procured</td>
<td>0</td>
<td>140</td>
<td>250</td>
<td>340</td>
<td>415</td>
<td>415</td>
</tr>
</tbody>
</table>
6.2. a) To provide adequate equipment, tools and infrastructure for HCWM

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values</th>
<th>Frequency</th>
<th>Data Source/Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>YR1</td>
<td>YR2</td>
<td>YR3</td>
<td>YR4</td>
</tr>
<tr>
<td>Orient incinerator operators in maintenance and servicing</td>
<td># Oriented</td>
<td>0</td>
<td>106</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>106</td>
</tr>
<tr>
<td>Procure approved equipment and tools such as trollies, wheel bins, waste bins, weighing scales, bin liners, air monitoring equipment, PPEs, tricycles and Hand tools.</td>
<td># of units procured</td>
<td>0</td>
<td>800</td>
<td>1600</td>
<td>2000</td>
<td>-</td>
<td>2000</td>
</tr>
<tr>
<td>Constructing approved storage facilities for HCW</td>
<td># constructed</td>
<td>0</td>
<td>30</td>
<td>60</td>
<td>80</td>
<td>106</td>
<td>106</td>
</tr>
<tr>
<td>Construction of 838 brick lined incinerators in health facilities where they none exist.</td>
<td># constructed</td>
<td>0</td>
<td>300</td>
<td>600</td>
<td>700</td>
<td>800</td>
<td>838</td>
</tr>
<tr>
<td>Procurement of 50 generators for 3rd, 2nd and 1st level hospitals including some big HCs</td>
<td># procured</td>
<td>25</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>50</td>
</tr>
<tr>
<td>Construct housing for incinerators</td>
<td># constructed</td>
<td>-</td>
<td>50%</td>
<td>100%</td>
<td>-</td>
<td>-</td>
<td>100%</td>
</tr>
<tr>
<td>Indicator Name</td>
<td>Core</td>
<td>Unit of Measure</td>
<td>Baseline</td>
<td>Cumulative Target Values</td>
<td>Frequency</td>
<td>Data Source/Methodology</td>
<td>Responsibility for Data Collection</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>-----------------</td>
<td>----------</td>
<td>--------------------------</td>
<td>-----------</td>
<td>--------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Repair of incinerators</td>
<td></td>
<td># repaired</td>
<td>0</td>
<td>100</td>
<td>200 200 100 600 annually</td>
<td>Maintenance report</td>
<td>MoH</td>
</tr>
<tr>
<td>Repair and servicing generators</td>
<td></td>
<td># repaired</td>
<td>0</td>
<td>-</td>
<td>20 10 20 annually</td>
<td>Maintenance report</td>
<td>MoH</td>
</tr>
<tr>
<td>Procure 40 bins for radiation isotope wastes</td>
<td></td>
<td># procured</td>
<td>0</td>
<td>20</td>
<td>20 - - 40 Twice</td>
<td>Procurement report</td>
<td>MoH</td>
</tr>
<tr>
<td>Procurement of cytotoxic spill kits</td>
<td></td>
<td># procured</td>
<td>0</td>
<td>100</td>
<td>200 300 -400 400 Annually</td>
<td>Procurement report</td>
<td>MoH</td>
</tr>
<tr>
<td>Procuring 1,500 Biohazard Bags for the Laboratory - Cancer Diseases Hospital</td>
<td></td>
<td># procured</td>
<td>0</td>
<td>200</td>
<td>400 800 1200 1500 Annual</td>
<td>Procurement report</td>
<td>MoH</td>
</tr>
</tbody>
</table>

b) Pre-treatment, collection, storage, transportation and final disposal of HCW

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values</th>
<th>Frequency</th>
<th>Data Source/Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitization of contractors in waste management collection</td>
<td></td>
<td># of sensitization</td>
<td>0</td>
<td>200</td>
<td>200 200 200 800 quarterly</td>
<td>Reports</td>
<td>Health promotion officers</td>
</tr>
<tr>
<td>Conduct technical support to health facilities in HCWM</td>
<td></td>
<td>Technical support done</td>
<td>0</td>
<td>40</td>
<td>80 120 160 200 quarterly</td>
<td>Reports</td>
<td>Health promotion officers</td>
</tr>
</tbody>
</table>

6.3 Maintenance of HCWM equipment and tools

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values</th>
<th>Frequency</th>
<th>Data Source/Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
</table>
### 6.4 Provision of code of conduct, standard operating procedures and technical guide lines for safety measures in HCWM

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values</th>
<th>Frequency</th>
<th>Data Source/ Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing of standard operating procedures guide lines for health facilities</td>
<td></td>
<td># of SOPs developed</td>
<td>0</td>
<td>3000 1000 - - 4,000</td>
<td>Quarterly</td>
<td>Reports</td>
<td>Health promotion</td>
</tr>
<tr>
<td>Production and printing of 2000 copies of SOPs</td>
<td></td>
<td># SOPs produced &amp; printed</td>
<td>0</td>
<td>2000 - - 2,000</td>
<td>Once</td>
<td>Production reports</td>
<td>Health promotion</td>
</tr>
</tbody>
</table>
## Distribution of SOPs in health facilities

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th># of SOPs distributed</th>
<th>0</th>
<th>2000</th>
<th>-</th>
<th>-</th>
<th>2,000</th>
<th>Quarterly</th>
<th>Reports</th>
<th>Health promotion</th>
</tr>
</thead>
</table>

### 6.5 Capacity building

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values</th>
<th>Frequency</th>
<th>Data Source/ Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing of standard operating procedures guide lines for health facilities</td>
<td>%</td>
<td>0</td>
<td>100%</td>
<td>-</td>
<td>-</td>
<td>100%</td>
<td>documents</td>
</tr>
<tr>
<td>Production and printing of 2000 copies of SOPs</td>
<td>0</td>
<td>900</td>
<td>500</td>
<td>600</td>
<td>2000</td>
<td>quarterly</td>
<td>Documents</td>
</tr>
<tr>
<td>Distribution of SOPs in health facilities</td>
<td>percentage</td>
<td>0</td>
<td>100%</td>
<td>-</td>
<td>-</td>
<td>100%</td>
<td>Record of distribution</td>
</tr>
</tbody>
</table>

### 6.6 Provision of code of conduct, standard operating procedures and technical guide lines for safety measures in HCWM

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values</th>
<th>Frequency</th>
<th>Data Source/ Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing of standard operating procedures guide lines for health facilities</td>
<td>percentage</td>
<td>0</td>
<td>100%</td>
<td>-</td>
<td>-</td>
<td>100%</td>
<td>documents</td>
</tr>
<tr>
<td>Production and printing of</td>
<td>0</td>
<td>900</td>
<td>500</td>
<td>600</td>
<td>2000</td>
<td>quarterly</td>
<td>Documents</td>
</tr>
</tbody>
</table>
2000 copies of SOPs | 0 | 100% | - | - | - | 100% | Record of distribution | MoH

### 6.7 Creation of regional centralized disposal facilities to handle large quantities of HCW

<table>
<thead>
<tr>
<th>Indicator Name</th>
<th>Core</th>
<th>Unit of Measure</th>
<th>Baseline</th>
<th>Cumulative Target Values</th>
<th>Frequency</th>
<th>Data Source/Methodology</th>
<th>Responsibility for Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement of Private Partnership to collect waste from health facilities.</td>
<td># of PP engaged in waste management. Vehicles procured</td>
<td>0</td>
<td>YR1</td>
<td>YR2</td>
<td>YR3</td>
<td>YR4</td>
<td>End Target</td>
</tr>
<tr>
<td>Procurement of 12 suitable vehicles for supervision and monitoring of HCWM</td>
<td># of vehicles procured</td>
<td>0</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Procurement of 116 Motorbikes for use in supervision by HCW managers</td>
<td># of motorbikes procured</td>
<td>0</td>
<td>116</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>116</td>
</tr>
<tr>
<td>Running and maintenance cost of 116 motor bikes and 12 vehicles.</td>
<td># of vehicles maintained</td>
<td>0</td>
<td>122</td>
<td>122</td>
<td>122</td>
<td>122</td>
<td>-</td>
</tr>
<tr>
<td>Environmental licensing for health facilities</td>
<td>Percentage of facilities licensed</td>
<td>0</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
6.8 To Create Community awareness on acceptable Health Care Waste Management

A. Conduct WASH in Health Facilities coordination stakeholders’ meetings at national level

| # meetings conducted | 0 | 4 | 8 | 12 | 16 | 20 | quarterly minutes | MoH |

B. Conduct WASH in Health Facilities meetings at provincial level

| # meetings conducted | 0 | 4 | 8 | 12 | 16 | 20 | quarterly minutes | PHO |

C. Conduct WASH in Health Facilities meetings at district level

| # meetings conducted | 0 | 4 | 8 | 12 | 16 | 20 | quarterly minutes | DHD |

Table 6: Monitoring and Evaluation: Monitoring and evaluation

4.2.1 Review and Harmonise legal, regulatory, policy and administrative framework of health-care waste

<table>
<thead>
<tr>
<th>No.</th>
<th>Action</th>
<th>Coordination</th>
<th>Supervision</th>
<th>Indicator of achievement</th>
</tr>
</thead>
</table>

9.1. To Create Community awareness on acceptable Health Care Waste Management

<table>
<thead>
<tr>
<th>No.</th>
<th>Action</th>
<th>Coordination</th>
<th>Supervision</th>
<th>Indicator of achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Action</td>
<td>Coordination</td>
<td>Supervision</td>
<td>Indicator of achievement</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>a)</td>
<td>Conduct meetings with stakeholders</td>
<td>AD-EH</td>
<td>MOH</td>
<td>Number of meetings conducted</td>
</tr>
<tr>
<td>b)</td>
<td>Support on-site training for all relevant staff in HCWM</td>
<td>AD-EH</td>
<td>MOH</td>
<td>Number of on-site supports conducted</td>
</tr>
</tbody>
</table>

9.2 Procure and introduce alternative appropriate equipment and technologies for treatment of HCW

<table>
<thead>
<tr>
<th>No.</th>
<th>Action</th>
<th>Coordination</th>
<th>Supervision</th>
<th>Indicator of achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Procure 106 incinerators which are environmentally friendly and with adequate capacity to handle waste</td>
<td>DIME</td>
<td>MOH</td>
<td>Approved incinerators with adequate capacity</td>
</tr>
<tr>
<td>b)</td>
<td>Procure Non incineration treatment options</td>
<td>DIME</td>
<td>MOH</td>
<td>Number of none incineration options procured</td>
</tr>
<tr>
<td>c)</td>
<td>Procure Onsite needle stick crushers</td>
<td>DIME/AD-EH</td>
<td>MOH</td>
<td>Number of onsite needle stick crushers procured</td>
</tr>
<tr>
<td>d)</td>
<td>Advocate for capacity building for the incinerator operators in maintenance and servicing</td>
<td>AD-EH</td>
<td>MOH</td>
<td>Number of advocacy meeting conducted</td>
</tr>
</tbody>
</table>

9.3 Inadequate equipment, tools and infrastructure for HCWM

<table>
<thead>
<tr>
<th>No.</th>
<th>Action</th>
<th>Coordination</th>
<th>Supervision</th>
<th>Indicator of achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Procure approved equipment and tools such as trolleys, wheel bins, tricycles, waste bins, bin liners, weighing scales, Air monitoring equipment, personal protective equipment and hand tools</td>
<td>CMEO/CEHO General</td>
<td>MOH</td>
<td>Procurement of tools and equipment done</td>
</tr>
<tr>
<td>b)</td>
<td>Construct approved storage facilities for health care waste.</td>
<td>Policy and Planning/DD – EOH (EOH)</td>
<td>MOH</td>
<td>Appropriate and approved infrastructure constructed</td>
</tr>
</tbody>
</table>

9.4 Pre-treatment, collection, storage, transportation and final disposal of HCWM

<table>
<thead>
<tr>
<th>No.</th>
<th>Action</th>
<th>Coordination</th>
<th>Supervision</th>
<th>Indicator of achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Short-term Capacity building of health care waste managers and operators</td>
<td>AD-EH</td>
<td>MOH</td>
<td>Number of Managers and operators capacity built</td>
</tr>
</tbody>
</table>
### 9.5 Maintenance of HCWM Equipment and tools

<table>
<thead>
<tr>
<th>No.</th>
<th>Action</th>
<th>Coordination</th>
<th>Supervision</th>
<th>Indicator of achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Operation and Maintenance of HCWM treatment equipment, trolleys, trolley bins, steel rods, brooms and waste ash buckets</td>
<td>DIME</td>
<td>MOH</td>
<td>All equipment repaired, replaced and working</td>
</tr>
<tr>
<td>b)</td>
<td>Maintenance of surroundings and fences of disposal sites.</td>
<td>PHO/DHD</td>
<td>MOH</td>
<td>Surroundings and fences maintained.</td>
</tr>
</tbody>
</table>

### 9.6 Provision of code of conduct, standard operating procedures and technical guidelines for safety measures HCWM.

<table>
<thead>
<tr>
<th>No.</th>
<th>Action</th>
<th>Coordination</th>
<th>Supervision</th>
<th>Indicator of achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Developing of standard operating procedure guidelines in health facilities</td>
<td>AD-EH</td>
<td>MOH/</td>
<td>SOPs and guidelines developed</td>
</tr>
<tr>
<td>b)</td>
<td>Distribution of SOPs to all health facilities</td>
<td>AD-EH</td>
<td>MOH/</td>
<td>SOPs and guidelines distributed</td>
</tr>
</tbody>
</table>

### 9.7 Creation of regional centralized disposal facilities to handle large quantities of HCW

<table>
<thead>
<tr>
<th>No.</th>
<th>Action</th>
<th>Coordination</th>
<th>Supervision</th>
<th>Indicator of achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Procure suitable vehicles for transportation of health care waste</td>
<td>AD-EH</td>
<td>MOH</td>
<td>Number of vehicles procured.</td>
</tr>
<tr>
<td>b)</td>
<td>Procure suitable vehicles for supervision of Health care waste</td>
<td>AD-EH</td>
<td>MoH/</td>
<td>Vehicles for supervision procured</td>
</tr>
<tr>
<td>c)</td>
<td>Running and maintenance costs for operational vehicles</td>
<td>AD-EH</td>
<td>MOH/</td>
<td>Plan for running and maintenance cost adhered to.</td>
</tr>
<tr>
<td>d)</td>
<td>Environmental Licensing for the Health Facilities</td>
<td>AD-EH</td>
<td>MOH/</td>
<td>All health facilities licenced.</td>
</tr>
<tr>
<td>e)</td>
<td>Monitoring standard operating procedures on;</td>
<td>AD-EH</td>
<td>MOH/</td>
<td>Number of monitoring and supervision visits recorded and reports available.</td>
</tr>
</tbody>
</table>
- Personal Protective Equipment

f) Monitoring and Supervision          AD-EH   MOH/  Number of monitoring and supervision visits recorded and reports available.

g) End of 2\textsuperscript{nd} year (midterm) evaluation of the project)  Consultant   MOH  Project evaluated

Table 7: Risks/assumptions Analysis and Risk Mitigation Measures for HCWM

<table>
<thead>
<tr>
<th>Risks/ Assumptions</th>
<th>Level</th>
<th>Mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lack of coordination among key ministries and stakeholders</td>
<td>Medium</td>
<td>Strengthening collaboration meeting among line ministries and key stakeholders.</td>
</tr>
<tr>
<td>2. The Ministry of Health / Government might not fund the implementation of HCWM due to inadequate resources.</td>
<td>Medium</td>
<td>Realign the plan with the National Development Plan [ Lobby and collaborate with cooperating partners for possible funding ]</td>
</tr>
<tr>
<td>3. Slow or no enhancement, adoption and implementation of national policies, plans and strategies (including guidelines and standards) on HCWM which are key in creating an enabling environment for the country.</td>
<td>Medium</td>
<td>Lobby and collaborate with stakeholders and cooperating partners for the support in the implementation of NHCWM.</td>
</tr>
<tr>
<td>4. Slow Review and harmonisation of the legal and regulatory framework work.</td>
<td>High</td>
<td>The MoH and all Committees to outline responsibilities and timelines. The evaluation project component will identify problems and recommend improvements.</td>
</tr>
<tr>
<td>5. Technology procurement beset by delays, inadequate equipment, wrong specifications, lack of transparency, or non-compliance with ZPPA bidding requirements and procedures.</td>
<td>High</td>
<td>Implement E-Procurement system to enable compliance, transparency and efficiency. [ The competitive bidding process for the non-incineration technologies will be centralized for whole country and will be transparent and adhere strictly to ZPPA requirements and procedures. ]</td>
</tr>
<tr>
<td>Risks/ Assumptions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Health care Facilities discontinue the use of none incineration technologies after the project comes to an end, and discontinue the maintenance resulting in their ultimate breakdown and return to open burning and incineration.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>Mitigation measures</th>
</tr>
</thead>
</table>
| High  | The most important aspect of the success of these types of projects is whether HCFs are able to keep up the best environmental practices they take up as part of the project and are able to ensure that newly installed technologies are regularly maintained and serviced so that they keep operating long beyond the project’s duration.  

The single most important aspect of sustainability in the area of HCWM, is keeping the HCWM expenditures as low as possible, ensuring that high quality maintenance capacity is available at local and national level, and ensuring that HCFs continue to be committed to HCWM and have at their disposal a budget line exclusively for HCWM.  

The plan will ensure that: i) non-incineration technologies are procured with a maintenance and insurance scheme for a minimum of 5 years beyond the plan’s duration; ii) at national level, with the help of distributors, maintenance teams are set-up and trained upon which the HCFs can call when technologies require maintenance or repair; iii) maintenance teams and operators at HCFs are trained in day-to-day maintenance procedures; iv) At national, provincial and district level, the plan will advocate for (and include in national policies and regulations) the compulsory allocation of a HCWM budget.  

As much as possible, agreements will be made with manufacturers and distributors to ensure the availability of parts and technical support for repair and maintenance of technologies. The national plan will establish a certification program under which accredited parties can certify the quality of non-incineration technologies.  

The teams of national experts will be encouraged to form a network for the purpose of information exchange, and professional development.  

The plan will also support HCFs in improving segregation, and recycling (of disinfected plastic waste fractions, composting, etc.) in order for the amount of
<table>
<thead>
<tr>
<th>Risks/ Assumptions</th>
<th>Level</th>
<th>Mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Insufficient number of technology suppliers involved in the bidding and/or high purchase costs.</td>
<td>Medium</td>
<td>Ensuring sufficient outreach to vendors, conducted within the scope of HCWM projects, will ensure sufficient vendors. Centralized high-volume procurement will help lower prices. Procurement facilitated by ZPPA will ensure that long-term agreements with various international suppliers can be relied upon.</td>
</tr>
<tr>
<td>8. Little confidence of healthcare facilities and providers in non-incineration technologies, resulting in continued use of inadequate incinerators.</td>
<td>Low</td>
<td>“Recipients facilities” that are successfully using non-incineration technologies will provide decision-makers at HCFs, Districts, provincial and National level with information on their experiences with non-incineration technologies.</td>
</tr>
</tbody>
</table>
3.12 POTENTIAL RISKS AND MITIGATION MEASURES

This document has highlighted the potential risks which could be encountered during the implementation of the project activities. It has also outlined the mitigation measures for the risks identified so that the risks are eliminated or minimized while benefits are enhanced.

Table 8: Potential risk and mitigation measures

<table>
<thead>
<tr>
<th>Potential risks</th>
<th>Mitigation measure</th>
<th>Responsible organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health workers at risk of disease transmission from HCW</td>
<td>• Training of health workers in HCWM&lt;br&gt;• Procurement of appropriate PPEs.&lt;br&gt;• Ensure that workers put on personal protective equipment.&lt;br&gt;• Prevention messages on exposure through IEC materials</td>
<td>MoH</td>
</tr>
<tr>
<td>Risk of disease transmission to scavengers</td>
<td>• Construct housing for incinerator.&lt;br&gt;• Restrict accessibility to the incineration area by fencing.&lt;br&gt;• Collection and disposal of ash at designated sites with restricted access</td>
<td>MoH/MLG</td>
</tr>
<tr>
<td>Air Pollution from Incineration</td>
<td>• Training of Incinerator Operators.&lt;br&gt;• Regular servicing of Incinerators.&lt;br&gt;• Post installation maintenance.&lt;br&gt;• Monitoring of the performance of Incinerators in Health facilities.&lt;br&gt;• Management of individual incinerators against overload</td>
<td>MoH/ MoH/ZEMA Respective managements at health facilities and Hospitals</td>
</tr>
</tbody>
</table>

3.13 Summary Recommendations
The Ministry of Health in collaboration with other stakeholders should ensure that the following issues are addressed in order to effectively manage HCW

Box 8: Summary

- Ensure that the guidelines for the sound management of HCW are reviewed to incorporate Non incineration treatment and disposal options. Review and suggest amendment of the Public Health Act to include a component on HCWM
- Collaborate with local authority agencies to develop Bye-laws that will deal more strictly with health-care waste.
- Develop health-care waste management plans, which are designed to salvage the capacity of HCFs and bring them to acceptable levels of sustainability
- Establish health management information systems on waste generation at all health care facilities.
- Establish HCW inventories for each facility using the same classification by type of waste.
- Facilitate development of integrated waste management plans for all levels of health care facilities.
- Institute best operating practices, to facilitate waste management procedures.
- Facilitate research in HCW characterization related to waste quantities and composition.
- Develop a culture in all health care facilities that will inculcate appropriate behavioural change among stakeholders to enhance success.
- Create HCW awareness raising campaigns through the use of electronic and print media (television, radio, pamphlets, posters, leaflets and brochures) to enhance capacity to deal with risks associated with health-care waste.

Table 9: Summary of types of treatment and disposal methods for HCW

<table>
<thead>
<tr>
<th>Method</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| Double chamber/rotary kiln incineration | - Elimination of health risks due to the complete destruction of the waste  
- Fully destroys microorganisms and sharps 
- Reduces volume and weight of waste 
- Destroys all types of organic and inorganic waste | - High investment and operation costs 
- Requires skilled staff to operate 
- Emit toxic flue gases 
- Generates residues that need safe land-filling |
| Single chamber or drum/brick incineration | - Good disinfection efficiency 
- Reduces volume and weight of waste 
- No need for highly trained operators | - Emission of atmospheric pollutants 
- Need for periodic removal of slag and soot 
- Inefficient in destroying thermally resistant chemicals and drugs 
- No destruction of sharps |
| Autoclaving                           | - Relatively simple to operate | - Relatively expensive to install and operate 
- Requires boiler and stack emissions controls 
- Relatively high maintenance costs 
- Generates contaminated wastewater that needs treatment |
| Microwave irradiation                 | - The shredding process reduces the volume of the waste 
- Once treated, waste can be land filled with other municipal waste 
- No air pollution | - Highly sophisticated and complex 
- High investment and running costs 
- Only solids can be treated and only when shredded 
- Cannot be used to treat pharmaceutical and cytotoxic waste 
- Highly skilled operators required 
- No reduction of the weight of the waste treated |
### Chemical disinfection
- The shredding process reduces the volume of the waste
- Cannot be used to treat pharmaceutical and cytotoxic waste
- Skilled operators required
- Chemicals used are themselves hazardous and require special precautions when used

### Encapsulation
- Simple, low cost and safe
- May be used for sharps
- Reduces the risk of scavengers gaining access to the waste
- Generates hazardous waste water that needs treatment

### Inertisation
- Simple, low cost and safe
- May be used for pharmaceutical waste
- Not applicable to infectious waste

### Refuse pit
- Simple to operate
- Practically for limited periods of time and amount of waste
- Possibility of groundwater pollution
- Risky HCW is not treated and remains hazardous

### 3.14 Training strategy for Health Care Personnel
A policy for the management of health care waste cannot be effective unless it is applied carefully, consistently and universally. It is through training that standardization of waste handling practices and its management can be achieved.

#### 3.14.1 Personnel to be trained
Training activities should be targeted to the following main categories of health care personnel both from the public sector and the private sector.

- Environmental health Staff.
- All staff working in health facilities
- Cleaners, porters, auxiliary staff, incinerator operators and waste handlers.
- Pre-service students from Health training institutions.

#### 3.14.2 Training Package for HCWM
The content of staff education on infection prevention and health care waste management programme should contain the following:
- Justification for all aspects of health care waste policy;
- Explanation of the role and responsibilities of each health facility staff member in implementing the policy.

Technical instructions relevant for the target group under some or all of the following headings;
- Definition of health care waste
- Importance of proper waste disposal
- Classification of health care waste
• Handling health care waste
• Segregation of health care waste
• Safety measures when handling health care waste
• Recording and reporting accidents
• Health care waste disposal methods
• Laws relating to waste management.
• Personal Protective Equipment (PPEs)
• Occupational Health and Safety
• Education of health risks associated with bio-medical waste to health workers and members of the public through Information Education and Communication (IEC) materials in all media.
• Education on safe disposal practices and methods to all. The public has a right and responsibility to know how to handle home based health care medical waste.
• Pre and post-test for all participants
• Ebola Virus Disease (EVD) waste Management and safety

3.15 INSTITUTIONAL FRAMEWORK ON TRAINING AND CAPACITY BUILDING

The plan will be implemented through the existing health sector institutional framework. MOH will take the overall responsibility for coordinating trainings and capacity building to ensure success. However, several other key sector partners will also be involved in its implementation.

1. This will be coordinated through the existing health sector organisational and management structures.
2. Ministry of health will spearhead mobilisation of resources for sponsorship of the trainings to be conducted in HCWM in order to have fully qualified personnel to handle the program.
3. Provincial Health Office (PHO) under the Ministry of Health will be the focal point in capacity building and trainings in all the 10 provinces of Zambia.
   ➢ Provincial Health Offices: PHOs will serve as intermediaries for trainings and capacity building in the implementation of HCWM plan within their respective provinces.
4. The District Health Offices will be the ones to have more capacity building at both district and Health Centre Level and cascade it to the community health workers and all their support staffs
   ➢ Health service delivery facilities: Health Centres, Hospitals, Health Posts, and community level, capacity building will be done by the district health office.
5. Other line Ministries like Ministry of Local Government and Housing, and Ministry of Agriculture, Ministry of Livestock and Fisheries will be involved in the capacity building of the personnel who handle health care waste.
Key Sector Partners

All the key sector partners will play their respective roles in the capacity building of the personnel who will be involved in the implementation of this HCWM plan. In order to ensure efficient and effective coordination of the partnerships with all these players, MOH will strengthen inter-sector collaboration and coordination mechanisms at all levels.

The following are the key partners:

• **The Faith-Based Health Sector**: The CHAZ group is the largest partner to Government in the health sector and is currently the second largest provider of health services to the general public, after MOH. CHAZ will, therefore, play an important role in the training and capacity building and implementation of the HCWM plan, through their network of health facilities, which include hospitals, health centres and health posts, distributed throughout the country.

• **Civil Society and Non-Governmental Organisations (NGOs)**: The civil society, both local and international, will play an important role in the implementation of the plan. Some civil societies are involved in the health promotion, provision of health services, training and capacity building, while others are involved in advocacy for health. MOH will work towards promoting stronger coordination and participation of the civil society in the health sector, through the Sector-wide Approach.

Other stakeholders include:

- Higher learning institutions such as University of Zambia, Copperbelt University, Health Science Colleges (Nursing schools and Paramedic colleges)
- Private higher learning institutions offering health sciences.

The Government will work towards strengthening partnerships with the CPs, and harmonisation of their support efforts, for high impacts.
CHAPTER FOUR

NATIONAL PLAN OF ACTION

4.1. Introduction

This plan is based on the results of the situation analysis presented in chapter two (2) and subsequent recommendations arrived at in chapter three (3). In this plan it is advocated for individual institutions to adopt / develop their own waste management plans that are realistic and affordable for implementation. The development of such plans should provide for possible donor / agency support while considering existing conditions, needs and available possibilities for waste management arrangements. An appropriate, safe and cost-effective health-care waste management plan should concentrate on generation, storage, collection, treatment, recycling, transportation and options for final disposal.

This chapter gives the detailed short- and long-term actions, coordination and supervision structures, diversification of technology and equipment, indicators for achievement and the cost implications. It is the ambition of the Ministry of Health in collaboration with, Ministries responsible for lands, natural resources, environmental protection, local government, fisheries, livestock and its development partners that through the setting up of institutional structures, the implementation of this action plan will result in improved HCWM in Zambia.

4.2. Strategy for the implementation of the plan

In this strategic plan, all healthcare facilities in Zambia that generate HCW should set up customized waste management systems based on the most appropriate means of achieving the environmentally safe management of health care waste at a reasonable cost dependent on the level of operation. The implementation of this plan is proposed to run for 5 years beginning from 2020 to 2024. The starting point of a successful program is building capacity for advocacy among the operators and their partners by encouraging them to carry out a situation analysis and coming up with a plan of action.

This plan therefore, endeavours to tackle the HCWM challenges in Zambia that comprise the following components as addressed in the recommendations stated below:

a) Legal, regulatory and institutional framework
b) Standardise and customise HCWM best practices.
c) Waste minimisation
d) Funding for HCWM activities.
e) None availability of technology and equipment for management of HCW.
f) Capacity-building, training, and awareness-building measures.
g) Reduction of pollution associated with HCWM.

h) Monitoring and evaluation

4.3. Setting up financing mechanism for HCWM systems

Adequate resources such as financial, human, infrastructure and information resource are cardinal in setting up and strengthening HCWM systems. It is recommended that countries should identify, mobilise and progressively allocate enough funds to the management of health care waste (WHO, 1999).

In Zambia, solid waste management financing is supported by government through MLG, local authorities and cooperating partners. The similar mechanism is being encouraged for funding for HCWM through the Ministry responsible for health. The funding of HCWM shall translate into measurable outcomes, such as reductions in needle stick injuries, lower disease burdens, reduced environmental pollution, economic savings, etc. Furthermore, waste management expenses should be part of overhead costs built into healthcare programmes.

Currently the Ministry of Health funds maintenance and servicing of incinerators through medical equipment budget line, whilst other HCW necessary supplies are supported by individual health facilities because there is no specific budget line to support such activities. The financial resources are allocated as a block fund together with other activities hence it is difficult to quantify exactly how much goes specifically to waste management.

To implement this plan therefore, it is necessary to formulate policies to address the need for financial allocation for the management of HCW based on plans which have been developed and costed. The implementation of HCW management plan will be within the legal framework provided for under the Environmental Management Act. The HCWM Financial mechanism should be linked to HMIS to strengthen monitoring and evaluation.

4.4 HCWM Financing

The HCWMP is expected to be implemented with financial support from the Government Republic of Zambia (GRZ). Government funding will be supplemented by the World Bank, GEF-UNDP, Zambia Health Services Improvement Project (ZHSIP), Italian Government, Water Aid and World Health Organization (WHO). It is envisaged that to ensure sustainability of the HCWM system, institutions will be required to include HCWM financing in their annual actions plans.
### Table 10: Action Plan showing activities, responsible unit, time frame and cost

13.1 To Review and Harmonize Legal, Regulatory, Policy and Administrative Framework for Health Care Waste

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Level of Coordination</th>
<th>Supervision</th>
<th>Indicators of Achievement</th>
<th>Time Frame</th>
<th>Amount in $</th>
<th>Source of funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reviewing Health Care Waste Guidelines</td>
<td>DP/EPSD</td>
<td>MoH</td>
<td>Availability of a copy of the reviewed Health Care Waste Management Guidelines</td>
<td></td>
<td>600,000</td>
<td>GRZ/CPs</td>
</tr>
<tr>
<td>Advocating and creation of HCWM data base in HMIS</td>
<td>DP/EPSD</td>
<td>MoH</td>
<td>HCWM data included in HMIS</td>
<td></td>
<td>548,000</td>
<td>GRZ/CPs</td>
</tr>
<tr>
<td>Advocacy on HCWM to Parliamentarian/Private Hospitals</td>
<td>DP/EPSD (SD)</td>
<td>MoH</td>
<td>Number of MPs sensitised/Number of Hospitals sensitised</td>
<td></td>
<td>824,000</td>
<td>GRZ/CPs</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>1,972,000</strong></td>
<td><strong>126,410.26</strong></td>
</tr>
</tbody>
</table>

Initial Rate: US$1=K15.6
### 13.2 To Create Community Awareness on acceptable Health Waste Management Practices

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Level of Coordination</th>
<th>Indicators of Achievement</th>
<th>Time Frame</th>
<th>Cost ZMK Initial</th>
<th>Amount in $</th>
<th>Source of funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducting quarterly collaborative meetings with line ministries and Stakeholders</td>
<td>DHPESD MoH</td>
<td>Number of meetings held with line ministries and Stakeholders with minutes and action sheets</td>
<td></td>
<td>800,000</td>
<td>51,282.05</td>
<td>GRZ</td>
</tr>
</tbody>
</table>
| Designing, Printing and distribution of IEC Materials in HCWM                   | DHPESD MoH/
IEC Designed, printed and distributed                                      |                                                                                                              |            | 1,500,000        | 96,153.85        | GRZ               |
| Training 7360 health workers in HCWM country wide                              | DHPESD MoH/           | No. of health workers trained                                                                             |            | 14,564,324       | 933,610.51       | GRZ               |
| Training of health workers in HCWM countrywide in private health facilities     | DHPESD MoH/           | No. of health workers trained                                                                             |            | 600000           | 38,461.54        | Private/GRZ       |
| Training of 3715 general workers in health facilities involved in waste handling| PHO, DMO MoH/         | No. of general workers trained                                                                            |            | 9,113,755        | 584,215.06       | GRZ               |
| Training of 100 medical equipment officers in maintenance and servicing new HCWM equipment | DHPESD MoH/           | No of officers trained in maintenance and servicing                                                        |            | 800000           | 51,282.05        | GRZ               |
| Orientating 30 Medical Equipment Technicians in new HCWM equipment             | DHPESD MoH/           | Number of Medical Equipment Technicians oriented in new HCWM Technology Options                           |            | 900,000          | 57,692.31        | GRZ               |
| Conducting Health Care Waste Risk Assessment annually                           | DHPESD MoH/           | Report, Findings and Recommendations on Health Care Waste Risk Assessment available                          |            | 1,250,000        | 80,128.21        | GRZ               |
| Holding Provincial Quarterly HCWM Performance review meetings                  | DDDSC & PHO/DHO/QA MoH/ | Number of HCWM Review meetings held with minutes and action sheets                                         |            | 1,700,000        | 108,974.36       | GRZ               |
| Conducting short training course of 6 officers in Radiation Protection and Radioactive Waste Management in Cancer Hospital and other | RPA & QA MOH/        | Number of Officers trained in Radiation Protection                                                         |            | 600,000          | 38,461.54        | GRZ               |
### 13.3 To Procure and introduce alternative equipment and technologies for treatment of Health-Care Waste

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Level of Coordination</th>
<th>Supervision</th>
<th>Indicators of Achievement</th>
<th>Cost ZMK</th>
<th>Initial Amount in $</th>
<th>Source of funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procuring and installation of 106 incinerators with adequate capacity to handle Health Care Waste</td>
<td>CMEO</td>
<td>MOH</td>
<td>Number of approved incinerators with adequate capacity</td>
<td>31,800,000.00</td>
<td>2,038,461.54</td>
<td>GRZ</td>
</tr>
<tr>
<td>Procure Mautoclaves for Treatment for Health care waste</td>
<td>CEHO-G</td>
<td>MoH/</td>
<td>Non Incineration Treatment Options procured</td>
<td>10,000,000</td>
<td>641025.641</td>
<td>GRZ/CPs</td>
</tr>
<tr>
<td>Procurement of Central Incinerator - Disposal site</td>
<td></td>
<td></td>
<td>Central Incinerator Procured for Final Disposal sites (15 Sites)</td>
<td>15,765,481</td>
<td>1010607.756</td>
<td>GRZ</td>
</tr>
<tr>
<td>Procuring onsite needle stick crushers</td>
<td>CMEO / CEHO</td>
<td>MOH</td>
<td>Availability of Onsite needle stick crushers</td>
<td>80,000</td>
<td>12,698.41</td>
<td>GRZ</td>
</tr>
<tr>
<td><strong>Sub total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>57,645,481</strong></td>
<td><strong>3,702,793.35</strong></td>
<td></td>
</tr>
</tbody>
</table>
## 13.4 To provide adequate Equipment, Tools and Infrastructure for HCWM

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Level of Coordination</th>
<th>Supervision</th>
<th>Indicators of Achievement</th>
<th>Time Frame</th>
<th>Cost ZMK</th>
<th>Amount in $</th>
<th>Source of funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procuring approved equipment and Tools such as Trolleys, Wheel bins, Waste bins, Bin liners, Weighing Scales, Air monitoring equipment, Personal Protective Equipment and Hand tools</td>
<td>CMO/CEHO - G</td>
<td>MoH</td>
<td>Availability of HCWM Equipment and Tools</td>
<td>2010</td>
<td>29,935,715</td>
<td>1,918,956</td>
<td>GRZ/CPs</td>
</tr>
<tr>
<td>Constructing approved storage facilities for HCW</td>
<td>Policy and Planning/DDDS&amp; R</td>
<td>MoH/</td>
<td>Availability of approved HCW Storage facilities</td>
<td>2010</td>
<td>580,500</td>
<td>37,212</td>
<td>GRZ</td>
</tr>
<tr>
<td>Construction of 838 incinerators in health facilities where they are non-existing. *</td>
<td>Policy and Planning/DDDS&amp; R</td>
<td>MoH/</td>
<td>No. of incinerators constructed</td>
<td>2010</td>
<td>25,140,000</td>
<td>1,611,538</td>
<td>GRZ</td>
</tr>
<tr>
<td>Procurement and installation of 50 generators for 3rd, 2nd and 1st level hospitals including big HC's</td>
<td>Policy and Planning/DDDS&amp; R</td>
<td>MoH/</td>
<td>No. of Generators procured</td>
<td>2010</td>
<td>12,500,000</td>
<td>801,282</td>
<td>GRZ</td>
</tr>
<tr>
<td>Construction of 50 Generator shelters</td>
<td>Policy and Planning/DDDS&amp; R</td>
<td>MoH/</td>
<td>No. of Generators installed</td>
<td>2010</td>
<td>500,000</td>
<td>32,051</td>
<td>GRZ</td>
</tr>
<tr>
<td>Repair and servicing of generators</td>
<td>DIME</td>
<td>MoH/</td>
<td>No. of Generators repaired and serviced</td>
<td>2010</td>
<td>300,000</td>
<td>19,231</td>
<td>GRZ</td>
</tr>
<tr>
<td>Procuring 40 Bins for radiation isotope wastes</td>
<td>DIME</td>
<td>MoH/</td>
<td>Number of Radioactive storage bns in wards at Cancer Disease Hospital</td>
<td>2010</td>
<td>1,600,000</td>
<td>102,564</td>
<td>GRZ</td>
</tr>
<tr>
<td>Procurement of cytotoxic spill kits</td>
<td>DIME</td>
<td>MoH/</td>
<td>Availability of cytotoxic spill kits</td>
<td>2010</td>
<td>800,000</td>
<td>51,282</td>
<td>GRZ</td>
</tr>
<tr>
<td>Procuring 1,500 Biohazard Bags for the Laboratory - Cancer Diseases Hospital</td>
<td>DIME</td>
<td>MoH/</td>
<td>Availability of Biohazard Bags in the Laboratory at Cancer Diseases Hospital</td>
<td>2010</td>
<td>300,000</td>
<td>19,231</td>
<td>GRZ</td>
</tr>
<tr>
<td><strong>Sub total</strong></td>
<td></td>
<td></td>
<td></td>
<td>2010</td>
<td>71656215</td>
<td>11350192</td>
<td></td>
</tr>
</tbody>
</table>
### 13.5 To provide for the Pre-treatment, collection, storage, transportation and final disposal of HCW

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Level of Coordination</th>
<th>Supervision</th>
<th>Indicators of Achievement</th>
<th>Time Frame</th>
<th>Cost ZMK</th>
<th>Amount in $</th>
<th>Source of funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation training of Contractors in Health Care Waste Collection</td>
<td>DHPESD</td>
<td>MOH</td>
<td>Availability of Contractors sensitized in Health Care Waste Collection</td>
<td>Initial</td>
<td>140,000</td>
<td>8,974.36</td>
<td>GRZ</td>
</tr>
<tr>
<td>Conduct technical support to health facilities in HCWM</td>
<td>DHPESD</td>
<td>MOH</td>
<td>Technical support conducted</td>
<td>Initial</td>
<td>800,000</td>
<td>51,282.05</td>
<td>GRZ</td>
</tr>
<tr>
<td><strong>Sub total</strong></td>
<td></td>
<td></td>
<td></td>
<td>Initial</td>
<td>940,000</td>
<td>60,256.41</td>
<td></td>
</tr>
</tbody>
</table>

### 13.6 Maintenance of HCWM Equipment and Tools

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Level of Coordination</th>
<th>Supervision</th>
<th>Indicators of Achievement</th>
<th>Time Frame</th>
<th>Cost ZMK</th>
<th>Amount in $</th>
<th>Source of funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation and Maintenance of HCWM treatment equipment, trolleys, trolley bins, steel rods, brooms and waste ash buckets</td>
<td>DIME</td>
<td>MoH</td>
<td>All equipment repaired, replaced and working</td>
<td>Initial</td>
<td>1,500,000</td>
<td>96,153.85</td>
<td>GRZ</td>
</tr>
<tr>
<td>Maintenance of surroundings and fences of disposal sites.</td>
<td>PHO/DMO</td>
<td>MOH</td>
<td>Surroundings and fences maintained.</td>
<td>Initial</td>
<td>1,000,000</td>
<td>64,102.56</td>
<td>GRZ</td>
</tr>
<tr>
<td>Repair and maintenance of 515 existing ordinary incinerators and 60 micro burns.</td>
<td>PHO/DMO</td>
<td>MOH</td>
<td>No of incinerators repaired and maintained</td>
<td>Initial</td>
<td>7,337,500</td>
<td>470,352.56</td>
<td>GRZ</td>
</tr>
<tr>
<td><strong>Sub total</strong></td>
<td></td>
<td></td>
<td></td>
<td>Initial</td>
<td>9,837,500</td>
<td>630,608.97</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Level of Coordination</th>
<th>Supervision</th>
<th>Indicators of Achievement</th>
<th>Time Frame</th>
<th>Cost ZMK</th>
<th>Amount in $</th>
<th>Source of funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing of standard operating procedure guidelines for health facilities</td>
<td>DQA/DI</td>
<td>MoH/</td>
<td>Sops and Guidelines developed</td>
<td>x</td>
<td>309,140</td>
<td>19,816.67</td>
<td>GRZ</td>
</tr>
<tr>
<td>Production and printing of 2000 copies of SOPs</td>
<td>POLICY</td>
<td>MoH/</td>
<td>SOPs printed and produced</td>
<td>x</td>
<td>240,000.00</td>
<td>15,384.62</td>
<td></td>
</tr>
<tr>
<td>Distribution of SOPs to all Health Facilities</td>
<td>DQA/QI</td>
<td>MOH/</td>
<td>SOPs and Guidelines distributed</td>
<td>x</td>
<td>360,000</td>
<td>23,076.92</td>
<td>GRZ</td>
</tr>
<tr>
<td>Sub total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>909,140</td>
<td>58,278.21</td>
<td></td>
</tr>
</tbody>
</table>
### 13.8 Creation of regional centralized disposal facilities to handle large quantities of health-care waste

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Level of Coordination</th>
<th>Supervision</th>
<th>Indicators of achievement</th>
<th>Time Frame</th>
<th>Amount in $</th>
<th>Source of funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement of PP to collect waste from health facilities</td>
<td>QA/QI</td>
<td>MOH</td>
<td>Availability of suitable vehicles for HCW Transportation</td>
<td>1</td>
<td>1,282,051.28</td>
<td>GRZ</td>
</tr>
<tr>
<td>Procuring of 15 suitable vehicles for supervision and monitoring of HCWM</td>
<td>QA/QI</td>
<td>MOH</td>
<td>Availability of suitable vehicles for monitoring and supervision of HCW</td>
<td>2</td>
<td>396,923.08</td>
<td>GRZ</td>
</tr>
<tr>
<td>Procuring 116 Motor bikes for use by HCW Managers in Health facilities</td>
<td>QA/QI</td>
<td>MOH</td>
<td>Availability of Motor bikes for HCW programmes</td>
<td>3</td>
<td>260,256.41</td>
<td>GRZ</td>
</tr>
<tr>
<td>Running and maintenance costs for 116 motors and 12 vehicles</td>
<td>QA/QI</td>
<td>MOH</td>
<td>All vehicles maintained and running</td>
<td>4</td>
<td>14,102.56</td>
<td>GRZ</td>
</tr>
<tr>
<td>Environmental Licensing of Health Facilities</td>
<td>QA/QI</td>
<td>MOH</td>
<td>All Health Facilities licensed</td>
<td></td>
<td>256,410.26</td>
<td>GRZ</td>
</tr>
<tr>
<td>Supervision and monitoring</td>
<td>QA/QI</td>
<td>MOH</td>
<td>HCWM Activities supervised and monitored</td>
<td></td>
<td>320,512.82</td>
<td>GRZ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>One midterm evaluation conducted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,530,256.41</td>
<td></td>
</tr>
<tr>
<td><strong>GRAND TOTAL (Table 1-8)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20,499,057.08</td>
<td></td>
</tr>
</tbody>
</table>
### Ebola Plan for Social and Environmental Safe Guards

**Specific objectives:**

1. To supervise and monitor the various activities being implemented through the M &E framework
2. To evaluate the implementation of the CERIP to assess impact

<table>
<thead>
<tr>
<th>No.</th>
<th>Activity</th>
<th>Performance Indicator</th>
<th>Budget (USD)</th>
<th>Partner contribution (USD)</th>
<th>Funding Gap (USD)</th>
<th>Responsible Department</th>
<th>Time Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>Develop M &amp;E framework and SOPs</td>
<td>M &amp;E framework and SOPs developed</td>
<td>5,000</td>
<td>5,000</td>
<td>ZNPHI/MoH</td>
<td>Sep-Feb</td>
<td></td>
</tr>
<tr>
<td>7.2</td>
<td>Conduct quarterly supervisory visits to six selected sites at a unit cost of $6169</td>
<td># of supervisory visits conducted</td>
<td>30,014</td>
<td>30,014</td>
<td>ZNPHI/MoH</td>
<td>Sep-Feb</td>
<td></td>
</tr>
<tr>
<td>7.3</td>
<td>Impact assessment in the 12 at risk districts at a unit cost of $8333</td>
<td>End term evaluation conducted</td>
<td>100,000</td>
<td>100,000</td>
<td>ZNPHI/MoH</td>
<td>Sep-Feb</td>
<td></td>
</tr>
<tr>
<td>7.0 Monitoring and Evaluation Subtotal</td>
<td></td>
<td></td>
<td>135,014</td>
<td>0</td>
<td>135,014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRAND TOTAL</td>
<td></td>
<td></td>
<td>4,261,806</td>
<td>0</td>
<td>1,261,806</td>
<td>3,000,000</td>
<td></td>
</tr>
</tbody>
</table>

*These items have already been budgeted for under ZHSIP budget line*
5 References
ISWA (1996/7). International solid waste association year book
ISWA (1997/8). International solid waste association year book
NCS/GTZ 7. Gaborone Botswana
UNCED (1992). Agenda 21, Rio


United Nations Development Programme Countries: Ghana, Madagascar, Tanzania and Zambia. PROJECT DOCUMENT: Reducing UPOPs and Mercury Releases from the Health Sector in Africa
### 6.0 Annexes

**Annex 2. Capacity and characteristics for technologies recommended at each level**

<table>
<thead>
<tr>
<th>Level of institution</th>
<th>Capacity</th>
<th>Technology</th>
<th>Characteristic and maintenance</th>
</tr>
</thead>
</table>
| **Health Centre**    | 2 m. deep & filled to a depth of 1-1.5m. | • Land disposal with safe burying | • Burial site lined with low permeability  
• Suitable for hazardous and quantities of chemical waste |
| (Rural and Urban)    | One bag at a time. | • Brick incinerator | • Appropriate for infectious and general health-care waste  
• Not suitable for chemical residues, pharmaceutical, genotoxic, radioactive, inorganic compounds, thermal resistant waste, pressurized containers, halogenated plastics and heavy metals  
• Easy to operate but not suitable where air pollution is a problem |
|                      | 100-200 kg/day at 300-400°C | | |
| **First Level**      | As above | • Land disposal with safe burying | • As for health centre |
| (District Hospital)  | 80°C for 45 minutes.  
7–73% concentration | • Chemical disinfection  
• Formaldehyde (HCHO) | • Inactivate microorganisms, used on dry and solid waste with steam  
• Corrosive to metals with exception of stainless steel and aluminum  
• Suitable where safety is guaranteed |
|                      | 37-55% at 60– | • Ethylene | • As for formaldehyde except it is |

---

National Health Care Waste Management Plan  
Ministry of Health  
Page 82
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% humidity for 4 – 12 hrs.</td>
<td>Oxide (CH₂OCH₂)</td>
<td>Corrosive to rubber and plastics</td>
<td>Not recommended because it irritates the skin, eyes and it is carcinogenic (health hazards)</td>
</tr>
<tr>
<td>2% for 5min. &amp; 10hrs. on spores</td>
<td>Glutaraldehyde (CHO-(CH₂)₃CHO)</td>
<td>As for formaldehyde</td>
<td>Not to discharge into sewers</td>
</tr>
<tr>
<td>2 – 12% active chlorine</td>
<td>Sodium hypochlorite (NaOCI)</td>
<td>Active on bacteria, viruses, &amp; spores but ineffective on blood and stool</td>
<td>Corrosive to metal &amp; safe to plastic, Mild health hazards</td>
</tr>
<tr>
<td>0.5 to 3 tones/hr. at 1200 – 1600 °C</td>
<td>Rotary kiln incinerator</td>
<td>Appropriate for infectious, chemical and pharmaceutical waste</td>
<td>Not suitable for non-risk, radioactive, pressurized containers and heavy metals, Require trained personnel</td>
</tr>
</tbody>
</table>

**Second Level** (General Hospital)  
25 (50LA)  
- Land disposal with safe burying  
- As for health centre

200 kg to 10 tons / day at 800 – 900 °C  
- Pyrolytic incinerator  
- Appropriate for infectious, pathological, pharmaceutical and chemical residue waste  
- Not suitable for non-risk, genotoxic, radioactive, pressurized
<table>
<thead>
<tr>
<th>Level</th>
<th>Location</th>
<th>Method</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Level</td>
<td>Health Centre</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 – 8kg requires 60 minutes. At 121°C</td>
<td>Chemical disinfection</td>
<td>Suitable for larger facilities</td>
</tr>
<tr>
<td>Third Level</td>
<td>Central Hospital including National Reference (University Teaching Hospital, Chainama, Liteta,)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>As above</td>
<td>Land disposal with safe burying</td>
<td></td>
</tr>
<tr>
<td></td>
<td>As above</td>
<td>Pyrolytic incinerator</td>
<td>As for general hospital</td>
</tr>
<tr>
<td></td>
<td>As above</td>
<td>Chemical disinfection</td>
<td>As for district hospital</td>
</tr>
<tr>
<td></td>
<td>As above</td>
<td>Wet thermal or steam treatment</td>
<td>As for general hospital</td>
</tr>
<tr>
<td></td>
<td>250kg/hr</td>
<td>Microwave irradiation disinfector (teaching hospital)</td>
<td>Potential operation and maintenance problems</td>
</tr>
<tr>
<td>Regional waste disposal site</td>
<td>As above</td>
<td>Land disposal with safe burying</td>
<td>As for health centre</td>
</tr>
</tbody>
</table>
(Two centralized incinerators stationed in Lusaka and Copperbelt provinces)

<table>
<thead>
<tr>
<th>As above</th>
<th>Chemical disinfection</th>
<th>As for district hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>As above</td>
<td>Pyrolytic incinerator</td>
<td>As for general hospital</td>
</tr>
</tbody>
</table>
| 160kg/hr or one for 500kg/hr 4 - 7hrs / day  | Incinerator 350 LA or one for 1000 LA wood/coal fired | Multiple chamber design with automatic temperature control  
|                                               |                       | Hygienically destroy putrescible waste (hospital, abattoir, sewage works, industry, municipalities, etc.)  
|                                               |                       | Spare parts readily available in South Africa and requires trained personnel |

**Note:**

1. The final choice of treatment and disposal should be made carefully after taking into consideration advantages, disadvantages and other factors at play.
2. Use deep pits in rural areas.
3. No disposal of health-care waste for landfill on municipal dumpsites.
Annex 3: Biohazard symbols
Annex 4: List of individuals and organisations consulted during HCWM development and validation

Annex 5: Health Care Waste Management Training Plan

<table>
<thead>
<tr>
<th>S/N</th>
<th>ACTIVITY</th>
<th>CATEGORY/TARGET</th>
<th>PERIOD/ DURATION</th>
<th>KEY AREA</th>
<th>Total cost (ZMW)</th>
<th>USD($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. National level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Development of Health Care Waste Management training materials</td>
<td>Health workers and General workers</td>
<td>1 year</td>
<td>Healthcare waste management manual &amp; training material.</td>
<td>120 000</td>
<td>17 143</td>
</tr>
<tr>
<td>2.</td>
<td>Orienting staff in new HCWM equipment</td>
<td>Medical equipment technicians 3 participants from each of the 10 provinces</td>
<td>3 years</td>
<td>Installation, maintenance and servicing of equipment</td>
<td>900000</td>
<td>142,857.14</td>
</tr>
<tr>
<td>3.</td>
<td>Training of staff in new HCWM equipment</td>
<td>Medical equipment Officers 2 participants from each of the 10 provinces</td>
<td>3 years</td>
<td>Installation, maintenance and servicing of equipment</td>
<td>600000</td>
<td>95,238.09</td>
</tr>
<tr>
<td>4.</td>
<td>Advocacy</td>
<td>Parliamentarians (160) 150 from constituencies &amp; 10 nominated by the president.</td>
<td>1 day</td>
<td>• HCWM information system • Risks of HCWM • Infection Prevention • Legislation and policy • Non-incineration methods • Auditor General’s report • HCWM plan • Abel investment</td>
<td>206,000.00</td>
<td>32,698</td>
</tr>
</tbody>
</table>

B. Provincial level
<table>
<thead>
<tr>
<th>S/N</th>
<th>ACTIVITY</th>
<th>CATEGORY/TARGET</th>
<th>PERIOD/</th>
<th>KEY AREA</th>
<th>Total cost</th>
<th>USD($)</th>
</tr>
</thead>
</table>
| 1   | Conduct trainings on HCWM | MoH – Provincial program officers (80) ( 8 participants from each of the 10 provinces ) | 5 days | - HCWM information system  
- Risks of HCWM  
- Infection Prevention  
- Auditor General’s report  
- HCWM plan  
- Role of H/Ws in HCWM  
- Practical  
- WHO guidelines on PEP  
- Legislation and policy  
- Non incineration methods  
- UPOP  
- Abel investment  
- ZEMA | 432,626.67 | 68,670.90 |
|     | Conduct trainings on HCWM | Provincial program (30) officers – Training of Trainers ( 3 participants from each of the 10 provinces ) | 5 days | - HCWM information system  
- Risks of HCWM  
- Infection Prevention  
- Auditor General’s report  
- HCWM plan  
- Role of H/Ws in HCWM  
- Practical  
- WHO guidelines on PEP  
- Legislation and policy  
- Non incineration methods  
- UPOP  
- Abel investment  
- ZEMA | 263,087.50 | 41,759.92 |

National Health Care Waste Management Plan  
Ministry of Health  
Page 88
### C. District level

<table>
<thead>
<tr>
<th>Activity</th>
<th>DURATION</th>
<th>(ZMW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Conducting trainings on HCWM</td>
<td>5 days</td>
<td>1,733,087.50</td>
</tr>
<tr>
<td>(Management teams (DCMO)530 (5 participants from each of the 106 districts within the 10 provinces across the country)</td>
<td></td>
<td>275,093.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conducting trainings on HCWM</td>
<td>5 days</td>
<td>3,370,778.80</td>
</tr>
<tr>
<td>(Health workers 1060 (10 participants from each of the 106 districts in 10 provinces across the country)</td>
<td></td>
<td>535,044.25, 567.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General workers 1060 (10 participants from each of the 106 districts in 10 provinces across the country)</td>
<td>7 days</td>
<td>412,040</td>
</tr>
<tr>
<td></td>
<td></td>
<td>65,403.17</td>
</tr>
<tr>
<td>S/ N</td>
<td>ACTIVITY</td>
<td>CATEGORY/TARGET</td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td>-----------------</td>
</tr>
</tbody>
</table>
| D. Hospitals 3rd level | Conducting trainings on HCWM | Management teams (120) 20 participants from each of the 6, 3rd level institutions across the country. | 5 days | • HCWM information system  
• Types of HCWM  
• Risks of HCW  
• Role of all staff in HCWM  
• HCW and Climate Change  
• Infection Prevention  
• Legislation and policy  
• Non incineration methods  
• Practicals  
• PPEs  
• WHO guidelines on PEP  
• Advocacy for HCWM inclusion in the curriculum  
• ZEMA | 563,087.50 | 89,378.97 |
| Conducting trainings on HCWM | Health workers (150)  
25 participants from each of the 6, 3rd level hospitals around the country | 5days | • HCWM information system  
• Types of HCWM  
• Risks of HCW  
• Role of all staff in HCWM  
• HCW and Climate Change  
• Infection Prevention  
• Legislation and policy  
• Non incineration methods  
• Practicals  
• PPEs  
• WHO guidelines on PEP  
• Advocacy for HCWM inclusion in the curriculum  
• ZEMA | 521,543.75 | 82,784.72 |

| E. Hospital 1st level | Conducting trainings on HCWM | Management teams (410)  
5 participants from each 82 1st level hospital across the country | 5 days | • HCWM information system  
• Types of HCWM  
• Risks of HCW  
• Role of all staff in HCWM  
• HCW and Climate Change  
• Infection Prevention  
• Legislation and policy  
• Non incineration methods  
• Practicals  
• PPEs  
• WHO guidelines on PEP  
• Advocacy for HCWM inclusion in the curriculum  
• ZEMA | 1,496,087.50 | 237,474.20 |
| Conducting trainings on HCWM | Health workers (1230) 15 participants from each of the 82 1st level hospitals across the country | 5 days | • HCWM information system  
• Types of HCWM  
• Risks of HCW  
• Role of all staff in HCWM  
• HCW and Climate Change  
• Infection Prevention  
• Legislation and policy  
• Non incineration methods  
• Practicals  
• PPEs  
• WHO guidelines on PEP  
• Advocacy for HCWM inclusion in the curriculum  
• ZEMA | 4,201,087.50 | 666,839.29 |
| Conducting trainings on HCWM | General workers (820) 10 participants from each of the 82 1st level hospitals across the country | 5 days | • HCWM information system  
• Types of HCWM  
• Risks of HCW  
• Role of all staff in HCWM  
• HCW and Climate Change  
• Infection Prevention  
• Legislation and policy  
• Non incineration methods  
• Practicals  
• PPEs  
• WHO guidelines on PEP  
• Advocacy for HCWM inclusion in the curriculum  
• ZEMA | 2,902,640 | 460,736.50 |
## F. Health centers

| Conducting trainings on HCWM | Management teams (1575) | 5 days | • HCWM information system  
| | 1 participant from each 1575 Health centers across the country | | • Types of HCWM  
| | | | • Risks of HCW  
| | | | • Role of all staff in HCWM  
| | | | • HCW and Climate Change  
| | | | • Infection Prevention  
| | | | • Legislation and policy  
| | | | • Non incineration methods  
| | | | • Practicals  
| | | | • PPEs  
| | | | • WHO guidelines on PEP  
| | | | • Advocacy for HCWM inclusion in the curriculum  
| | | | • ZEMA | 679,925 | 107,924.6 |

| Conducting trainings on HCWM | Health workers (1575) | 5 days | • HCWM information system  
| | 1 participants from each of the 1575 health centers across the country | | • Types of HCWM  
| | | | • Risks of HCW  
| | | | • Role of all staff in HCWM  
| | | | • HCW and Climate Change  
| | | | • Infection Prevention  
| | | | • Legislation and policy  
| | | | • Non incineration methods  
| | | | • Practicals  
| | | | • PPEs  
| | | | • WHO guidelines on PEP  
| | | | • Advocacy for HCWM inclusion in the curriculum | 536 837.5 | 85 212.30 |
### Conducting trainings on HCWM

<table>
<thead>
<tr>
<th>Conducting trainings on HCWM</th>
<th>General workers (1,575)</th>
<th>5 days</th>
<th>ZEMA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 participant from each of the 1,575 health centers across the country</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>557,156.50</td>
</tr>
</tbody>
</table>

### HCWM information system
- Types of HCWM
- Risks of HCW
- Role of all staff in HCWM
- HCW and Climate Change
- Infection Prevention
- Legislation and policy
- Non incineration methods
- Practicals
- PPEs
- WHO guidelines on PEP
- Advocacy for HCWM inclusion in the curriculum
- ZEMA

### GRAND TOTAL

<table>
<thead>
<tr>
<th>GRAND TOTAL</th>
<th>7,712,520.47</th>
<th>913,000.50</th>
</tr>
</thead>
</table>
Annex 6: Pictures of health care waste

RED 140 ltr Wheelie bins
Sale Price £35.40 - No £44.64 (inc VAT and Delivery)
£29.50 (Ex. VAT) £35 VAT)
Including Delivery*

[Image: Picture of a RED 140 ltr Wheelie Bin]

Buy
Yellow 140ltr Wheelie bin (Sale Bins)
Sale Price £35.40 - Normally £44.64 (inc VAT and Delivery)
£29.50 (Ex. VAT) £35.40 (Inc. VAT)
Including Delivery*

1 Buy

USD$1,600 Gabbage Tricycles

USD$2,000 Gabbage Tricycles

Waste Trolley Bin

USD$1,800 Gabbage Tricycle

USD$300 Wheelie bin (Sale Bins)

USD$2,000 Gabbage Tricycles

USD$29.50 (Ex. VAT) £35.40 (Inc. VAT)
Including Delivery*
Annex 8: Breakdown of funding for National level

4.3.1. To Create Community Awareness on acceptable Health Waste Management Practices

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Cost ZMK</th>
<th>Amount in $</th>
<th>Source of funding</th>
<th>Lusaka</th>
<th>Copperbelt</th>
<th>Northern</th>
<th>Luapula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducting quarterly collaborative meetings with line ministries and Stakeholders</td>
<td>800,000.00</td>
<td>126,984.13</td>
<td>GRZ</td>
<td>136,000.00</td>
<td>21,587.30</td>
<td>120,000.00</td>
<td>19,047.62</td>
</tr>
<tr>
<td>Training 10,000 health workers in HCWM country wide</td>
<td>30,000,000.00</td>
<td>4,761,904.76</td>
<td>GRZ</td>
<td>5,100,000.00</td>
<td>809,523.81</td>
<td>4,500,000.00</td>
<td>0</td>
</tr>
<tr>
<td>Training of 6000 general workers in health facilities involved in waste handling</td>
<td>18,000,000.00</td>
<td>2,857,142.86</td>
<td>GRZ</td>
<td>3,060,000.00</td>
<td>485,714.29</td>
<td>2,700,000.00</td>
<td>0</td>
</tr>
<tr>
<td>Training of 120 medical equipment officers in maintenance and servicing new HCWM equipment</td>
<td>3,240,000.00</td>
<td>514,285.71</td>
<td>GRZ</td>
<td>550,800.00</td>
<td>87,428.57</td>
<td>486,000.00</td>
<td>77,142.86</td>
</tr>
<tr>
<td>Orientating 120 Medical Equipment Technicians in new HCWM equipment</td>
<td>3,600,000.00</td>
<td>571,428.57</td>
<td>GRZ</td>
<td>612,000.00</td>
<td>97,142.86</td>
<td>540,000.00</td>
<td>85,714.29</td>
</tr>
<tr>
<td>Conducting Health Care Waste Risk Assessment annually</td>
<td>1,250,000.00</td>
<td>198,412.70</td>
<td>GRZ</td>
<td>212,500.00</td>
<td>33,730.16</td>
<td>187,500.00</td>
<td>29,761.90</td>
</tr>
<tr>
<td>Report writing for the assessment and publication</td>
<td>330,000.00</td>
<td>52,380.95</td>
<td>GRZ</td>
<td>56,100.00</td>
<td>8,904.76</td>
<td>49,500.00</td>
<td>7,857.14</td>
</tr>
<tr>
<td>Holding Provincial Quarterly HCWM Performance review meetings</td>
<td>1,700,000.00</td>
<td>269,841.27</td>
<td>GRZ</td>
<td>289,000.00</td>
<td>45,873.02</td>
<td>255,000.00</td>
<td>40,476.19</td>
</tr>
<tr>
<td><strong>Sub total</strong></td>
<td><strong>58,920,000.00</strong></td>
<td><strong>9,352,380.95</strong></td>
<td><strong>10,016,400.00</strong></td>
<td><strong>1,589,904.76</strong></td>
<td><strong>8,838,000.00</strong></td>
<td><strong>1,402,857.14</strong></td>
<td><strong>4</strong></td>
</tr>
<tr>
<td>Procuring and installation of 106 incinerators with adequate capacity to handle Health Care Waste</td>
<td>31,800,000.00</td>
<td>5,047,619.05</td>
<td>GRZ</td>
<td>5,406,000.00</td>
<td>858,095.24</td>
<td>0</td>
<td>4,770,000.00</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Capacity building for incinerator operators in maintenance and servicing</td>
<td>3,472,000.00</td>
<td>551,111.11</td>
<td>GRZ</td>
<td>590,240.00</td>
<td>93,688.99</td>
<td>250,800.00</td>
<td>0</td>
</tr>
<tr>
<td>Sub total</td>
<td>35,272,000.00</td>
<td>5,598,730.16</td>
<td>5,996,240.00</td>
<td>951,784.13</td>
<td>0</td>
<td>3,174,480.00</td>
<td>0</td>
</tr>
<tr>
<td>Procuring approved equipment and Tools such as Trolleys, Wheel bins, Waste bins, Bin liners, Weighing Scales,</td>
<td>29,935,715.00</td>
<td>4,751,700.79</td>
<td>GRZ</td>
<td>5,089,071.55</td>
<td>807,789.13</td>
<td>0</td>
<td>4,490,357.20</td>
</tr>
<tr>
<td>Air monitoring equipment, Personal Protective Equipment and Hand tools</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Construction of 838 incinerators in health facilities where they are non existing,</td>
<td>25,140,000.00</td>
<td>3,990,476.19</td>
<td>GRZ</td>
<td>4,273,800.00</td>
<td>678,380.95</td>
<td>0</td>
<td>3,771,000.00</td>
</tr>
<tr>
<td>Procurement and installation of 50 generators for 3rd, 2nd and 1st level hospitals including big HCs</td>
<td>12,500,000.00</td>
<td>1,984,126.98</td>
<td>2,125,000.00</td>
<td>337,301.59</td>
<td>0</td>
<td>1,875,000.00</td>
<td>0</td>
</tr>
<tr>
<td>Construction of 50 Generator shelters</td>
<td>500,000.00</td>
<td>79,365.08</td>
<td>0</td>
<td>51,000.00</td>
<td>8,095.24</td>
<td>45,000.00</td>
<td>0</td>
</tr>
<tr>
<td>Repair and servicing of generators</td>
<td>300,000.00</td>
<td>47,619.05</td>
<td>51,000.00</td>
<td>8,095.24</td>
<td>45,000.00</td>
<td>0</td>
<td>7,142.86</td>
</tr>
<tr>
<td>Procuring 15 Digital X-ray units</td>
<td>3,000,000.00</td>
<td>476,190.48</td>
<td>GRZ</td>
<td>510,000.00</td>
<td>80,952.38</td>
<td>450,000.00</td>
<td>0</td>
</tr>
<tr>
<td>Procuring 200 Hand held Thermo Scanners (Thermometers)</td>
<td>1,260,000.00</td>
<td>200,000.00</td>
<td>0</td>
<td>214,200.00</td>
<td>34,000.00</td>
<td>189,000.00</td>
<td>0</td>
</tr>
<tr>
<td>Sub total</td>
<td>72,635,715.00</td>
<td>11,529,475.16</td>
<td>5</td>
<td>1,234,071.55</td>
<td>196,011.36</td>
<td>10,895,357.25</td>
<td>9</td>
</tr>
<tr>
<td>Sensitizing of Contractors in Health Care Waste Collection</td>
<td>140,000.00</td>
<td>22,222.22</td>
<td>GRZ</td>
<td>23,800.00</td>
<td>3,777.78</td>
<td>21,000.00</td>
<td>0</td>
</tr>
<tr>
<td>Conduct technical support to health facilities in HCWM</td>
<td>800,000.00</td>
<td>126,984.13</td>
<td>GRZ</td>
<td>136,000.00</td>
<td>21,587.30</td>
<td>120,000.00</td>
<td>0</td>
</tr>
<tr>
<td>Activity/Action</td>
<td>Cost ZMK</td>
<td>Amount in $</td>
<td>Source of funding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>----------</td>
<td>-------------</td>
<td>-------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution of SOPs to all Health Facilities</td>
<td>45,000.00</td>
<td>7,142.86</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub total</td>
<td>940,000.00</td>
<td>149,206.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation and Maintenance of HCWM treatment equipment, trolleys, trolley bins, steel rods, brooms and waste ash buckets</td>
<td>3,000,000.00</td>
<td>476,190.48</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance of surroundings and fences of disposal sites.</td>
<td>1,000,000.00</td>
<td>158,730.16</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair and maintenance of 515 existing ordinary incinerators and 60 micro burns.</td>
<td>7,337,500.00</td>
<td>1,164,682.54</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub total</td>
<td>11,337,500.00</td>
<td>1,799,603.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity/Action</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub total</td>
<td>11,337,500.00</td>
<td>1,799,603.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution of SOPs to all Health Facilities</td>
<td>45,000.00</td>
<td>7,142.86</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub total</td>
<td>45,000.00</td>
<td>7,142.86</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub total</td>
<td>11,337,500.00</td>
<td>1,799,603.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engagement of PP to collect waste from health facilities</td>
<td>20,000,000.00</td>
<td>3,174,603.17</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procuring of 12 suitable vehicles for supervision and monitoring of HCWM</td>
<td>6,192,000.00</td>
<td>982,857.14</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procuring 116 Motor bikes for use by HCW Managers in Health facilities</td>
<td>4,060,000.00</td>
<td>644,444.44</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Running and maintenance costs for 116 motors and 12 vehicles</td>
<td>1,220,000.00</td>
<td>193,650.79</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Licensing of Health Facilities</td>
<td>4,000,000.00</td>
<td>634,920.63</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring and Supervision</td>
<td>5,000,000.00</td>
<td>793,650.79</td>
<td>GRZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub total</td>
<td>40,472,000.00</td>
<td>6,424,126.98</td>
<td>6,880,240.00</td>
<td>1,092,101.59</td>
<td>6,070,800.00</td>
<td>963,619.05</td>
<td>3,642,480.00</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------</td>
<td>---------------</td>
<td>---------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Grand Total</td>
<td>219,622,215.00</td>
<td>34,860,669.00</td>
<td>37,335,776.50</td>
<td>5,926,313.74</td>
<td>32,943,332.25</td>
<td>5,229,100.35</td>
<td>19,765,999.35</td>
</tr>
</tbody>
</table>
Central, North Western, Western and Eastern Provinces

9.6 To Create Community Awareness on acceptable Health Waste Management Practices

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Cost ZMK</th>
<th>Amount in $</th>
<th>Source of funding</th>
<th>Central</th>
<th>North western</th>
<th>Western</th>
<th>Eastern</th>
</tr>
</thead>
</table>


### Southern and Muchinga Provinces

**9.10 To Create Community Awareness on acceptable Health Waste Management Practices**

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Cost ZMK Initial</th>
<th>Amount in $</th>
<th>Source of funding</th>
<th>southern ZMW</th>
<th>southern US$</th>
<th>Muchinga ZMW</th>
<th>Muchinga US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducting quarterly collaborative meetings with line ministries and Stakeholders</td>
<td>800,000.00</td>
<td>126,984.13</td>
<td>GRZ</td>
<td>96,000.00</td>
<td>15,238.10</td>
<td>40,000.00</td>
<td>6,349.21</td>
</tr>
<tr>
<td>Training 10,000 health workers in HCWM country wide</td>
<td>30,000,000.00</td>
<td>4,761,904.76</td>
<td>GRZ</td>
<td>3,600,000.00</td>
<td>571,428.57</td>
<td>1,500,000.00</td>
<td>238,095.24</td>
</tr>
<tr>
<td>Training of 6000 general workers in health facilities involved in waste handling</td>
<td>18,000,000.00</td>
<td>2,857,142.86</td>
<td>GRZ</td>
<td>2,160,000.00</td>
<td>342,857.14</td>
<td>900,000.00</td>
<td>142,857.14</td>
</tr>
<tr>
<td>Training of 120 medical equipment officers in maintenance and servicing new HCWM equipment</td>
<td>3,240,000.00</td>
<td>514,285.71</td>
<td>GRZ</td>
<td>388,800.00</td>
<td>61,714.29</td>
<td>162,000.00</td>
<td>25,714.29</td>
</tr>
<tr>
<td>Orientating 120 Medical Equipment Technicians in new HCWM equipment</td>
<td>3,600,000.00</td>
<td>571,428.57</td>
<td>GRZ</td>
<td>432,000.00</td>
<td>68,571.43</td>
<td>180,000.00</td>
<td>28,571.43</td>
</tr>
<tr>
<td>Conducting Health Care Waste Risk Assessment annually</td>
<td>1,250,000.00</td>
<td>198,412.70</td>
<td>GRZ</td>
<td>150,000.00</td>
<td>23,809.52</td>
<td>62,500.00</td>
<td>9,920.63</td>
</tr>
<tr>
<td>Report writing for the assessment and publication</td>
<td>330,000.00</td>
<td>52,380.95</td>
<td>GRZ</td>
<td>39,600.00</td>
<td>6,285.71</td>
<td>16,500.00</td>
<td>2,619.05</td>
</tr>
<tr>
<td>Holding Provincial Quarterly HCWM Performance review meetings</td>
<td>1,700,000.00</td>
<td>269,841.27</td>
<td>GRZ</td>
<td>204,000.00</td>
<td>32,380.95</td>
<td>85,000.00</td>
<td>13,492.06</td>
</tr>
<tr>
<td><strong>Sub total</strong></td>
<td><strong>58,920,000.00</strong></td>
<td><strong>9,352,380.95</strong></td>
<td></td>
<td><strong>7,070,400.00</strong></td>
<td><strong>1,122,285.71</strong></td>
<td><strong>2,946,000.00</strong></td>
<td><strong>467,619.05</strong></td>
</tr>
</tbody>
</table>

**9.11 To Procure and introduce alternative equipment and technologies for treatment of Health-Care Waste**

<table>
<thead>
<tr>
<th>Activity/Action</th>
<th>Cost ZMK Initial</th>
<th>Amount in $</th>
<th>Source of funding</th>
</tr>
</thead>
</table>
### 9.13 To provide adequate Equipment, Tools and Infrastructure for HCWM

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
<th>GRZ</th>
<th>Amount</th>
<th>GRZ</th>
<th>Amount</th>
<th>GRZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procuring and installation of 106 incinerators with adequate capacity to handle Health Care Waste</td>
<td>31,800,000.00</td>
<td>5,047,619.05</td>
<td>3,816,000.00</td>
<td>605,714.29</td>
<td>1,590,000.00</td>
<td>252,380.95</td>
</tr>
<tr>
<td>Capacity building for incinerator operators in maintenance and servicing</td>
<td>3,472,000.00</td>
<td>551,111.11</td>
<td>416,640.00</td>
<td>66,133.33</td>
<td>173,600.00</td>
<td>27,555.56</td>
</tr>
<tr>
<td><strong>Sub total</strong></td>
<td>35,272,000.00</td>
<td>5,598,730.16</td>
<td>4,232,640.00</td>
<td>671,847.62</td>
<td>1,763,600.00</td>
<td>279,936.51</td>
</tr>
</tbody>
</table>

### 9.14 To provide for the Pretreatment, collection, storage, transportation and final disposal of HCW

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
<th>GRZ</th>
<th>Amount</th>
<th>GRZ</th>
<th>Amount</th>
<th>GRZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitizing of Contractors in Health Care Waste Collection</td>
<td>140,000.00</td>
<td>22,222.22</td>
<td>16,800.00</td>
<td>2,666.67</td>
<td>7,000.00</td>
<td>1,111.11</td>
</tr>
<tr>
<td>Conduct technical support to health facilities in HCWM</td>
<td>800,000.00</td>
<td>126,984.13</td>
<td>96,000.00</td>
<td>15,238.10</td>
<td>40,000.00</td>
<td>6,349.21</td>
</tr>
</tbody>
</table>

Sub total: 72,635,715.00 11,529,478.57 8,716,285.80 1,383,537.43 3,631,785.75 576,473.93
| Sub total | 940,000.00 | 149,206.35 | 112,800.00 | 17,904.76 | 47,000.00 | 7,460.32 |
Annex 9: Colour coding guide

**Colour Coding and Receptacles for various HCW types**

<table>
<thead>
<tr>
<th>Waste Code</th>
<th>Types of Waste</th>
<th>Colour Code</th>
<th>Type of Receptacle</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>General Waste</td>
<td>Black</td>
<td>Plastic bag of appropriate size</td>
</tr>
<tr>
<td>B</td>
<td>Infectious Waste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>Highly infectious waste</td>
<td>Red</td>
<td>Puncture-resistant containers plastic bags</td>
</tr>
<tr>
<td>B2</td>
<td>Sharps</td>
<td>Yellow</td>
<td>Puncture-resistant containers plastic bags</td>
</tr>
<tr>
<td>B3</td>
<td>Patient Waste ¹</td>
<td>Yellow</td>
<td>Plastic bags and containers</td>
</tr>
<tr>
<td>B4</td>
<td>Culture/Specimen</td>
<td>Yellow</td>
<td>Plastic bags and containers</td>
</tr>
<tr>
<td>C</td>
<td>Pathological/Organic</td>
<td>Yellow</td>
<td>Plastic bags</td>
</tr>
<tr>
<td></td>
<td>Human Tissues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>Pharmaceutical Waste</td>
<td>Brown²</td>
<td>Plastic bags and containers</td>
</tr>
<tr>
<td>D2</td>
<td>Photographic Chemical Waste</td>
<td>Brown</td>
<td>Plastic containers</td>
</tr>
<tr>
<td></td>
<td>- Photographic developer</td>
<td></td>
<td>To be recycled/reused</td>
</tr>
<tr>
<td></td>
<td>- Fixer solution</td>
<td></td>
<td>To be neutralized</td>
</tr>
<tr>
<td></td>
<td>- X-ray photographic film</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D3</td>
<td>Radioactive Waste</td>
<td>Yellow</td>
<td>Containers with radio-active symbol</td>
</tr>
<tr>
<td></td>
<td>- Solid-Combustible/compactable</td>
<td></td>
<td>Durable plastic bags which can be sealed</td>
</tr>
<tr>
<td></td>
<td>- Non combustible/non-compactable</td>
<td></td>
<td>Puncture-resistant containers (metal)</td>
</tr>
<tr>
<td></td>
<td>- Liquid-Aqueous</td>
<td></td>
<td>Thick walled polythene bottles or organic-glass containers but should have secondary container to prevent them from breaking</td>
</tr>
<tr>
<td></td>
<td>- Spent sealed sources</td>
<td></td>
<td>Container in which the source was originally received.</td>
</tr>
<tr>
<td>D4</td>
<td>Laboratory Waste</td>
<td>Brown</td>
<td>Containers with appropriate labels</td>
</tr>
<tr>
<td>D4.1</td>
<td>- Acids</td>
<td></td>
<td>Acid label</td>
</tr>
</tbody>
</table>

¹ Includes patients stool, vomits, secretions and articles
² Colourless to be used in place of brown in cases where brown is not available on the market.
Annex 10: Minimum specifications for HCW incinerators

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of incinerator.</td>
<td>At least 30-60m from nearest infrastructure</td>
</tr>
<tr>
<td>Manufacturers rated capacity of incinerator (kg/hr)</td>
<td>As specified by manufacturer</td>
</tr>
<tr>
<td>Model of incinerator.</td>
<td>As specified by ZEMA</td>
</tr>
<tr>
<td>Height of incinerator stack.</td>
<td>As specified by ZEMA</td>
</tr>
<tr>
<td>Temperatures.</td>
<td>As appropriate to the model</td>
</tr>
<tr>
<td>Waste destruction efficiency</td>
<td>As specified by ZEMA</td>
</tr>
<tr>
<td>Restriction of accessibility to the area.</td>
<td>As appropriate to the model and operating instruction</td>
</tr>
<tr>
<td>Personal Protective Equipment for workers.</td>
<td>As specified by ZEMA</td>
</tr>
<tr>
<td>Planned Preventive Maintenance schedule.</td>
<td>As specified by manufacturer</td>
</tr>
<tr>
<td>Availability of trained incinerator operator</td>
<td>As specified by manufactured</td>
</tr>
</tbody>
</table>

Annex 11: National HCWM policy schedule of development

<table>
<thead>
<tr>
<th>No</th>
<th>ACTIVITY</th>
<th>PURPOSE</th>
<th>RESPONSIBLE ORGANISATION</th>
<th>Time frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hold a consultative meeting with all stakeholders involved in HCWM</td>
<td>Formulate the thematic areas for the Policy and provide the course of action</td>
<td>MoH/</td>
<td>2\textsuperscript{nd} quarter 2015</td>
</tr>
<tr>
<td>2</td>
<td>Hold a meeting with health professionals and HCWM stakeholders</td>
<td>To make a draft plan of the policy with the earlier thematic areas suggested</td>
<td>MoH/</td>
<td>2\textsuperscript{nd} quarter 2015</td>
</tr>
<tr>
<td></td>
<td>Task Description</td>
<td>Required Documentations</td>
<td>Responsible Ministries</td>
<td>Quarter 2015</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>3</td>
<td>Submission of the draft document to legal competent persons</td>
<td>In put the legal components that should allow for the draft policy be ready for presentation to approving authorities</td>
<td>Ministry of Justice</td>
<td>3rd quarter 2015</td>
</tr>
<tr>
<td>4</td>
<td>Presentation of the draft policy to the stakeholders</td>
<td>Review the content documents and comments</td>
<td>MoH</td>
<td>3rd quarter 2015</td>
</tr>
<tr>
<td>5</td>
<td>Submission of policy to Permanent secretaries responsible and onward submission to the approving body</td>
<td>Study the document for onward submission to approving Authorities</td>
<td>MoH/ MoJ, Min of Agric and live stock, Min of Energy, Environ &amp; natural resources</td>
<td>3rd quarter 2015</td>
</tr>
<tr>
<td>6</td>
<td>After approval, derive guidelines for its implementation and operationalize it</td>
<td>National Provincial District/ Facility level trainings</td>
<td>MoH</td>
<td>4th quarter 2015</td>
</tr>
</tbody>
</table>

Annex 14: Technologies options
Brick incinerator (Source: ECZ, 2005)

Design of simple used fuel drum incinerator
ANNEX 12: ZAMBIA WASTE MANAGEMENT GUIDANCE FOR EBOLA VIRUS DISEASE (EVD) AND OTHER HIGHLY INFECTIOUS DISEASES

1. Introduction

Ebola Virus Disease (EVD) is a severe and often fatal infection caused by the Ebola virus. EVD is spread primarily through direct contact with blood or other body fluids of a person who is ill with Ebola and from contact with objects contaminated with Ebola virus. There is need to break the transmission of EVD between Health Care Workers and their working environment. EVD waste management control measures must be applied in order to protect human health and the environment. EVD infected waste poses a health risk through the retransmission of EVD in outbreak settings. Appropriate waste management needs to be highly effective in order to contain the outbreak and break any environmental viral transmission lines.

2. Waste Generation

Waste generated from caring for or cleaning up after an Ebola patient may pose a risk to workers if it is not managed properly. Safe handling, treatment, transportation and disposal of waste that is suspected or known to be contaminated with Ebola virus begins at the point the waste is generated (i.e., the point of origin) and continues through to final disposal. Waste may be generated at the point of origin during activities such as:

- Using and discarding sharps, dressings, and other supplies while caring for a patient with suspected or confirmed Ebola;
- Discarding supplies used for clinical laboratory testing of samples from a patient with suspected or confirmed Ebola;
• Cleaning hospital rooms; ambulances, airplanes, and other vehicles; airport and other transportation facilities; residences; or other areas with suspected or confirmed Ebola-virus contamination; and
• Removing and discarding disposable personal protective equipment (PPE) after working in an environment with suspected or confirmed Ebola-virus contamination.

Infectious waste should be segregated from non-infectious waste using colour coded bins and bin liners as outlined in the Health Care Waste Management Technical guidelines.

3. Waste Storage

During waste storage there is need to ensure that the health care workers and the environment are not exposed to health care waste. Storage of waste must be based on the classification or type of waste being dealt with and the potential risk of infection to health care workers and waste disposal staff. For effective EVD health care waste management, the following storage practices must be followed:

• infectious waste must be placed in double, leak proof bags, and stored in a rigid, leak-proof container to reduce the risk of worker exposure.
• Infectious waste must be placed in a red bag/bin with a highly infectious bio hazard symbol.
• The storage facility must be secured to avoid both human and animal ingress.
• Signage must be clear.

Note: EVD waste must not be stored for more than 12 hours

Refer to the Health Care Waste Technical guidelines for Storage of health care waste

4. Waste Transportation

Waste transportation can happen from point of origin (i.e., where the waste was generated) to the point of treatment and disposal. Workers that collect and transport waste are required to be protected from exposure to EVD waste. In order to reduce exposure to Ebola virus, stringent packaging protocols, including decontaminating waste containers, at the point of origin must be adhered to. The outlined guidance must be strictly followed:

• Transporters should have appropriate PPE;
• Place containers of waste as close to the ground as possible to prevent falling and spillage;
• Vehicles and wheeled bins should have appropriate biohazard symbols and clear labels (UN 2814 for Human and UN 2900 for Animals). Secure containers, especially stacked ones, within vehicles using suitable straps or tie-downs;
• Transport infectious and non infectious separately; and
• Use a non busy route to the disposal sites.

5. Waste treatment and management

The Ebola virus is considered to be fragile and can be destroyed by applying the following methods:
- Disinfection: Through the use of 0.5% or 0.05% chlorine solution in accordance with the materials to be treated.
- Heat: Through medical waste incineration, sterilization by autoclave or incineration.
- The strict application of universal precautions: Through good hand hygiene by regularly washing with soap and water.

In accordance with the different resources reviewed: Centres for Disease Control and Prevention (CDC), World Health Organization (WHO) and Médecins Sans Frontières (MSF) EVD infection control (IFC) guidelines, the following is recommended:

5.1 Solid medical waste

All used disposable PPE, non-sharps and other infectious medical waste needs to be collected in leakproof hazard waste bags and placed in covered waste bins. Pouring 0.5% chlorine solution on top of the waste bags prior to being securely sealed as pre-treatment disinfection is recommended. The procedure can create back-splash, so care should be taken to protect eyes. Pre-treated contaminated medical waste can be transported for incineration in accordance with these guidelines.

5.2 Sharps waste disposal

The recommendations from WHO and the application of universal precautions is to limit all invasive procedures to be performed on EVD suspected/confirmed cases to a minimum, and where possible, to substitute these with oral alternatives. However, the use of sharp objects cannot be avoided in clinical EVD management settings. All sharps (including syringes, needles, scalpel blades, cannulas and other sharps) are to be disposed of into puncture-resistant/leak-proof sealed disposable containers designed for sharp medical waste collection before incineration.

5.3 Biological infectious waste:

Biological waste material such as placenta and biopsy samples are to be treated as above or incinerated.

5.4 Infectious excretes:

All biological infectious liquid waste (i.e. faeces, vomit, urine, etc...) is to be disposed of in patient latrines and disinfected by pouring 2% chlorine solution.

5.5 Mattresses:

Bed mattresses are to be sprayed with 0.5% chlorine solution before Incineration. Mattress covers and linen are to be soaked twice in 0.5% chlorine solution for min. 30 minutes prior to being washed with the use of a mixture of soap and 0.5 % chlorine.

5.6 Patient’s clothes:

Used clothes from patients are to be collected and sealed in a bag for incineration.
5.7 Reusable medical equipment and PPE (i.e. boots, goggles, aprons, etc.):

Used reusable medical and PPE items are to be sprayed with 0.5% chlorine solution and then soaked in 0.05% chlorine before washing them and leaving them hung out to dry while exposed to direct sunlight.

5.8 Outreach waste:

All used outreach kit material (i.e. gloves, masks, surgical gowns etc...) is to be collected and contained in a waste bag. 0.5% chlorine solution should be poured over the top before being sealed. The outside of the bag is to be sprayed with 0.5% chlorine solution prior to disposal through incineration.

5.9 Cadaver and corpse burial:

Corpses need to be contained in sealed, leak-proof cadaver bags (or double bags to ensure that there is no leakage as per WHO recommendation). After placing the corpse in the cadaver bag, they are to be sealed and surface sprayed with 0.5% chlorine before being moved for burial or cremation. Burials must not be done at night. Corpses must be kept in the morgue and buried at first opportunity (within 12 hours).

Recommended Chlorine Concentrations for Disinfection

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Dilution</th>
<th>Purpose or Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>2%</td>
<td>4 tablespoons of granular chlorine in 2 litres of water</td>
<td>Infectious stool, vomitus, cadavers</td>
</tr>
<tr>
<td>0.5%</td>
<td>4 tablespoons of granular chlorine in 8 litres of water</td>
<td>Cleaning floors, footbath, Bed mattresses contact tracing, toilets</td>
</tr>
<tr>
<td>0.05%</td>
<td>1 tablespoon of granular chlorine in 20 litres of water</td>
<td>Handwashing Washing of soiled clothes, dishes</td>
</tr>
</tbody>
</table>

5.10. Incinerator Selection

The use of an appropriate incinerator is essential to ensure the proper, effective and efficient disposal of EVD contaminated waste.

To incinerate medical waste as required by ZEMA under these Guidelines, the following assumptions should be taken into consideration when selecting the appropriate incinerator specifications for EVD waste management:
- The installation will be located at a central level.
- The need for reliable power supply availability.
- Suitability for wet waste.
- To be used to incinerate all the above mentioned infectious solid and sharps waste materials.
- The incinerator must be capable of burning average HCW at an approximate rate of 18.75kg / hour.
- The incinerator must have an efficiency burning capacity of 850 degrees and above (e.g. double chamber incinerators)
- The stack height of 6 meters above the tallest building in the environment.

5.10 Combustion

The system to be used must have an operator to ensure a steady load-rate to match the hourly consumption capacity of the incinerator. However, the rate of combustion of each batch of waste should be self-regulating. The operator should not make manual adjustments to air supply or the burner during normal operation to avoid exposure. The system must automatically compensate for the varying waste characteristics. The following is recommended for the incineration of highly infectious waste:

I. Temperature: The incinerator must be able to consistently maintain combustion temperatures of 850°C.
II. Residual ash: The resulting ash residue must be less than 5% of the original waste volume.
III. Flue-gas residence time: Residence time must not be less than one second in the secondary chamber.

6.0 Smoke and Solid Particle Emissions

The emission of smoke and solid particles should be limited by ensuring efficient combustion of the flue-gases and effective settling of particulates.

Emission test results must be submitted to ZEMA to ensure compliance to the Environmental Management Act No. 12 of 2011 and Environmental Management (Licensing) Regulations SI No. 112 of 2013. The ash must be inertised and disposed of at a landfill.

7.0 Final disposal of treated waste

Waste that has been properly treated and disinfected using thermal/heat treatment (e.g., microwaves), autoclaving, incineration, or a combination of these or other accepted methods should be disposed of according to these guidelines. Treated waste must be disposed of at an appropriate landfill.

8.0 Training

All health personnel involved in infectious waste management from the point of waste generation to disposal must be trained in EVD Infection Prevention and control guidelines.
9.0 References


For further questions or additional information, please contact:

Helene Moller        Annika Salovaara Chief, Health Technology Centre Contracts Manager
UNICEF Supply Division UNICEF Supply Division +45 45 33 55 85 +45 45 33 55 88
hmoller@UNICEF.org   asalovaara@UNICEF.org Gregory Kiluva Aadrian Sullivan Technical
Specialist Information Management UNICEF Supply Division UNICEF Supply Division +45
45 33 55 94     +45 45 33 57 68 gkiluva@UNICEF.org asullivan@UNICEF.org

Other UNICEF information notes are found at http://www.UNICEF.org/supply/index_54214.html.