Government of Samoa

NATIONAL HEALTHCARE WASTE MANAGEMENT STRATEGY

FY2020/21 - FY2024/25

Ministry Of Health

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PREFACE

This strategic plan has been developed to provide guidance and standards for the management of health care wastes as required by the Ministry of Health (MOH), and the Ministry of Natural Resources and Environment (MNRE).

This health care waste management strategy plan has been prepared by the Ministry of Health with technical assistance provided through by Stewart Henry Williams Consulting (Australia), and in consultation with relevant stakeholders. The project was sponsored by the World Bank as part of the Samoa Health Program for Results (PforR)

It is expected that health care institution administrators, doctors, dentists, nurses, technicians, sanitation personnel, and other health care professionals will become familiar with the contents of the management plan and the management systems required by it and implement them in a safe and compliant manner in the course of their daily activities.

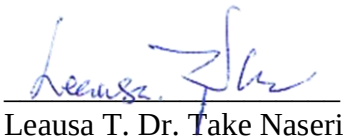
The health care waste management plan is intended to serve as the regulatory basis for health care waste management for all hospitals and health care facilities in Samoa. The strategic plan has been tailored based on a detailed assessment of the current status of healthcare waste management in Samoa though detailed costing for implementation.

Training of staff in the requirements of the health care waste management strategy is essential for its successful implementation. Training programs will be widely available from the Ministry of Health's and the Ministry of Natural Resources & Environment's endorsed trainers where required, and contact should be made with the MOH *Principal Health Care Waste Officer*.

Compliance with the health care waste management plan is important in order to protect ourselves, our families and those we care for, the general public and the environment at large from disease and chemical contamination.

We would commend all people involved in the health care sector, and associated waste management activities, to strive to achieve the standard of practice required by the health care waste management plan so as to better protect our community and environment.

Ma le fa'aaloalo lava.



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DIRECTOR GENERAL OF HEALTH

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Acknowledgement is given to all Government of Samoa staff, including the Ministry of Health, the Ministry of Natural Resources and Environment, the Planning and Urban Management Agency, Quarantine Services and other agencies.

Special thanks are given to the healthcare waste unit, all staff from the hospitals and clinics in Samoa and the health care waste collection and treatment facility operators. While full appreciation is also given to the World Bank who have funded the development of this strategy through the Health Samoa Health Program for Results.

ACRONYMS

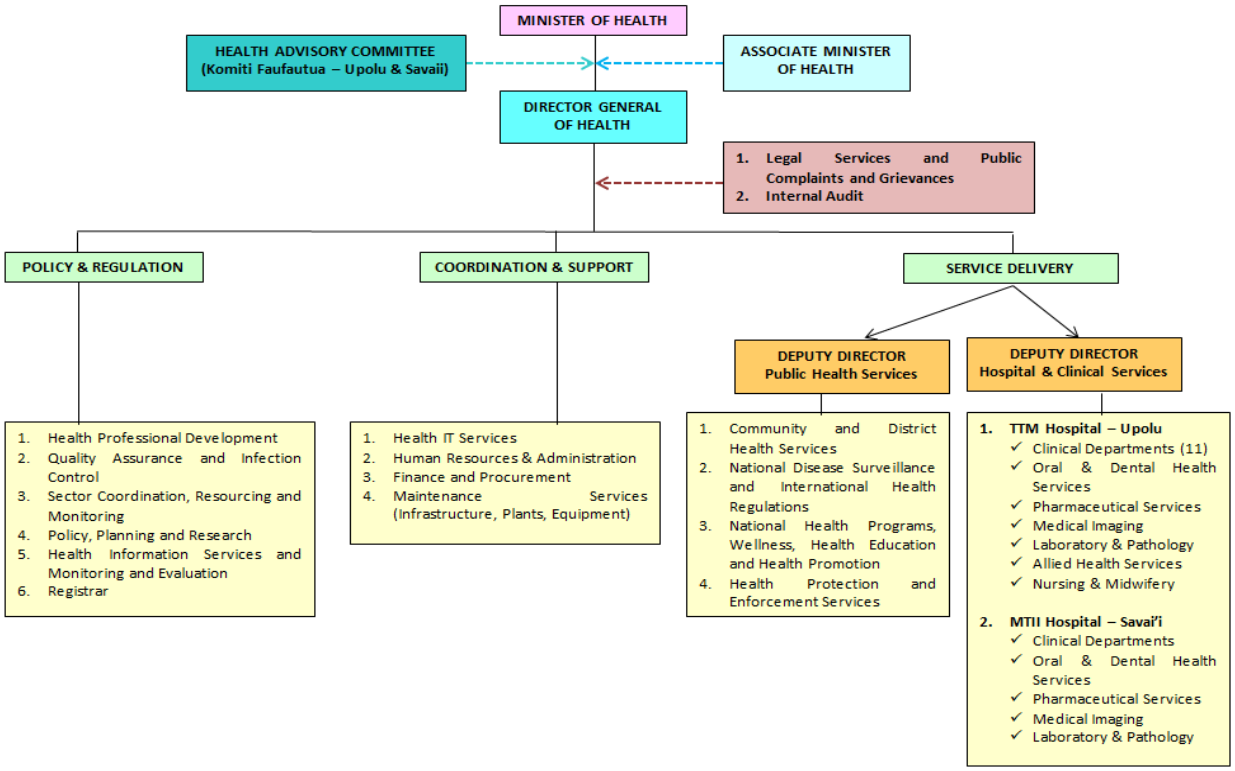
BAT	**Best Available Techniques**
BEP	Best Environmental Practice
DLSE	Department of Lands, Survey and Environment
HCW	Health Care Waste
HCWM	Health Care Waste Management
JICA	The Japanese International Cooperation Agency
LSE Act	Lands, Survey and Environment Act 1989
MNRE	Ministry of Natural Resources
MOH	Ministry of Health
MTII	The Malietoa Tanumafili II Hospital
NHS	National Health Service
NZODA	The New Zealand Overseas Development Agency
PHCWO	Primary Health Care Waste Office
POPs	Persistent Organic Pollutants
PPE	Personal Protective Equipment
PUMA	The Planning and Urban Development Agency
PVC	Polyvinyl Chloride
SPREP	Secretariat of the Pacific Regional Environmental Programme
TTMH	The Tupua Tamaese Meaole Hospital
UN	United Nations
UNEP	United Nations Environment Program
WHO	World Health Organisation

CHAPTER 1: INTRODUCTION

1.1 Scope

The National Healthcare Waste Management Strategy (2020-2024) applies to all institutions/facilities generating healthcare waste in Samoa and supersedes the National Healthcare Waste Management Plan (2013) under the authority of the Samoan Ministry of Health (MOH).

Figure 1: Ministry of Health Organisational Chart



1.2 Aims and Objectives

The overarching aims of the plan are:

- **To protect human health** by reducing exposure of employees, patients, visitors and communities in Samoa to hazardous healthcare waste;
- **To protect the environment** from hazardous waste generated in healthcare facilities; and
- **To ensure regulatory compliance** and avoid long-term liability.

In achieving these aims, the objectives of this plan are to:

- **Establish uniform waste management practices** throughout all healthcare institutions in Samoa;
- **Ensure that all healthcare institutions have a Healthcare Waste Management Plan** and an officer (or committee) responsible for the development and implementation of the Healthcare Waste Management Plan.

- **Reduce occupational health and safety risks** to all healthcare workers, and waste handlers;
- **Minimise the amount of waste** that is generated by healthcare facilities in Samoa; and
- **Enable better accounting** of the types and quantities of wastes generated within healthcare institutions.

1.3 Application

The National Healthcare Waste Management Plan (2020-2024) applies to all healthcare institutions/facilities in Samoa, including premises owned or occupied by the Government of Samoa, as well as private clinics, research facilities, veterinary facilities, home care and traditional and religious care givers.

It is expected that healthcare institution administrators, doctors, dentists, nurses, technicians, sanitation personnel, and other healthcare professionals will become familiar with the contents of this plan and implement the guidelines in a safe and compliant manner during the course of their daily activities.

It is a requirement of this plan that all institutions generating healthcare waste in Samoa develop a healthcare waste management implementation plan suitable for the types and volumes of healthcare waste generated.

This plan is in line with both the national and international guidelines and legislation related to the proper management of healthcare waste and hazardous materials and draws heavily on the World Health Organization's 2014 guidelines on safe management of wastes from health-care activities.

1.4 National Legal Framework for Waste Management

1.4.1 The Lands, Survey and Environment Act 1989

The Lands, Survey and Environment Act 1989 (LSE Act) provides the basis for environmental protection and management in Samoa. It adopts an approach designed to avoid adversely affecting the beneficial uses of the environment from pollution, and the improper management of wastes.

The beneficial uses of the environment which are to be protected throughout Samoa include the life, health, and wellbeing of humans; the life, health and wellbeing of other forms of life, including the protection of ecosystems and biodiversity; and local amenity and aesthetic enjoyment.

Part VIII of the Lands, Survey and Environment Act through the application of Division 4 ("Management Plans") provides the legislative framework for waste management in Samoa.

This Healthcare Waste Management Plan was developed under S116(1)(h) of the LSE Act which allows management plans to be prepared for "waste and litter disposal" and under

S116(1)(i) for "any other matter relating to the environment which in the opinion of the Board will benefit from a management plan".

This latter provision allows for such issues as waste classification, segregation, packaging, labelling, and transport operations, and the application and performance of treatment technologies to be included in addition to the disposal of wastes, or waste treatment residues, covered by S116(1)(h).

S118 of the LSE Act provides for monetary penalties for contravention of approved management plans. The maximum such fine is $500, although lesser fines may be imposed.

1.4.2 Health Ordinance Act 1959

The Health Ordinance 1959 consolidates certain laws pertaining to public health defining functions and powers to enable officials to protect public health.

These functions entail the role of the Ministry of Health in carrying out its duties which focuses on buildings/dwellings, nuisances, infectious diseases and other related matters. In particular, healthcare waste is a matter of public health importance as well as environmental protection.

There are certain requirements pertaining to healthcare waste that need to be adhered to, and the Ministry of Health has a statutory responsibility to ensure that there are suitable appliances for the disposal of healthcare waste in a manner that is safe and not dangerous to public health.

The Government of Samoa encourages a multi–sectoral approach involving relevant government ministries and agencies to work in partnership to obtain the objective of its relevant laws; in particular working in collaboration with the Ministry of Natural Resources and Environment in the development of the healthcare waste management plan.

1.4.3 Waste Management Act 2010

This is the main legislative document concerning waste management in Samoa and covers the collection, management, disposal, and recycling of waste as well as providing for registration and licensing of waste operators, permits for dumping and incinerating wastes, sets environmental standards for the management of waste, and provides for community involvement in waste management.

For healthcare waste management, which is identified as hazardous waste, it has broad powers to regulate and audit the generation, transport and disposal.

Section 9 of the Act details provisions for the registration and licensing of waste operators including: (1) All landfill sites and waste dumps in Samoa must be licensed by the Ministry [of Natural Resources and Environment]; (2) The registration and licensing of other waste management facilities and operators may be required in accordance with Regulations made under this Act".

Section 18 of the Act regulates incineration of wastes and stipulates a number of offences relating to intentionally burning wastes including where such burning is done:
(d) creates an unintentional Persistent Organic Pollutant as provided for in the Stockholm Convention;

Section 18 (2) of the Act describes an offence if a person "...lights a fire, or causes a fire to be lit, in an approved landfill or waste management facility other than in an approved incinerator or in accordance with lawful directions given by an approved waste management operator.

Under the Act the Ministry of Health is an "approved waste management operator" under the and has a number of associated responsibilities including: the provision of appropriate waste treatment, storage and disposal facilities; the promotion of recycling and the implementation of measures to minimise wastes having particular adverse implications for human health and the environment.

It further required the Ministry of Health to conduct monitoring and reporting on the effects of wastes on human health and the environment; the preparation, adoption and enforcement of rules, operating manuals, codes of practice and standards relating to the facilities provided by or under the control of the operator; and the formulation and implementation of policies, programs and initiatives aimed to reduce the generation of wastes.

1.4.4 Planning and Urban Management Act 2004

The primary environmental legislation in Samoa is the Planning and Urban Management Act 2004 (PUM Act).

The objectives of PUM Act include: To provide for the fair, orderly, economic and sustainable use, development and management of land including the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity; to enable land use and development planning and policy to be integrated with environmental, social, economic, conservation and resource management policies at national, regional, district, village and site-specific levels.

It further requires PUMA to secure a pleasant, efficient and safe working, living and recreational environment for all Samoans and visitors to Samoa; and to balance the present and future interests of all Samoans. While part V of the PUM Act 2004, specifically Section 37, requires consent for development within Samoa. The process for determining whether a Development Consent is required, and the application process are detailed in the Planning and Urban Management (Environmental Impact Assessment) Regulations 2007.

The Planning and Urban Development Agency (PUMA) is responsible for monitoring and enforcing: The requirements of management plans; all developments in Samoa require Development Consent and applications shall be submitted to PUMA for assessment to allow a determination is made; and no works are to be undertaken until a Development Consent is secured.

1.5 International Agreements

Samoa is party to the following international agreements and conventions that are relevant to the management of wastes from healthcare facilities and the protection of the environment. In

preparing this plan, care has been taken to ensure that Samoa's obligations to these international conventions are met.

1.5.1 Basel Convention

The Basel Convention on the Control of Trans-Boundary Movements of Hazardous Wastes and their Disposal (the Basel Convention) aims to protect human health and the environment against the adverse effects resulting from the generation, management, transboundary movements and disposal of hazardous and other wastes.

The Basel Convention regulates the transboundary movements of hazardous and other wastes by applying the "prior informed consent" principle. Shipments without consent to and from non-parties are illegal unless there is a special agreement that contains provisions no less environmentally sound than the convention. Each party is required to introduce appropriate national or domestic legislation to prevent and punish illegal traffic in hazardous and other wastes.

In addition, the convention obliges its parties to ensure that hazardous and other wastes are managed and disposed of in an environmentally sound manner. To this end, parties are expected to minimise the quantities that are moved across borders, to treat and dispose of wastes as close as possible to their place of generation, and to prevent or minimise the generation of wastes at source. Strong controls have to be applied from the moment of the generation of a hazardous waste to its storage, transport, treatment, reuse, recycling, recovery and final disposal.

The Basel Convention specifically refers to: clinical wastes from medical care in hospitals, medical centres and clinics: and waste pharmaceuticals, drugs and medicines. The convention also has a category of hazardous characteristics defined as infectious substances which are substances or wastes containing viable microorganisms or their toxins which are known or suspected to cause disease in animals or humans.

In addition, the Convention secretariat has produced the comprehensive document Technical guidelines on the environmentally sound management of biomedical and healthcare wastes (Y1; Y3) (UNEP, 2003). The Basel Convention is modified periodically through decisions made at the regular Conference of the Parties to the Basel Convention.

1.5.2 Waigani Convention

The Waigani Convention to ban the importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement of Hazardous wastes within the South Pacific Region, entered into force on 21 October 2001.

The objective of the Convention is to reduce and eliminate transboundary movements of hazardous and radioactive waste, to minimize the production of hazardous and toxic wastes in the Pacific region and to ensure that disposal of wastes in the Convention area is completed in an environmentally sound manner.

1.5.3 Noumea Convention

The Noumea Convention is the convention for the Protection of Natural Resources and Environment of the South Pacific Region (1986), also known as the SPREP Convention or Noumea Convention. Two additional Protocols entered into force in 1990. This convention is the major multilateral umbrella agreement in the Pacific Region for the Protection of Natural Resources and the Environment.

1.5.4 Stockholm Convention

The Stockholm Convention on Persistent Organic Pollutants (POPs) is a global treaty to protect human health and the environment from persistent organic pollutants (POPs). POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms and are toxic to humans and wildlife. POPs circulate globally and can cause damage wherever they travel.

Under Article 5 and Annex C, governments that are party to the convention are required to reduce or eliminate releases from unintentional production of POPs – in particular, polychlorinated dibenzo-p-dioxins and dibenzofurans. These chemicals are formed and released to the environment by medical waste incinerators and other combustion processes. Governments must require the use of best available techniques and promote best environmental practices for new incinerators within four years after the convention comes into force for the country.

The Guidelines on best available techniques and provisional guidance on best environmental practices (UNEP, 2006) were released in 2006. Section V.A.II deals specifically with health-care waste. Best environmental practices (BEP) include source reduction, segregation, resource recovery and recycling, training, and proper collection and transport.

The best available techniques (BAT) guidelines for health-care waste incinerators require a combination of specified primary and secondary measures to achieve air emission levels of polychlorinated dibenzo-p-dioxins and dibenzofurans no higher than 0.1 ng I-TEQ/Nm3 (at 11% O2), as well as dioxin and furan concentrations less than 0.1 ng I-TEQ/litre of wastewater from the flue gas treatment.

1.5.5 Minamata Convention

The Minamata Convention on Mercury is a global treaty to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. The Convention was adopted on 10 October 2013 at a Diplomatic Conference held in Kumamoto, Japan. The Convention draws attention to a global and ubiquitous metal that, while naturally occurring, has broad uses in everyday objects and is released to the atmosphere, soil and water.

Controlling the anthropogenic releases of mercury throughout its lifecycle has been a key factor in shaping the obligations under the Convention. Major highlights of the Minamata Convention relevant to Samoa include the phase out and phase down of mercury use in a

number of products and processes and control measures on emissions to air and on releases to land and water.

The Convention also addresses the interim storage of mercury and mercury compounds other than waste mercury, and the disposal of mercury wastes, sites contaminated by mercury as well as health issues. The overall objective of the Minamata Initial Assessment (MIA) is to assist the countries in preparing for the implementation of the Minamata Convention in order to enable policy and strategic decision-making and to prioritize areas for future interventions. Samoa signed the Minamata Convention on 10 October 2013 and deposited its instrument of ratification on 24 September 2015.

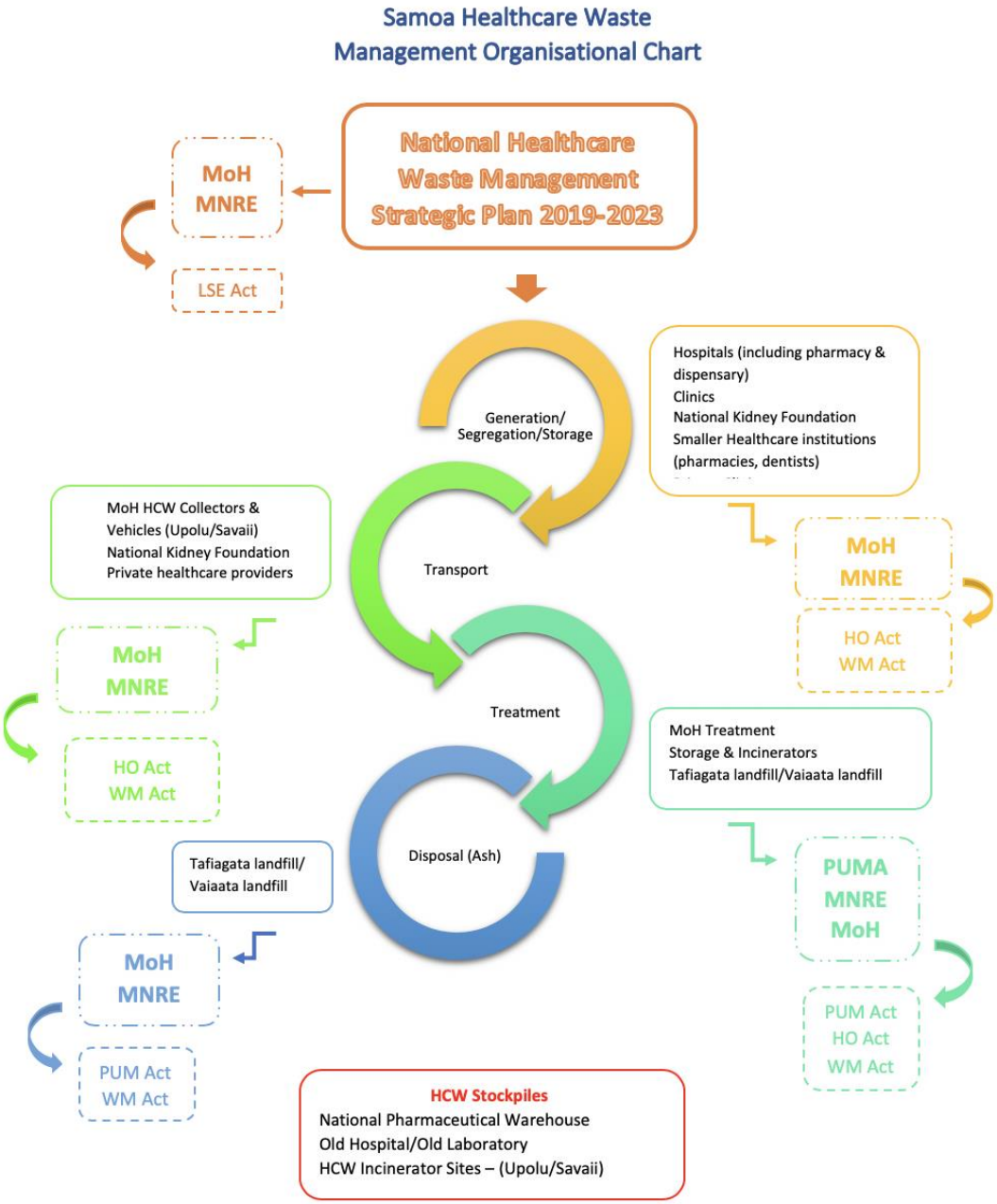
The Initial Assessment Report for Samoa (June 2018) found that mercury sources related to healthcare and related activities accounted for 23% of total mercury inventory including 13% from the dental sector (mercury amalgam), 6% from crematoria and burial and 4% from incineration. A number of activities ongoing in Samoa related to healthcare waste management including dental, incinerators and crematoriums.

CHAPTER 2: SITUATION ANALYSIS OF HCWM IN SAMOA

2.1 Samoa HCWM Organization

Figure 2 below shows the current organisation of healthcare waste management, the principal ministries and core legislation related to each component in the management chain from the point of healthcare waste generation to its disposal.

Figure 2 Samoa Healthcare Waste Management Chart



2.2 Healthcare Waste Operational Management and Responsibilities

2.2.1 National Healthcare Waste Management Strategy

The Strategy has been developed under the Lands Survey Environment Act 1989 by the Ministry of Health who is responsibility for its administration assisted by other relevant agencies and stakeholders, namely the Ministry of Natural Resources and Environment who is the main agency responsible for overall waste and chemicals management.

Administration of the previous Healthcare Waste Management Plan 2013 was adhoc with no developed monitoring, evaluation and reporting framework linked to planning and tracking the stepwise implementation of the plan by either the Ministry of Health or the Ministry of Natural Resources and Environment.

This has resulted in little change in healthcare waste management in the period from 2013 to 2019 with the evaluation of hospitals and clinics not being shared beyond the audit team and therefore not enabling a process of continued improvement. No implementation plan or formal reporting mechanisms were developed against the plan recommendations.

2.2.2 Healthcare Waste Generation and Segregation

Previous estimates of healthcare waste for Upolu and Savaii provided through the EU funded PacWaste project in 2014 determined the following quantities of healthcare waste were generated in Upolu and Savaii (Table 1 below) with estimates of 735 kilograms of healthcare waste generated per week or approximately 38 tonnes annually.

The methodology to determine this was based on verbal interview information from hospital staff at Tupua Tamasese Meaole Hospital, Upolu and Malietoa Tanumafili II Hospital, Savaii as well as operators at the TTMH Incinerator Upolu and MTH Incinerator Savaii.

Table 1 - Healthcare Waste Generation Estimate – PacWaste Project Report – 2014

Samoa	**Weekly (kg)**	**Annually (kg)**
Upolu	600	31,000
Savaii	135	7000
Total	**735**	**38000**

Studies conducted under the TA assignment preparing for development of this in May 2019 determined the following quantities of healthcare waste were generated in Upolu and Savaii (Table 2 below) with estimates of 8301 kilograms of healthcare waste generated per week or approximately 431tonnes annually.

The methodology to determine this healthcare waste generation rates for Upolu was based on over 6 months of weighbridge information (from Tafaigata Landfill) for healthcare waste received at the TTMH Incinerator Upolu from Tupua Tamasese Meaole Hospital, all other MOH hospitals and clinics and the National Kidney Foundation. The average ‘weight per bin’ established in Upolu was then applied to Savaii for the Malietoa Tanumafili II Hospital and associated clinics to determine amounts of healthcare waste received at the MTH Incinerator Savaii.

This is a significant difference which resulted in further investigation and shows the value in empirical information over rapid estimation techniques particularly when there are many other sources of healthcare waste and not the primary hospitals

Table 2 - Healthcare Waste Generation Estimate – TA Healthcare Waste Assessment – 2019

Samoa	**Weekly (kg)**	**Annually (kg)**
Upolu	7301	379000
Savaii	1000	52000
Total	**8301**	**431000**

Further comparison with the Samoan Government estimates given in the World Summit report for 2001 are shown in Table 3 below and very closely matches the information found in the TA Healthcare Waste Assessment with a total of 8193 kilograms of healthcare waste being generated per week or approximately 426 tonnes annually.

Table 3 – Healthcare Waste Generation Estimate – World Summit on Sustainable Development – Government of Samoa - 2001

Samoa	**Weekly (kg)**	**Annually (kg)**
Upolu	7126	370552
Savaii	1067.5	55510
Total	**8193**	**426062**

In relation to segregation of medical waste into healthcare waste, general waste and sharps this was found to be universally well applied across the hospitals and clinics in both Upolu and Savaii though the lack of any signage on incorrect segregation was found to results in too much general waste being included in the yellow healthcare waste bins.

For sharps containment almost all were contained in bins that were properly labelled. This included a variety of dedicated collapsible cardboard boxes which meet all safety requirements but at the other extreme small yellow pedestal bins (some without lids) were also commonly utilised as sharps.

As the pedestal bins do not restrict access to the disposed sharps and the sharps can easily be dislodged, they pose a significant risk in relation to needle stick injury can even easily be knocked over and the contents strewn about.

It was apparent that clinics in particular lacked the level of equipment and budget to have sufficient dedicated sharps been of correct design and while bin liners were universally used there was clearly a lack of correctly labelled and appropriately coloured liners.

Dedicated general waste and healthcare waste bins were mostly in good condition and correctly coloured with a few minor exceptions and in sufficient quantity. PPE for correct waste handling was in short supply and no dedicated spill kits were in place.

2.2.3 Healthcare Waste Transport

There were two specialised healthcare waste trucks purchased in 2004 with the correct technical parts and specifications in terms of movable ramps, storage bins containment and holding bins.

However only the HCW truck on Upolu is now in use, while the HCW truck on Savaii is broken down at the main hospital and substitute vehicle is in use. While the operational HCW Truck in Upolu is still working adequately including the ramp and restraints it is physical quite work out with high number of kilometres on it and replacements for both vehicles are urgently needed with all specifications and standards similar to the existing trucks to ensure safe and secure loading and transport.

'Drive alongs' were conducted under the TA assignment for all healthcare collections in both Upolu and Savaii which confirmed regular pickups in accordance with agreed frequency and quantity of pickup. Good practice was observed with pickup, transport and offload.

Trucks are clean and regularly washed, by the drivers only have minimal PPE, no spill kits, no signage and no manifest of load carried except for a notebook with some recording of pickups. Records taken are not part of any established recording plan, but drivers had an excellent understanding of their system.

A one to two to man collection team works on the pickup on Upolu and one-man collection team in Savaii, but as they also double up as the incinerator operators at TTMH Incinerator Upolu and MTH Incinerator Savaii there is a need for more human resources.

2.2.4 Healthcare Waste Treatment

Healthcare waste treatment in Samoa is conducted through MoH owned and operated high temperature incinerators for TTMH and Upolu located at the Tafaigata Landfill and for MTH and Savaii located at Vaiatta.

The incinerators are very different in quality of the unit itself and the building, the age and the level of ongoing operational maintenance and repair with the 2004 high temperature 'Entech' unit at Tafiagata still in reasonable shape in a suitable dedicated building though it needs some repairs to remain.

TTMH Incinerator, Tafaigata, Upolu

Though the Entech unit is operating well below optimum temperature range (only 800 degrees and not 1100 degrees) resulting in excessive smoke and breaching Samoan and international best practice standards and requires higher levels of technical expertise to rectify this issue.

Table 4 – TTMH Incinerator Treatment Capacity

TTMH Incinerator	**Daily (kg)**	**Weekly (kg)**	**Annually (kg)**
Treatment Capacity	1100*	7700	400400
Treatment Required	1043	7301	379000
Remainder	**57**	**399**	**21,400**

In relation to treatment capacity as indicated in Table 4 the TTMH incinerator is at full technical capacity and is used to burn healthcare waste 7 days a week with the 2 staff conducting both the incineration and the healthcare waste pick up.

Any increase in healthcare waste treatment (such as eliminating stockpiles) can only be achieved through increasing the number of burn cycles per day (generally there are two) and this would require more staff, longer operational hours and more fuel.

Given the incinerator is now 15 years old plans should be made for a replacement unit with a higher capacity due to inevitable increases in healthcare waste. Potentially this could be combined with quarantine waste treatment which is inadequately serviced with its current treatment options.

MTH Incinerator, Vaiaata, Savaii

The two 2011 'Mediburn' units are inoperable and have been so far many years, they are rusted out, with pieces missing and housed in a low metal shed with the roof in poor condition and without any ongoing maintenance and repair budget.

Despite this problem the officer responsible for healthcare waste collections and treatment still uses one mediburner manually which enables all the waste to be adequately treated though at suboptimal temperatures. The incinerators and building need to be substituted with better quality replacements with a dedicated budget for operational maintenance and repair.

Table 5 – MTH Incinerator Treatment Capacity

MHT Incinerator	**Daily (kg)**	**Weekly (kg)**	**Annually (kg)**
Treatment Capacity	200*	1000	52000
Treatment Required	200	1000	52000
Remainder	**0**	**0**	**0**

In relation to treatment capacity as indicated in Table 5 the MTH incinerator is at full technical capacity even though it is actually not working which is a heavy workload for the 1 staff member who conducts both the incineration and the healthcare waste pick up.

Given the poor state of both the incinerator and the shed need to be urgently replaced for higher quality items with full budgeted ongoing operational maintenance and repair and of a capacity that is able to destroy the current waste load with capacity for some increase.

Operations at both incinerators related to storage, unloading (no lifter), cleaning, storage and record keeping were in general adequate with no real problems.

Bins are manually lifted, or bags manually thrown in which puts the operators at risk and this should be rectified. As with the hospitals and clinics there is no signage, no (formal) standard operating procedures, PPE is inadequate, storage for equipment is limited and no spill kits are present. Adhoc record keeping occurs not as part of a formal system of record keeping and improvement.

2.2.4 Healthcare Waste Disposal

Both healthcare waste incinerator sites at Upolu at Tafaigata and Savaii at Vaiaata utilise ash disposal pits that have been established next to the incinerators.

The incinerator operators are advised that all ash generated should be collected in a tight-fitting lid bin before discharging into ash pits and make sure the thickness of soil cover should be at least 150mm when burial of final ash is done. They are also advised that PPE including goggles, face masks or respirators should be used when dealing with collection of final ash from incinerators, though such PPE was not viewed during visits.

It is unclear if such disposal is appropriate as incinerator ash can contain heavy metals, persistent organic pollutants (POPs) and other products of incomplete which could impact on water sources or underground water. While ash that is not properly disposed of can also become air borne if not properly covered with some soil material and could be inhaled unintentionally by MoH officers or residents near the incinerator sites.

Further consideration needs to be given on consent conditions for such disposal, improvements that could be made to ensure such impacts are minimised and to investigate other options such as sending the ash to landfill.

2.2.5 Healthcare Waste Stockpiles

Healthcare Waste Inventories were conducted on existing stockpiles and day to day generation of healthcare waste in all Upolu and Savaii locations. The five legacy waste stockpiles were identified in Table 6 below were fully characterized and quantified with the overall the weight and volume of stockpiles.

Table 6 Healthcare Waste Stockpiles Samoa

Location	Storage Type	Stockpile Make-up
Savaii	Up to thirty 220L healthcare waste bins	Sharps
National Pharmaceutical Warehouse (Indoors)	Airconditioned Warehouse	Mixed expired medical supplies (including pharmaceuticals)
National Pharmaceutical Warehouse (Outdoors)	Unlocked Shipping Container (x1)	Mixed expired medical supplies (including pharmaceuticals)
Tafaigata Incinerator (National Pharmaceutical Warehouse)	Locked Shipping Container (x5)	Expired pharmaceutical waste
Old Laboratory	Semi-abandoned and unsecure building	Mixed hospital chemical and pharmaceutical waste

In Upolu the total recorded weight and volume of stockpiled healthcare was found to be 23,180.44kg and 113.40m^3 respectively (mostly expired pharmaceuticals) while healthcare waste stockpiled in Savaii was estimated at 2,500kg and 10m3 (mostly used needles stored in wheelie bins) as indicated in Table 7 below.

With the MHT Incinerator in Savaii with no further capacity for treatment the more then 20 tonnes of stockpiled healthcare waste can only be treated in the TTMH Incinerator through a planned stockpile reduction project.

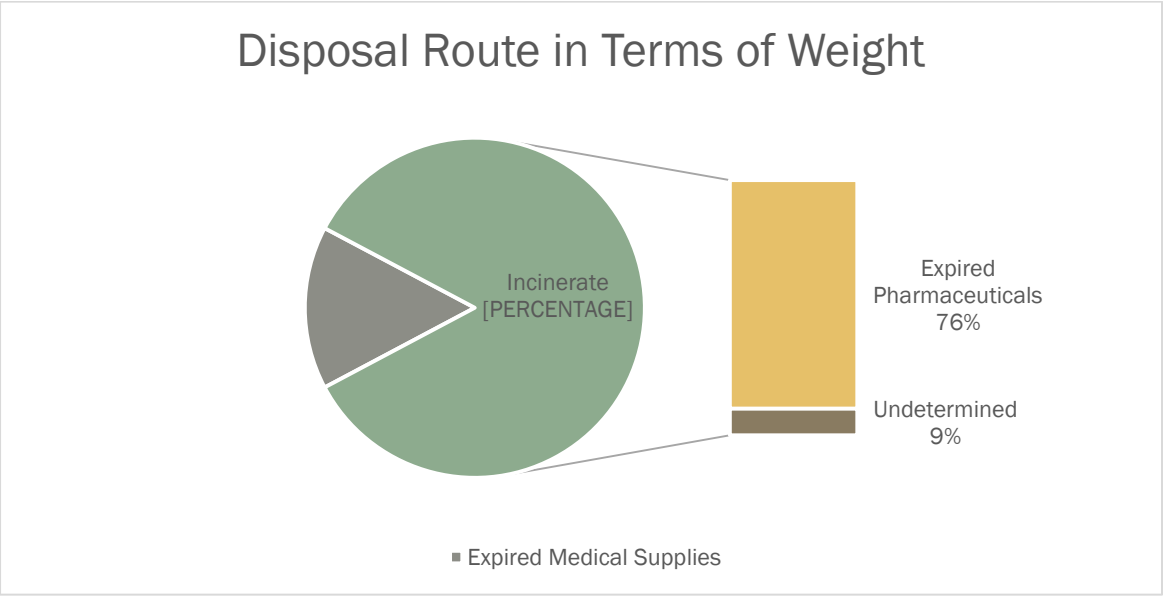
With the TTMH incinerator at full capacity arrangements additional burns would need to be organized for 26 full additional burn days (2 to 3 burns) which would have to be specifically planned and budgeted.

Table 7 – Healthcare Waste Stockpiles in Samoa

Samoa HCW Stockpiles	**Volume (m^3)**	**Weight (kg)**
Upolu	113.40	23180.44
Savaii	10	2500
Total	**123.40**	**25680.44**

The formation of the healthcare waste stockpiles is the result of past failures of healthcare waste treatment to keep up with volumes for the used sharps stored in Savaii and for timely separation of expired medical supplies into expired pharmaceuticals and expired general medical supplies with the ratios of each shown in Figure 3 below.

Figure 3 – Expired Medical Supply Characterisation & Disposal Options



CHAPTER 3: HEALTHCARE WASTE: DEFINITIONS AND HAZARDS

The term healthcare waste refers to all waste generated by organisations, facilities or individuals that are involved in diagnosis, treatment or immunisation of people or animals. This includes public and private hospitals, public and private clinics, dental facilities, pharmacies, veterinary practices as well as research centres and laboratories that undertake medical procedures. It also includes waste that is generated from minor and scattered sources, such as waste produced in the course of healthcare activities undertaken in the home or community.

3.1 Definitions

There are two broad categories of healthcare waste – general waste and hazardous (or potentially hazardous) waste. It is worth emphasising that any healthcare waste that has the potential to be hazardous must be treated as though it is hazardous.

The different categories of healthcare waste, and their sub-categories, are explained in more detail below and are detailed in Table 1.

3.1.1 General (non-hazardous) Healthcare Waste

General waste is non-hazardous solid waste generated by the healthcare sector that can be disposed of safely through the normal waste disposal system. General waste is mostly generated from the administrative and housekeeping functions of healthcare facilities and may also include items such as packaging materials, office waste and general waste from members of the public and patients (such as food wrappings).

General (non-hazardous) healthcare waste does not need to be handled in a special way and it does not pose a risk to human health or to the environment. In Samoa, general waste is disposed to sanitary landfill. Some types of general waste can be recycled such as plastics, glass, metal, paper and cardboard.

If hazardous or potentially hazardous waste is mixed in with general waste, all the waste must then be considered to be hazardous.

3.1.2 Hazardous Healthcare Waste

Any healthcare waste that is not general waste is considered to be hazardous or potentially hazardous waste.

Infectious Waste (excluding sharps)

Infectious waste is comprised of material that may contain pathogens (such as bacteria, viruses, parasites or fungi) that could be harmful to human health, animal health or the environment.

Infectious waste includes any item that is contaminated with blood, excreta or other body fluids, such as used dressings, bandages, swabs, gloves, masks, gowns, curtains, tubing, filters, disposable towels, aprons and laboratory coats.

It also includes wastes from laboratory cultures, stocks or specimens of micro-organisms, live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from the production of biologicals, toxins, and dishes and devices used for the transfer of cultures.

Pathological Waste

Pathological waste (also often referred to as anatomical waste) consists of tissues, organs, placentae, and body parts (excluding teeth and hair). It also includes animal carcasses that are known to be, or suspected of being, infective.

Pathological waste is classified separately to infectious waste as it often requires special methods of handling, treatment and disposal.

Sharps Waste

Sharps are items that could cause cuts or puncture wounds, including needles, hypodermic needles, scalpels and other blades, knives, infusion sets, saws, broken glass and pipettes. Whether or not they are infected, sharps are considered highly hazardous health-care waste and should always be treated as if they were infectious.

Pharmaceutical Waste

Pharmaceutical waste includes expired, unused, spilt and/or contaminated pharmaceutical products; and drugs, vaccines and sera that are no longer usable as medication and need to be disposed of appropriately. This category also includes discarded items used in the handling of pharmaceuticals, such as bottles or boxes with residues, gloves, masks, connecting tubing and drug vials.

Some types of Pharmaceutical waste can be cytotoxic or genotoxic (see below).

Cytotoxic and Genotoxic Waste

Cytotoxic and genotoxic waste may include certain cytostatic/chemotherapeutic drugs, or bodily fluids that may contain metabolites of these drugs from patients treated in the hospital or at home. This type of waste is highly hazardous and may have mutagenic, teratogenic or carcinogenic properties; that is, it is capable of interacting directly with genetic material, causing DNA damage that can be assayed for analysis and/or passed on to offspring.

Cytotoxic substances and residues include all items contaminated by such substances, or used in the delivery of chemotherapy for cancer treatment, as well as unused or discarded preparations.

Chemical Waste

Chemical waste consists of solid, liquid or gaseous products that contain dangerous or polluting chemicals. Chemical waste from healthcare is considered to be hazardous if it is either toxic, corrosive, flammable, reactive or oxidizing.

The most common types of hazardous chemicals used in healthcare facilities include formaldehyde, photographic fixing and developing solutions (used to produce x-rays that still use photographic film), solvents, disinfecting and cleaning solutions, vacuum-pump and engine oils, insecticides and rodenticides, acids and alkalis, oxidants and reducing agents, and wastes from materials with high heavy-metal content such as mercury.

Radioactive Waste

This category includes disused sealed radiation sources, liquid and gaseous materials contaminated with radioactivity, excreta of patients who underwent radionuclide diagnostic and therapeutic applications, paper cups, straws, needles, syringes, test tubes and tap water washings of such paraphernalia. Radioactive waste is produced as a result of procedures such as in vitro analysis of body tissues and fluids, in vivo organ imaging, tumour localisation and treatment and various clinical studies involving the use of radioisotopes. There is currently no known radioactive waste generated in Samoa.

Table 8: Categories of Health Care Waste

Waste Category	Description	Source of Waste	Treatment and Disposal
healthcare waste (hazardous)			
1 Infectious waste	Waste suspected to contain pathogens and that poses a risk of disease transmission.	Waste contaminated with blood and other body fluids; Laboratory cultures and microbiological stocks; Waste (including excreta and other materials) that has been in contact with patients infected with highly infectious diseases in isolation wards.	Handling with appropriate PPE, placed in yellow labelled bags, transported in yellow labelled bins to the treatment facility and incinerated (ash disposed to landfill).
2 Sharps waste	Used or unused sharps.	Hypodermic, intravenous or other needles; Auto-disable syringes; Syringes with attached needles; Infusion sets; Scalpels; Pipettes; Knives; Blades; Broken glass.	Handling with appropriate PPE, placed in dedicated, labelled sharps containers (one-way access), transported in yellow labelled bins to the treatment facility and incinerated (ash disposed to landfill)
3 Pathological waste	Anatomical waste.	Human tissues, organs or fluids; body parts; unused blood products.	Handling with appropriate PPE, placed in yellow labelled bags, transported in yellow labelled bins to the treatment facility and incinerated (ash disposed to landfill).

Waste Category	Description	Source of Waste	Treatment and Disposal
4 Pharmaceutical waste	Waste from pharmaceuticals and pharmaceutical compounds.	Pharmaceuticals that are expired or no longer needed; items contaminated by or containing pharmaceuticals	Handling with appropriate PPE, transported in original containers or yellow labelled bins to the treatment facility and incinerated (ash disposed to landfill).
5 Cytotoxic and Genotoxic waste	Waste containing substances with cytotoxic or genotoxic properties.	Waste containing cytostatic drugs – often used in cancer therapy; Genotoxic chemicals.	Stored securely in accordance with the requirements for the specific cytotoxic or genotoxic collection for export for specialised treatment and disposal
6 Chemical waste	Waste containing chemical substances or with a high content of heavy metals.	Laboratory reagents; Film developer; Disinfectants that are expired or no longer needed; Solvents; Batteries; Broken thermometers and blood-pressure gauges.	Stored securely in accordance with the requirements for the specific chemical collection for export for specialised treatment and disposal
7 Radioactive waste	Waste containing radioactive substances.	Unused liquids from radiotherapy or laboratory research; Contaminated glassware, packages or absorbent paper; Urine and excreta from patients treated or tested with unsealed radionuclides; Sealed sources.	Stored securely in accordance with the requirements for the radioactive substances for export for specialised treatment and disposal
General waste (Non-hazardous)			
8 General waste from healthcare facilities	Waste that does not pose any biological, chemical, radioactive or physical hazard.	Packaging materials, office waste and general waste (such as food wrappings)	Stored in black bags and transported in black/green bins for landfill disposal

3.2 Exposure to Hazardous Healthcare Waste

3.2.1 Hazards from Infectious Waste and Sharps

Infectious waste and sharps can cause serious injury and disease if not managed properly. Pathogens in infectious waste can enter the human body through a number of different routes: through a puncture, abrasion or cut in the skin; through mucous membranes; by inhalation; and/or by ingestion.

Concentrated cultures of pathogens and contaminated sharps (particularly hypodermic needles) are the waste items that pose the most acute potential hazards to health.

3.2.2 Hazards from Chemical and Pharmaceutical Waste

The improper disposal of chemical and pharmaceutical products can cause intoxication either by acute or by chronic exposure, and injuries such as burns. Intoxication can result from absorption of a chemical or pharmaceutical substance through the skin or the mucous membranes, or from inhalation or ingestion.

Injuries and burns to the skin, eyes, or mucous membranes of the airways can be caused by contact with flammable, corrosive or reactive chemicals.

3.2.3 Hazards from Genotoxic/Cytotoxic Waste

The severity of the hazards for health-care workers responsible for the handling or disposal of genotoxic/cytotoxic waste is governed by a combination of the substance toxicity itself and the extent and duration of exposure. The main pathways of exposure are inhalation of dust or aerosols, absorption through the skin, and ingestion of food accidentally contaminated with genotoxic/cytotoxic pharmaceuticals. Exposure can also occur through contact with body fluids and secretions of patients undergoing chemotherapy.

Many cytotoxic drugs are extreme irritants and have harmful local effects after direct contact with skin or eyes. Cytotoxic drugs may also cause dizziness, nausea, headache or dermatitis.

Special care in handling genotoxic/cytotoxic waste is therefore essential; any discharge of such waste into the environment could have disastrous ecological consequences.

3.2.4 Hazards from Radioactive Waste

The nature of illness caused by radioactive waste is determined by the type and extent of exposure. It can range from headache, dizziness and vomiting to much more serious problems. Radioactive waste is genotoxic, and a sufficiently high radiation dose may also affect genetic material. Handling highly active sources, such as those used in diagnostic instruments (e.g. gallium sealed sources) may cause much more severe injuries, including tissue destruction, necessitating the amputation of body parts. Extreme cases can be fatal. The hazards of low-activity radioactive waste may arise from contamination of external surfaces of containers or improper mode or duration of waste storage. Health-care workers, and waste-handling and cleaning personnel exposed to radioactivity are most at risk.

3.2.5 Hazards of Healthcare Waste to Public Health and the Environment

Apart from the risk to staff and patients at facilities that generate hazardous healthcare waste, the improper management of healthcare waste can have grave impacts upon the general public and the environment. The major risks include pollution of the air, water and soil, as well as aesthetic damage.

3.2.6 Hazards from Healthcare Waste Treatment Methods

Flue gases from waste incinerators may have an impact on people living and working close to a treatment site. The health risk is most serious where an incinerator is improperly operated or poorly maintained. If poorly controlled, emissions from waste incinerators may cause health concern from particulates (associated with increased cardiovascular and respiratory mortality and morbidity); volatile metals, such as mercury and cadmium (associated with damage to the immune system, neurological system, lungs and kidneys); and dioxins, furans and polycyclic aromatic hydrocarbons (which are known carcinogens but may also cause other serious health effects).

Ash from the incineration of hazardous healthcare waste may also pose a risk. Burnt-out needles and glass may have been disinfected but can still cause physical injury. Also, incinerator ash may contain elevated concentrations of heavy metals and other toxic items.

Burial of healthcare waste in landfill sites can pose hazards to workers and the general public. Chemical contaminants or pathogens in landfill leachate may be released into surface streams or groundwater. On poorly controlled land-disposal sites, the presence of fires and subsurface burning waste poses the further hazard of airborne smoke. The smoke may contain heavy metals and other chemical contaminants that, over time, may affect the health of site workers and the general public.

3.3 Sources and Composition of Healthcare Waste in Samoa

The major sources of healthcare waste in Samoa are the Tupua Tamaese Meaole Hospital (TTMH), in Apia, Upolu, and the Malietoa Tanumafili II Hospital (MTII) in Tusivi, Savaii. Other sources of healthcare wastes in the public healthcare sector include district hospitals, nursing centres, and nursing sub-centres.

Sources of healthcare waste in the private healthcare sector include private hospitals, nursing homes, private doctor and specialist clinics, dental practices, veterinary clinics and mortuaries. The types of healthcare waste generated depends on the area of healthcare practice, as not all types of wastes will be generated everywhere within the healthcare sector.

All facilities generating healthcare waste are required to segregate, store and dispose of waste in accordance with this healthcare waste management plan.

3.4 Persons at Risk

All individuals that come into contact with hazardous healthcare waste are potentially at risk to being exposed to a hazard. The main groups of people who are at risk of exposure include:

- Staff of facilities that generate hazardous healthcare waste such as doctors, nurses, dentists, veterinarians, morticians, healthcare auxiliaries and maintenance personnel;
- Patients in healthcare facilities or receiving home care;
- Visitors to healthcare facilities;
- Workers in support services, such as cleaners, people who work in laundries or those who transport waste to a treatment or disposal facility;
- Workers and operators of waste treatment and disposal facilities such as landfills or incinerators; and
- Informal recyclers (scavengers or waste pickers).

When healthcare waste is not disposed of properly, members of the general public may also be exposed to hazards.

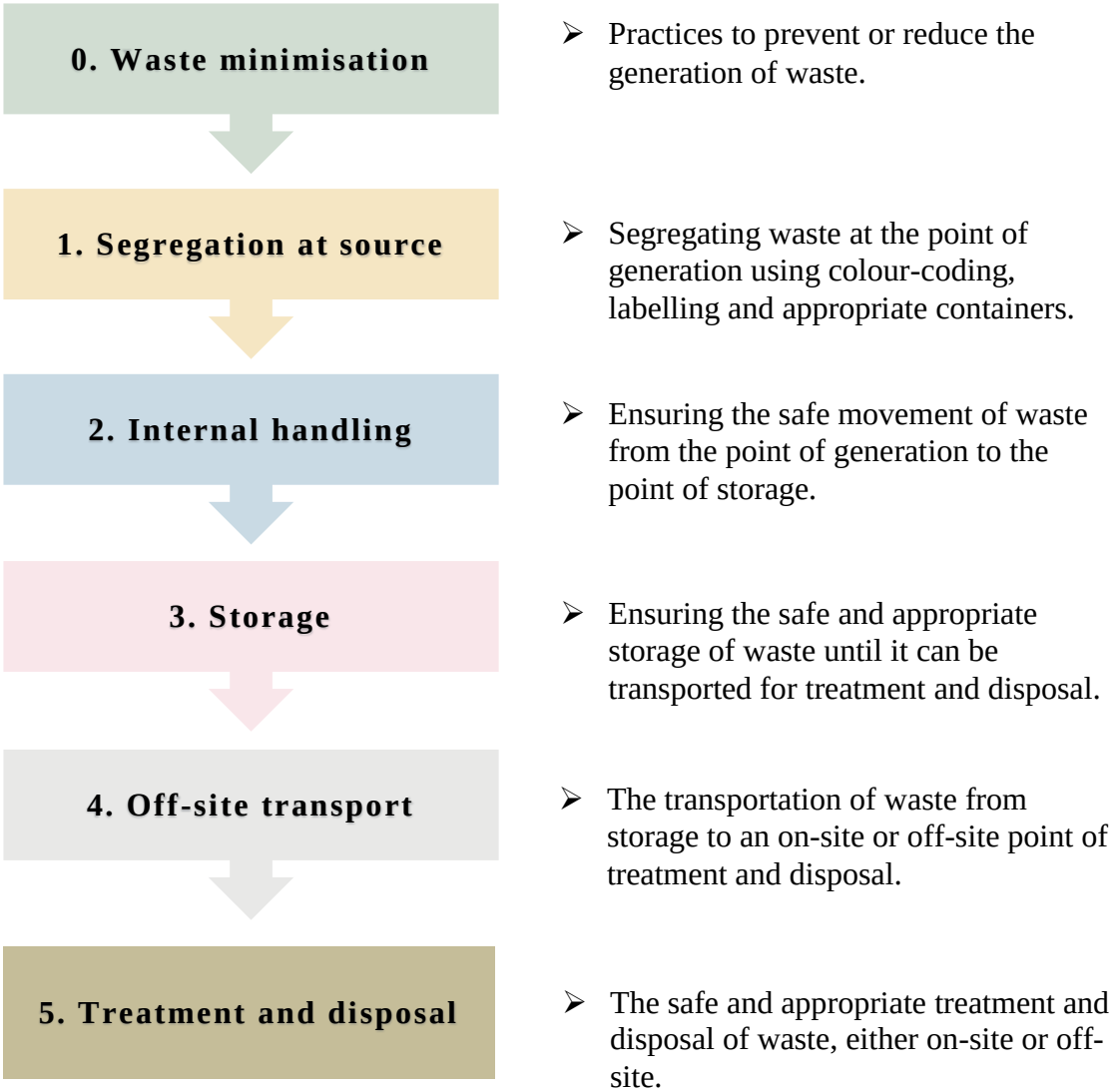
CHAPTER 4: HEALTHCARE WASTE MANAGEMENT BEST PRACTICE

4.1 The Healthcare Waste Management Process

The proper management of healthcare waste requires an understanding of the healthcare waste process. This process (or stream) starts from before the waste is generated and extends up until its final treatment and disposal.

The healthcare waste stream is composed of several steps, depicted in Figure 1 below, that include: waste minimisation, segregation at the source of generation, collection and handling, storage, offsite transportation, and finally, treatment and disposal of the healthcare waste. The proper management of healthcare waste requires attention to each one of these steps in the healthcare waste management process.

Figure 4 Steps for Hospital Waste Management



CHAPTER 5: HEALTHCARE WASTE MINIMISATION

Growing awareness around the importance of environmental sustainability, has led to concern around the high volume of waste produced by health facilities, such as through the use of single-use items. Healthcare waste minimisation aims to prevent or reduce the generation of waste within healthcare facilities.

Healthcare waste minimisation reduces the cost of waste disposal, reduces the environmental impact of healthcare waste, enhances public health, enhances worker safety and improves the public image of the healthcare facility.

Waste minimisation is considered 'Step 0' in the healthcare waste management process because efforts to reduce the volume of waste in healthcare settings commence well before the waste is generated.

The World Health Organization (WHO) recommends that the waste minimisation practices should feature in the waste-management policy of all healthcare facilities, with a broad aim to move current practices away from disposal, to prevention (source reduction), recovery, safe reuse and recycling.

Given the limited recovery and recycling options available in Samoa at present, the preferable approach to healthcare waste minimisation is prevention, or source reduction, which focuses on producing as little waste as possible, thus minimising the volumes of waste entering the waste stream. This approach should be supported by efforts to enhance the safe reuse of items, provided a patient's health and wellbeing is not compromised.

5.1 Source Reduction

Source reduction (also known as waste avoidance and reduction) can be achieved in a number of different ways, such as:

- Carefully segregating hazardous healthcare waste from general healthcare waste to reduce the volume of waste that needs to be specially treated and disposed of;
- Selecting and purchasing supplies that are less wasteful, require smaller quantities, or that produce a less hazardous waste product;
- Choosing to purchase supplies that have minimal waste generating materials in their product packaging;
- Using physical rather than chemical cleaning methods (such as steam disinfection instead of chemical disinfection);
- Preventing the wastage of products;
- Monitoring chemical use and centralising the purchase of hazardous chemicals;
- Ordering relatively small quantities of chemical and pharmaceutical products (rather than large amounts at one time) to reduce the quantities used and wasted;
- Using the oldest batch of chemical and pharmaceutical products first, and being sure to use all the contents of each container;
- Checking of the expiry date of all products at the time of delivery and refusing to accept short-dated items from a supplier.

5.2 Safe Reuse

Reusable items should be selected over disposable items whenever it is clinically appropriate, environmentally sound and practical.

When considering reuse, it is important to make a distinction between different types of products. For example, disposable non-medical items can often be avoided, as can medical devices that pose no cross-infection risk (such as blood-pressure meters) or medical devices specifically designed for reuse.

However, single-use devices must not be reused because they cannot be cleaned thoroughly and pose an unacceptable risk of cross-infection. Where there is an option, purchasing a reusable device of similar quality for a medical or nonmedical use is preferable to purchasing a single-use device.

5.3 Minimum Standards for Healthcare Waste Minimisation

- Waste minimisation approaches should feature in the Healthcare Waste Management Plans of all healthcare facilities, with a broad aim to shift practices away from disposal, to source reduction, safe reuse and recycling (where possible).

CHAPTER 6: HEALTHCARE WASTE SEGREGATION

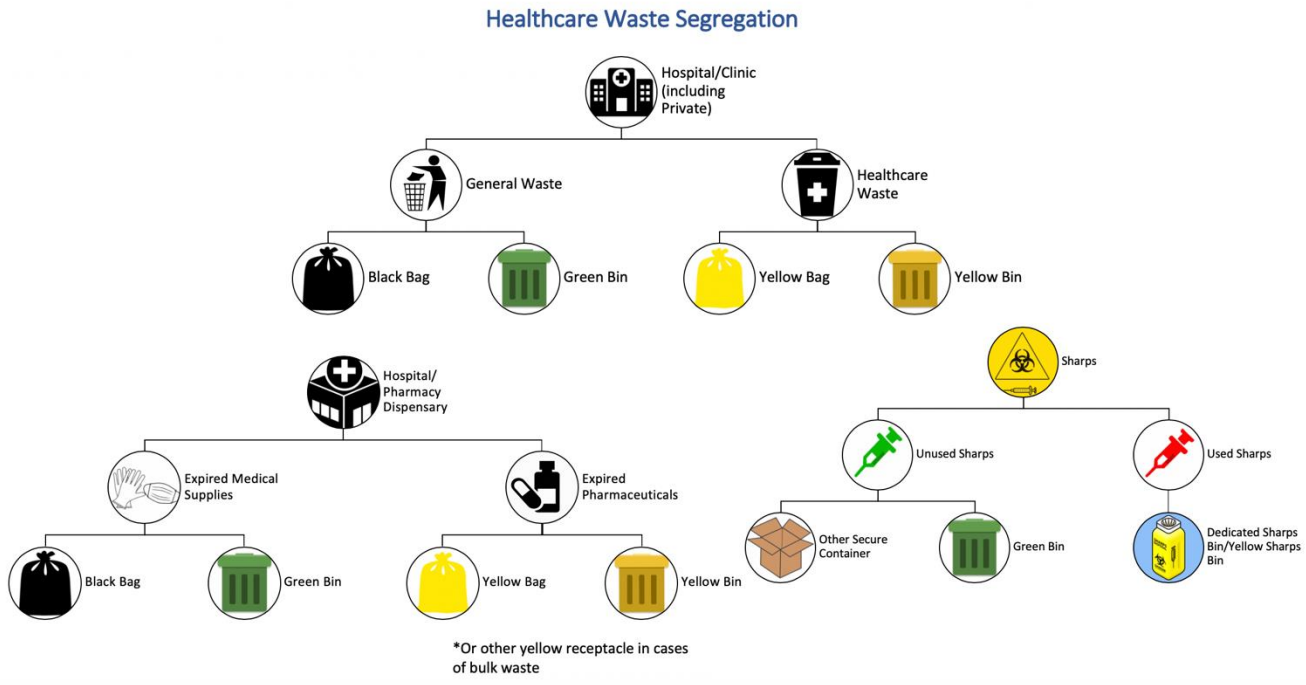
Segregation is one of the most important steps to successfully manage healthcare waste. Proper segregation reduces treatment and disposal costs and greatly reduces the risk of people being exposed to hazards.

Segregation is the process of separating different categories of waste at the point of generation, keeping them isolated from each other for specific reasons and in suitably designed, labelled and colour-coded containers/packaging for visual identification.

The correct segregation of healthcare waste is the responsibility of the person who produces each waste item, whatever their position in the organisation. Segregation should be carried out by the producer of the waste as close as possible to its place of generation, which means segregation should take place in a medical area, at a bedside, in an operating theatre or laboratory by nurses, physicians and technicians.

The healthcare facility management is responsible for making sure there is a suitable segregation, transport and storage system, and that all staff adhere to the correct procedures.

Figure 5 – Hospital Waste Segregation



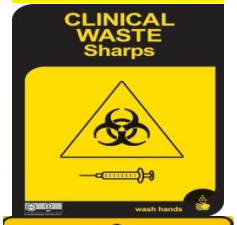
If classification of a waste item is uncertain, as a precaution it should be placed into a container used for hazardous healthcare waste.

6.1 Colour Coding

The correct classification of healthcare waste is the responsibility of all healthcare workers at the point of waste generation.

The colour coding system (see Table 2) ensures that different waste types are identified, segregated and stored according to the risks and disposal methods required for that type of waste.

Table 9: Colour Coding, Types of Containers and Labelling

Waste type	Type of container	Symbol
• **Infectious waste** • **Pathological waste**	Yellow plastic bin with lid, and yellow plastic bin liner.	
• **Sharps waste**	Yellow, puncture-proof container marked ‘sharps’	
• **Pharmaceutical waste** • **Chemical waste**	Original packaging and label’s with chemical classification	
• **Cytotoxic/genotoxic**	Purple, secure containers marked ‘cytotoxic’	
• **Radioactive waste**	Lead box, marked ‘radioactive’	
• **General waste**	Black/Green plastic bin with lid and black bin liner.	General Waste Signage

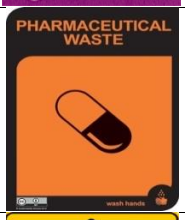
Colour coding makes it easier for medical staff and hospital workers to put waste items into the correct container, and to maintain segregation of the wastes during transport, storage, treatment and disposal. Colour coding also provides a visual indication of the potential risk posed by the waste in that container.

It is important that the colour of bin liners matches the colour of the bin to avoid confusion.

6.2 Signage and Hazard Symbols

In addition to colour coding, hazardous healthcare waste must be labelled with the appropriate symbol.

Table 10. Waste Types and Hazard Symbols.

Waste type	Hazard symbol
Infectious waste, pathological waste	
Sharps	
Cytotoxic waste	
Pharmaceutical waste	
Chemical waste (toxic)	
Chemical waste (corrosive)	
Chemical waste (flammable)	
Chemical waste (oxidising)	

6.3 Containment

6.3.1 Bins

This plan mandates the use of a colour-coded system of labelled, plastic, mobile garbage bins with lids to be used in all healthcare institutions in Samoa. Bins should have well-fitting lids, preferably operated by a foot pedal.

Plastic bins used for the segregation and containment of healthcare waste must be constructed of heavy-duty plastic and be fitted with a hinged lid, so as to reduce odours and exposure to insect vectors and vermin.

Where larger bins (>75 L capacity) are used they should be fitted with wheels. The bins used by an institution or practice shall be suitably sized for the institution's needs and collection timetable.

It is an offence to remove any of these bins from the healthcare institution's grounds without the express permission of the site's Waste Management Coordinator or delegate.

6.3.2 Signage

Signage indicating correct waste segregation practices is a valuable tool to provide ongoing guidance to staff. The success of the waste/recycling system will depend on having a clearly identified container for each type of material. This is achieved by the use of colour coded containers, symbols and wording. In addition, signage must be placed so that those wanting to dispose of materials can clearly and readily identify which container to deposit such materials into. Once designed, signs should be located on walls above all waste containers as well as on the container itself.

6.3.3 Sharps

Sharps are to be managed with particular care due to the risk of needle-stick injury or puncturing of the skin by other contaminated sharp objects. Sharps should be collected in puncture proof, impermeable containers with one-way apertures or restricted access to prevent/minimise contact between disposed needles and hands (to prevent needlestick injuries) and are difficult to open after closure (pedestal bins are not suitable).

Where healthcare service delivery occurs in the villages, such as immunisation programs, reusable sharps containers must be carried by service providers in order to safely contain sharps and any other potentially infectious wastes generated in the course of these duties.

On returning to the healthcare institution these wastes shall be deposited into a yellow hazardous waste bin and the reusable sharps container cleaned with disinfectant and hot water. Re-usable sharps containers must be made of heavy-duty plastic that can withstand cleaning and disinfection procedures. The preferred type of sharps container accepts the syringe complete with attached needle. Needles should not be recapped or removed from syringes for the purposes of waste disposal.

6.4 Segregation of Chemical Waste

Currently chemical waste from the healthcare sector (mostly laboratory) is not well managed in Samoa being stored in an adhoc manner and not in accordance with required standards.

There is no clear process for disposal, with few if any options in Samoa for disposal with MNRE about to advise of agents in New Zealand and Australia for international export. Given this difficulty in managing chemical waste take back arrangements with suppliers should also be considered in contractual arrangements.

Currently chemical waste (mostly laboratory) is stored in an adhoc manner in several locations including:

- The Current Hospital Laboratory
- The Old Hospital Laboratory
- The Old Hospital.

Chemical waste should be classified in accordance with the United Nation's International Convention for Dangerous Goods. This international convention has a range of symbols and colours for each Hazard Class. The classes relevant for the types of chemical wastes produced within the healthcare industry include:

- UN Hazard Class 3: Flammable Liquids
- UN Hazard Class 4: Flammable Solids
- UN Hazard Class 5: Oxidising Substances
- UN Hazard Class 6: Poisons
- UN Hazard Class 8: Corrosive Substances

Properly labelled chemicals usually have these classifications and relevant symbols on their labels that can be used as an aid to recognizing their potential hazards. If any such materials need to be repackaged due to deterioration of their containers they must still be labelled appropriately.

Certain Hazard Classes should be separated, and there are international rules governing their segregation according to Hazard Class, as some classes when mixed can cause hazardous chemical reactions which can cause fires, explosions, or the generation of toxic, flammable and/or corrosive fumes. Therefore, certain chemical wastes need to be appropriately and properly contained and segregated according to Hazard Class.
The following general segregation rules should be followed:

- All Hazard Classes should be segregated from each other, except for Classes 3 and 4 which may be stored together;
- Acids and Alkalis that are in "Hazard Class 8 – Corrosive Substances", should also be segregated for the purposes of storage, as they are chemically incompatible.

6.5 Labelling

All bins used in the collection of healthcare wastes are required to be labelled with the appropriate hazard symbol (as outlined in Table 3) and the name of the healthcare institution from which the waste originates.

When waste audits are conducted, labelling of the waste at the point of generation is required in the form of a tag or an adhesive label that is attached to the container prior to, or at the time of collection.
This waste tagging system allows waste audits to be conducted in order to identify compliance or non-compliance.

6.6 Minimum Standards for Healthcare Waste Segregation

- All facilities that generate healthcare waste must have dedicated plastic waste bins (with lids) suitable for the types of waste generated.
- All bins must colour coded and must display the appropriate hazard symbol and the name of the healthcare institution.
- Sharps must always be deposited into containers that reduce potential for needlestick injury.
- Signs must be displayed in all areas where waste bins are located indicating the correct container for the various waste types.
- Waste must be correctly segregated in all wards/departments with use of containers that are colour coded for the different waste types.

CHAPTER 7: HEALTHCARE WASTE COLLECTION AND HANDLING

7.1 Internal Handling

Once segregated and contained, waste needs to be transported from the point of generation to an appropriate storage area to await collection. This is known as internal handling.

In larger institutions the filled waste bins should to be taken directly from the collection point to a designated healthcare waste storage area by the cleaners or sanitation staff responsible for the collection and transfer of wastes through the healthcare institution.

The colour of the bin will designate the appropriate area for waste collection.

Table 11: Bin collection locations.

Bin type	Location
Yellow bins	Taken to a collection area where the wastes will be collected for transport to the incineration facility.
Pharmaceutical waste	
Black bins	Taken to the general waste collection area where wastes are to be collected for transport to the landfill.

7.1.1 Interim storage areas (collection points)

It is important that collection points are located away from public access ways and sterile or clean areas so that access by sanitation staff through such areas is minimised or avoided.
Collection times should be fixed and appropriate to the quantity of waste produced in each area of the healthcare facility. Medical staff should consult with the sanitation technicians and cleaners to determine what is the most suitable and practical arrangement for the collection of wastes from each area.

Access to areas, designated waste storage areas, frequency of collection and collection times are some of the important issues that should be discussed between medical staff and waste management staff. Each healthcare institution must implement a scheduled waste collection program specifying the timing of waste collection, destination of wastes and responsibility for collection.

7.2 On-Site Transport

The on-site transport of waste should take place during less busy times whenever possible. Set routes should be used to prevent exposure to staff and patients and to minimise the passage of hazardous waste through patient care and other clean areas.

Depending on the design of the healthcare facility, the internal transport of waste should use separate floors, stairways or elevators as far as possible. Regular transport routes and collection times should be fixed and reliable.
Hazardous and non-hazardous waste should always be transported separately.

7.2.1 On-site Modes of Transportation

Transportation of waste within a large healthcare facility should involve trolleys, wheeled containers or carts that are dedicated solely for this purpose. On-site transportation vehicles should meet the following specifications:

- Easy to load and unload;
- No sharp edges that could damage waste bags or containers during loading and unloading;
- Easy to clean;
- Lined with impervious and durable materials;
- Marked with 'fill limit' indicators, to prevent toppling as a result of over-filling leading to possible breakage and/or spillage; and
- Be properly maintained and replaced when necessary.

The on-site transportation vehicles should be cleaned and disinfected daily with an appropriate cleaning agent.

7.2.2 Personal Protective Equipment

Workers transporting the waste should be issued with (and wear) appropriate personal protective equipment (PPE), including gloves, strong and closed shoes, overalls and masks and be suitably trained in how to use their PPE.

7.2.3 On-site Transportation Routing

Separate hazardous and non-hazardous routes should be planned and used. Collection should start from the most hygienically sensitive medical areas and follow a fixed route around other medical areas and interim storage locations. The frequency of collection should be refined through experience to ensure that there are no overflowing waste containers at any time.

7.3 Minimum Standards for Internal Handling

- In larger healthcare facilities, a dedicated trolley must be used for waste transport. The trolley must be designed so that any spills are contained.
- Healthcare waste must not be transported where clean linen and/or food are transported.
- All waste handlers must be provided with, and use, appropriate PPE including overalls/protective clothing, gloves and eye protection.
- Interim storage areas at ward/department level should be secure and located away from public areas. Interim storage areas should be sufficient in size to allow waste to be segregated and so as to avoid waste of different classifications being stored together.
- Each healthcare institution must implement a scheduled waste collection program specifying the timing of waste collection, destination of wastes and responsibility for collection.

CHAPTER 8: HEALTHCARE WASTE STORAGE

8.1 Storage of Hazardous Healthcare Waste

All hazardous and potentially hazardous healthcare waste should be collected and stored in a temporary waste storage area until it is transported to a designated treatment and disposal facility. The storage area should be marked with a warning sign.

All healthcare facilities should designate a central storage area for healthcare waste. Waste generated from different units should be collected daily and transported to the designated storage site. The central storage area should be located within the healthcare facility and situated so as to minimise the risk of contamination to medicines, foodstuffs, textiles, employees, patients and visitors.
In smaller healthcare waste facilities, a safe holding point should be identified for safe storage of the waste.
Storage areas need to be clearly demarcated as such. Additionally, storage areas require the following:

- An impermeable, hard-standing, slip-resistant floor with good drainage that is easy to clean and disinfect as needed;
- A proximal water supply for cleaning purposes;
- Easy access for staff in charge of handling the waste;
- Lockable, to prevent access by unauthorised persons;
- Easy access for a waste collection vehicle;
- Protected from sun, rain, strong winds, floods, etc;
- Inaccessible to animals, insects and birds;
- Good lighting and adequate ventilation;
- Not situated in the proximity of fresh food stores or food preparation areas;
- Convenient to a supply of cleaning equipment, protective clothing and waste bags or containers;
- Kept clean in accordance with established cleaning procedures that, at a minimum, should include the daily cleaning of floors; and
- Have sufficient capacity to accommodate the volume of waste to be stored in accordance with facility's waste generation profile and the collection frequency.

Additionally, the storage area should be checked on a daily basis to ensure it is secure, clean and organised.

8.2 Healthcare Waste Storage Time Limits

The storage of infectious and pathological waste must not exceed 24 hours unless refrigerated at between 3°- 8°C.

Sharps containers may be stored for up to 30 days, and pharmaceutical and chemical waste may be stored for up to 90 days.

Waste collection times in TTMH and MTII shall be daily. Waste collection times in all Public District Hospitals, Nursing Centres and Sub-Centres and Private Hospitals shall be at least thrice weekly. Waste collections from smaller private healthcare institutions shall be at least weekly.

8.3 Chemical Waste Storage

The storage of redundant chemicals and collected chemical wastes needs to be undertaken in a safe and secure manner, and in accordance with recognised segregation practices according to UN Hazard Class.

In general, the following rules should be followed:

- Where redundant chemicals of the same Class are to be stored on shelves, all liquid wastes should be stored on the lower shelves and solid wastes stored above them.
- Chemical stores should be protected from the elements, be well ventilated and suitably signposted with the symbol for the appropriate hazard class.
- Appropriate spill management kits and fire extinguishment equipment should be available for the chemicals being stored.
- Manifests of the wastes stored must be maintained and be up to date. Such manifests should name the chemical wastes, and indicate its Hazard Class, the amount and the type of container.
- Where containers are deteriorating the waste must be repackaged into a suitable and durable container.
- A management plan should be prepared for the chemical wastes identifying possible reuse, recycling, treatment and disposal options. This should be reviewed annually and those wastes for which no viable management options exist in Samoa should be identified.

8.4 Minimum Standards for Healthcare Waste Storage

- A dedicated central storage area that meets the standards outlined in section 7.1 must be used to store untreated healthcare waste, with the exception of chemical waste.
- The storage area should be signposted with the bio-hazard symbol and other labelling appropriate to the types of waste stored in the area.
- Loading/unloading of waste must be carried out in accordance with designated safe procedures, with relevant records completed and maintained.
- Spill kits for biohazardous and cytotoxic waste must be located in the storage areas.

CHAPTER 9: OFF-SITE TRANSPORTATION OF HEALTHCARE WASTE

Where healthcare waste requires transportation to an off-site facility for treatment and disposal, the waste must be properly contained in the correct colour-coded container. In addition, the container must display the appropriate hazard symbol, the name of the healthcare institution and a tag or label displaying the source of generation (e.g. Maternity) if waste auditing is to be conducted (notification will be given to the institution if this is to occur).

9.1 Waste Transport Vehicles

Untreated healthcare waste can only be transported in vehicles that have been authorised for that purpose by MOH and MNRE in accordance with the standards required by this management plan as follows:

- Transport vehicles for healthcare wastes will have a fully enclosed storage compartment, which must be maintained in a clean and hygienic manner and display the biohazard symbol at the front and rear of the vehicle.
- The vehicle must be air-conditioned.
- The waste storage area must be sealed from the driver's area by the use of a wire cage.
- Healthcare waste will be required to be transported in sealed plastic bins that are restrained during transport such that wastes cannot not be spilled during transport.
- Healthcare waste transport vehicles must be maintained in a roadworthy manner and driven in compliance with all required rules of the road.

9.2 Routing

Hazardous healthcare waste should be transported via the quickest or shortest possible route, which should be planned before the trip begins. After departure from the source, every effort should be made to avoid further handling of the waste.

9.3 Waste Transport Certificates

Off-site waste transport requires the correct and legible completion of waste tracking documentation. The waste transport certificate system is required for the off-site transport of healthcare wastes. This enables waste tracking to occur and assists in the development of a database on waste generation amounts and sources of waste, so that appropriate systems and infrastructure can be provided and maintained to support the management plan.

9.4 Minimum Standards for Off-site Transportation of Healthcare Waste

- A dedicated vehicle that meets the standards outlined in section 8.1 is used to transport healthcare waste.
- Waste transport certificates are correctly and legibly completed for each journey.
- A spill kit is provided in the vehicle and staff are trained in how to use it.

CHAPTER 10: HEALTHCARE WASTE TREATMENT AND DISPOSAL

There are a number of different types of technology available for treating hazardous healthcare waste. Different treatment methods have strengths and weaknesses that need to be considered in the context of an individual country's circumstances.

10.1 Best Practice Treatment Technology

When selecting treatment technology it is important to consider factors such as: treatment efficiency; occupational, health and safety and environmental considerations; volume and mass reduction; types and quantity of waste for treatment and disposal/capacity of the system; infrastructure and space requirements; locally available treatment options for final disposal; availability of skills; operation and maintenance considerations; location of the treatment site and disposal facility; social and political acceptability; and regulatory requirements.

Types of treatment technology include thermal, chemical, irradiation, biological processes, encapsulation, inertisation, pulverisation, shredding and compaction/baling. Treatment solutions may involve a single technology, more than one technology for subcategories of healthcare waste, or a combination of technologies.

10.2 Technologies Applicable in the Samoan Context

In Samoa, high temperature incineration is currently the most appropriate disinfection practice, provided the units are modern, maintained, have sufficient waste volumes and locked-in supplier maintenance and training contracts.

10.3 Siting of Waste Treatment Facilities

In determining a safe location for waste treatment facilities, it is important to take into account the safe transfer routes, average distances from waste sources and temporary storage requirements, as well as space needed by workers to manoeuvre safely around the treatment unit. The location of the facility should not cause traffic problems as waste is brought in and out. Odour, noise, visual impact of operations on patients and visitors, public access and security should also be considered.

High temperature incineration of hazardous healthcare waste takes place at two locations in Samoa as indicated below.

Tupua Tamasese Meaole Hospital, utilises an incinerator that is designed to burn at high temperatures and is located away from the hospital and community and housed in an undercover building. At present, this unit is sufficient in scale and effectiveness to treat all of its healthcare waste, and those provided by surrounding healthcare facilities.

Malietoa Tanumafili II Hospital has two MediBurn 20 model incinerators (neither currently operational). One Mediburn unit is still being used through waste being manually burnt through it at low temperature. They are located within a dedicated building away from the hospital and community. A replacement incinerator sufficient in scale and effectiveness is required to treat all of its healthcare waste, and those provided by surrounding healthcare facilities.

10.4 Maintenance and Operation of Incinerators

Healthcare waste incinerators must be maintained and operated in accordance with the following standards:
The incinerator shall be operated so as to have no smoke (i.e. a non-visible emission), except during start-up, at which time smoke may not be discharged for more than five minutes, and during waste loading in which case smoke must not occur for more than three minutes in any hour of operation;

- The incinerator stack shall allow free vertical discharge of waste gases to atmosphere;
- Excess combustion air will be available to the incinerator's afterburner at all times;
- Optimal operating temperatures in the afterburner (or secondary chamber) shall be maintained at a minimum of 1100°C and 1.0 second residence time during all times at which waste is loaded into the incinerator;
- Primary chamber temperatures shall be maintained at between 650 and 950°C at all times. Waste must not be loaded into the primary chamber when temperatures are either above or below these limits;
- Primary and secondary chamber temperatures shall be continuously monitored.
- Waste loading into the incinerator shall occur via an automated waste bin tipper and hydraulic ram system;
- Incinerator operators shall wear the appropriate personal protective equipment at all times, including eye goggles, gloves, and work boots;
- The incineration facility and area around it shall be kept clean of any uncontained healthcare wastes or litter at all times;
- Healthcare waste from damaged bins shall be repackaged and incinerated immediately; and
- No open burning of any healthcare waste is permitted at any time.

10.5 Waste Disposal Systems

10.5.1 Sanitary Landfill

Sanitary landfills are engineered to keep waste isolated from the environment. Appropriate engineering preparations must be completed before the site is allowed to accept waste. There must be trained staff present on site to control operations and organise deposits and daily coverage of waste.

Once incineration of hazardous healthcare waste has been undertaken, residues (ash) from such treatment must be disposed of to a sanitary landfill.

10.6 Treatment and Disposal by Waste Category

10.6.1 Infectious Waste, Pathological Waste, Cytotoxic Waste and Sharps

All potentially infectious care waste must be treated in an incineration plant approved by the MNRE. Incineration ash and residues shall be disposed of to a sanitary landfill.

10.6.2 Pharmaceutical (including genotoxic) Waste

All pharmaceutical wastes must be approved for destruction by incineration by the Chief Pharmacist at TTMH. The disposal of narcotics must occur under the supervision of a pharmacist or their authorised delegate. Care must be taken to ensure that any highly

flammable materials are not disposed of in bulk to the incinerator as this may cause damage to the incinerator if all introduced into the incinerator at once. Some other organic chemical wastes may be able to be disposed of by incineration, if approved by the chief Pharmacist at TTMH, in consultation with the MNRE. Chlorinated organic wastes (excluding the PVC in healthcare wastes) should not be incinerated. The incineration plant must be approved by the MNRE. Incineration ash and residues shall be disposed of in a special pit at the sanitary landfill. Chemical wastes must be rendered inactive or harmless by treatment before their disposal to landfill, wastewater treatment system or septic tank system.

Those chemical wastes for which no safe or environmentally sound treatment technology exists must be properly stored and a management plan prepared for their safe and secure storage and ultimate disposal.

10.6.3 General Waste

Non-hazardous (general) healthcare waste can be disposed of directly to landfill.

10.7 Minimum Standards for Treatment and Disposal of Healthcare Waste

- All hazardous healthcare waste must be incinerated prior to disposal to reduce the potential for harm.
- Incinerators must be maintained and operated in accordance with the standards outlined in Section 9.4.
- Once treated, hazardous healthcare waste must be disposed of to sanitary landfill and covered immediately on arrival.

CHAPTER 11: WASTEWATER TREATMENT AND DISPOSAL

11.1 Characteristics of Wastewater from Healthcare Facilities

The basic principle underlying effective wastewater management in healthcare facilities is a strict limit on the discharge of hazardous liquid to sewers. Wastewater from healthcare facilities contains potentially hazardous elements, including:

- Microbiological pathogens (bacteria, viruses and helminths), which are easily transmitted through water; and
- Small amounts of hazardous chemicals from cleaning and disinfection operations.

Wastewater or sewage from healthcare facilities can be discharged into domestic (municipal or city) sewers without pre-treatment, provided that the following requirements are met:

- The municipal sewers are connected to an efficiently operated sewage treatment plant that ensures at least 95% removal of bacteria;
- The sludge resulting from the sewage treatment plant is subjected to anaerobic digestion, leaving no more than one helminth (parasite) egg per litre in the digested sludge;
- Hazardous wastewater with significant quantities of toxic chemicals (e.g. formaldehyde, pharmaceuticals, radionuclides, cytotoxic drugs and antibiotics) coming from laboratories, research centres, clinics, mortuary and autopsy centres, should be discharged to a pre-treatment/neutralization tank for sewage (toxic) neutralization and disinfection by chlorination prior to discharge or connection to the sewage treatment plant; and
- Excreta from patients being treated with cytotoxic drugs are collected separately and adequately treated (as with other cytotoxic waste).

11.2 On-Site Treatment of Wastewater

It is recommended that healthcare facilities/institutions that do not have access to municipal wastewater (sewage) treatment should have their own wastewater treatment facilities. In the case of septic tanks, healthcare facilities are expected to follow a building engineer plan for septic tanks design. A septic tank provides primary treatment, comprising a primary sedimentation tank and digestive chamber. This action results in partial biodegradation for organic pollutants. Septic tanks must be occasionally serviced by a vacuum tanker for final treatment and disposal of the sewage in a sewage treatment plant.

11.3 Off-Site Treatment of Wastewater

Healthcare facilities situated where there is a main sewer line should connect to an approved off-site treatment facility. Healthcare facilities should have an inventory or database of all chemicals, disinfectants and detergents used. Each chemical should have a material safety data sheet. Healthcare facilities must set out comprehensive policy and procedures for handling and usage of the chemicals.

11.4 Emergency Procedures

As untreated wastewater has the potential to be contagious due to the high concentration of organisms, facilities/institutions should have a contingency plan for dealing with spillages/failures of wastewater treatment systems.

11.5 Minimum Standards for Wastewater Treatment and Disposal

- Healthcare facilities/institutions that do not have access to municipal wastewater (sewage) treatment should have their own wastewater treatment facilities.
- Healthcare facilities situated where there is a main sewer line should connect to an approved off-site treatment facility.
- Healthcare facilities should have an inventory or database of all chemicals, disinfectants and detergents used. Each chemical should have a material safety data sheet.
- Healthcare facilities must set out comprehensive policy and procedures for handling and usage of chemicals.
- Healthcare facilities/institutions must have a contingency plan for dealing with spillages/failures of wastewater treatment systems.

CHAPTER 12: HEALTH AND SAFETY PRACTICES

Healthcare waste management plans developed by each facility must include arrangements for the continuous monitoring of health and safety. This is to ensure that correct handling, treatment, storage and disposal procedures are being followed.

12.1 Risk Assessment

Healthcare facilities should conduct risk assessments at least every six months. The assessment needs to follow the basic steps of:

- Hazard identification;
- Exposure assessment: who might be harmed and how;
- Dose response assessment: evaluate the risk and decide on proper precautions; and
- Risk characterisation: create or review and update the assessment, as necessary.

12.2 Training

Healthcare workers must be trained on healthcare waste management before starting work, and then on a routine basis (annually) to update their knowledge of prevention and control measures. More information on training can be found in Section 13.

12.3 Personal Protection

All staff must be provided with, and use, appropriate PPE. Workers handling healthcare waste must, a minimum, be provided with:

- Heavy-duty gloves;
- Industrial aprons;
- Overalls (coveralls); and
- Leg protectors and/or industrial boots.

Incinerator operators must be provided with, and use, the following additional items of PPE:

- Face masks; and
- Noise protection.

Healthcare facilities must ensure that a system is in place to monitor the correct use of PPE.

12.4 Spill Kits

Spill kits must be provided for all types of healthcare waste in all wards/departments, storage areas and on trolleys and vehicles. Staff must be trained on the use of spill kits. All incidents of spills of healthcare waste must be investigated and where appropriate remedial actions implemented.

12.5 Response to Injuries

All healthcare staff must be trained to deal with occupational injuries and exposure. A programme prescribing the actions to be taken in the event of an incident, injury or exposure must be put in place and should include (but not be limited to) the following:

- Immediate first aid measures;
- An immediate report of the incident to a designated responsible person;

- Retention, if possible, of the item involved in the incident, with details of its source for identification of possible infection;
- Additional medical attention in an accident and emergency or occupational health department as soon as possible;
- Medical surveillance;
- Blood or other tests if indicated;
- Recording of the incident;
- Investigation of the incident; and
- Identification and implementation of remedial action to prevent a similar incident in the future.

12.6 Reporting Accidents and Incidents

Accidents or incidents, including near-misses, spillage, damaged containers, inappropriate segregation and any incidents involving sharps, should be reported to the Waste Management Committee or Waste Management Officer.

The report should include the following details:

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

The waste management officer or other responsible officer should investigate the cause of the accident or incident, and also take all possible action to prevent recurrence.

12.7 Minimum Standards for Health and Safety Practices

- Healthcare facilities must conduct risk assessments at least every six months.
- All staff must be provided with, and use, appropriate PPE as outlined in Section 11.3.
- Spill kits must be provided for all types of healthcare waste in all wards/departments, storage areas and on trolleys and vehicles.
- All healthcare staff must be trained to deal with occupational injuries and exposure.
- All accidents or incidents must be reported and investigated.

CHAPTER 13: TRAINING AND AWARENESS

Raising awareness and providing good training are among the most important actions that need to be undertaken to reduce the risk that hazardous healthcare waste poses both to public health and the environment.

Training and awareness are essential for healthcare staff, but decision makers and the general public also need to be well informed. Promoting appropriate handling and disposal of healthcare waste is important for community health, and everyone has the right to be informed about the potential health hazards of healthcare waste.

13.1 Training of Healthcare Facility Staff

All staff should receive training appropriate to their work. The overall aim of the training should be to develop awareness of health, safety and environmental issues relating to healthcare waste, and how these can affect employees in their daily work. It should also highlight the roles and responsibilities of healthcare staff in the management of healthcare waste.

Basic education for healthcare staff should include:

- Information on, and justification for, all aspects of the healthcare waste management plan;
- Information on the role and responsibilities of each healthcare staff member in implementing the plan; and
- Technical instructions on the application of waste management practices.

All staff must receive initial training (on induction) and annual refresher training sessions.

13.2 Training for Waste Handlers and Transporters

Persons involved in the handling of healthcare waste, the operation of healthcare waste treatment technologies and the transportation of healthcare waste require additional training.

In addition to the basic education outlined above, additional topics should include:

- Information on the risks associated with the handling of healthcare waste;
- Procedures for dealing with spillage and other accidents;
- Correct use of PPE; and
- Documentation and recording of hazardous healthcare waste.

13.3 Training for Incinerator Operators

In addition to the basic training outlined in Section 21.1, additional topics for Incinerator Operators should include:

- General functioning of the incinerator, including basic maintenance and repair training;
- Health, safety and environmental implications of treatment operations;

- PPE, its correct use and removal and cleaning (if appropriate);
- Technical procedures for operation of the incinerator;
- Recognition of abnormal or unusual conditions;
- Emergency response, in case of equipment failure;
- Maintenance of the facility and record keeping;
- Surveillance of the quality of ash and emissions; and
- Safe disposal of residues.

13.4 Minimum Standards for Training and Awareness

- A structured waste management education program has been developed with a clear delivery structure.
- All staff receive waste management education during induction. All staff receive refresher training annually. Waste management training is delivered following an adverse incident to the relevant staff/ward/department.
- A designated officer has responsibility for ensuring all training occurs as required and that records are maintained of all training and attendance.

CHAPTER 14: COMPLIANCE, MONITORING AND EVALUATION

Figure 5 Roles and Responsibilities in Healthcare Waste Monitoring

It is the legal duty of the management of the healthcare institution to ensure that healthcare wastes are managed in a manner that does not have adverse impact on human health or the environment.

All institutions generating healthcare waste in Samoa, regardless of their size, are required to utilise these guidelines to develop a Healthcare Waste Management Implementation Plan suitable for the types and volumes of healthcare waste generated at their facility with an outline of the responsibilities for each entity being given in Figure 6 above.

14.1 Healthcare Waste Management Implementation Plans

Healthcare Waste Management Implementation Plans should incorporate the aims and objectives of the National Healthcare Waste Management Plan.

Guidance on the development of Healthcare Waste Management Implementation Plans as well as a sample template, is attached as Annex 3.

Healthcare Waste Management Implementation Plans must be submitted to the Ministry of Health for approval and, once approved, should be regularly monitored, reviewed, revised and updated.

It is intended that each institution's application of their Healthcare Waste Management Implementation Plan will be regularly reviewed to ensure that it is practical, cost effective

and compliant with current regulatory requirements as outlined in this document, in order to promote a safer working and health care environment for all.

14.2 Waste Management Officer

It is a further requirement of this plan that all facilities generating healthcare waste in Samoa, regardless of their size, appoint a designated Waste Management Officer.

The Waste Management Officer is responsible for the day-to-day operations and monitoring of the waste management system. In larger facilities, the role should be established as a distinct post however, one appointee could be responsible for the waste management performance for a number of hospitals with a stated time fraction allocated to each hospital.

14.3 Healthcare Waste Management Committee

All facilities generating healthcare waste in Samoa shall appoint a Waste Management Committee to provide guidance and support to the Waste Management Officer and assist in the implementation of developed actions. This could be a sub-committee of the Infection Control Committee for small facilities.

In larger hospitals, a separate waste management committee should be formed. For smaller hospitals, such a committee could be either part of the responsibility of another related committee (e.g. infection control or quality assurance), or a sub-committee reporting back to this related committee.

The Waste Management Committee will work with staff, stakeholders and the wider community to develop a culture of environmentally responsible waste management through information sharing and education.

Its members will ensure that waste management issues are considered on committees that deal with product evaluation, infection control and occupational health and safety.

The responsibilities of the Waste Management Committee should include:

- Help to develop the Healthcare Waste Management Implementation Plan;
- Ensure that the hospital is meeting due-diligence requirements as specified by the Healthcare Waste Management Implementation Plan;
- Develop and implement a system to document waste and recyclable quantities on a spreadsheet to evaluate these quantities and therefore the waste minimisation programs that have been implemented, ensuring the results are circulated to all unit managers/department managers on a regular basis;
- Review and submit subsequent reporting to unit managers/department managers of the results of all implemented programs and trials;
- Work on implementing the most appropriate waste minimisation/management recommendations as agreed with hospital management and the Waste Management Team;
- Target in order the waste items that are contributing the most significant quantities of waste being generated and in particular waste segregation methods;
- Agree on the waste reduction targets for the hospital and outline the key objectives of the committee;

- Review current work and waste management practices and develop waste management/minimisation initiatives;
- Conduct mini audits to review progress;
- Visually inspect waste and recycling containers to ascertain if staff are depositing appropriate items into them;
- Report annually on waste generation and management.

CHAPTER 15: CONSIDERATIONS FOR SMALLER HEALTHCARE INSTITUTIONS

15.1 Smaller Healthcare Institutions and Clinics

Healthcare wastes generated by smaller healthcare institutions, clinics and dispensaries also include materials which can be physically, chemically and biologically hazardous. The quantities of these types of waste produced by smaller institutions will be of a much smaller scale than the larger hospitals, however care must still be exercised when handling and disposing of these wastes.

Healthcare wastes generated by smaller and private institutions shall be disposed of through the healthcare waste management system established and operated by the MOH, and as specified in the healthcare waste management plan. A fee schedule needs to be developed by MOH for the provision of this service. It is acceptable for collection times for these smaller healthcare institutions to be conducted on a tailored schedule rather than thrice weekly and daily as is required of the larger public facilities.

15.2 Pharmacies and Dispensaries

Expired pharmaceutical waste makes up most of the existing healthcare waste stockpiles that exist in Samoa, with most of this coming from the public health system.

It is therefore recommended that a pharmaceutical waste management plan is introduced that both minimises the generation of such stockpiles and the costs associated with managing them.

The following measures are therefore recommended in developing such a plan:

- That consideration is given in developing Extended Producer Responsibility type arrangements with expired pharmaceuticals being returned to the contracted provider;
- That customs limitations on restricting the entry of near expiry pharmaceuticals that are imported commercially as part of a private business or gifted;
- That MOH considers a program that better matches the import of pharmaceuticals to the actual usage to minimise expired pharmaceutical waste production.

Expired medical supplies at the National Pharmaceutical Warehouse consisted of co-mingled pharmaceuticals and non-pharmaceutical waste which then delayed the correct and lawful disposal of both waste streams.

To prevent this from occurring in the future a hospital supplies segregation program needs to be put in place to separating these two waste streams into expired ‘general medical supply waste’ that can be landfilled (unused needles, face masks, baby food, food gels, etc) and ‘expired pharmaceutical waste that needs to be incinerated.

The disposal methods of pharmaceutical healthcare wastes from commercial pharmacies and dispensaries shall be to the main pharmacy at either TTMH or MTII in accordance with a developed fee schedule applied by MOH for the provision of this service. This is the responsibility of the managing pharmacist.

CHAPTER 16: OTHER CONSIDERATIONS

16.1 Disasters and Healthcare Waste

Healthcare waste management needs to also be integrated into natural disaster preparedness and response building in the lessons from the 2009 Samoa earthquake and tsunami and tropical cyclones such as Evan.

Such events show that issues such as mass casualties, increased healthcare activities, disruption to collection, treatment and disposal and an oversupply of donated medical supplies all contribute to unique and problematic aspects of healthcare waste management that should be integrated into the National Disaster Management Plan.

In implementing these strategy connections with the Samoan NDMO should be formed to ensure healthcare waste management issues are captured for natural disaster management.

16.2 Biosecurity & Quarantine

Healthcare issues from wastes surrendered by incoming tourists, cruise liners and at airports is a small but notable issue (usually pharmaceuticals) and arrangements should be made that such waste is directed to MOH in a similar manner as expired pharmaceuticals.

Other issues such as any healthcare waste or chemical issues such as with repatriated bodies need to be formalised with MOH with instructions and arrangements made for where such wastes should be directed and instructions on how this should be done as well as advice on equipment and training requirements

16.3 Crematoria and Morgues

For crematoria linkages with mercury have already been covered in section1.4 in relation to issues on mercury management. For other issues such as any healthcare waste or chemical issues arrangements need to be formalised with MOH with instructions and arrangements made for where such wastes should be directed and instructions on how this should be done as well as advice on equipment and training requirements

CHAPTER 17: STRATEGIC PRIORITIES

The strategic priorities relate principally to the stepwise application of each chapter of the strategy to ensure there is an ongoing and systematic improvement in healthcare waste management from the current situation and that these improvements are recorded and tracked.

Table 12 gives a summary description of strategy elements that should be prioritised to make the identified improvements, address issues found in the current system and move towards best environmental practice and best available technology for managing healthcare waste in Samoa.

Table 12: Strategic Plan Implementation Matrix

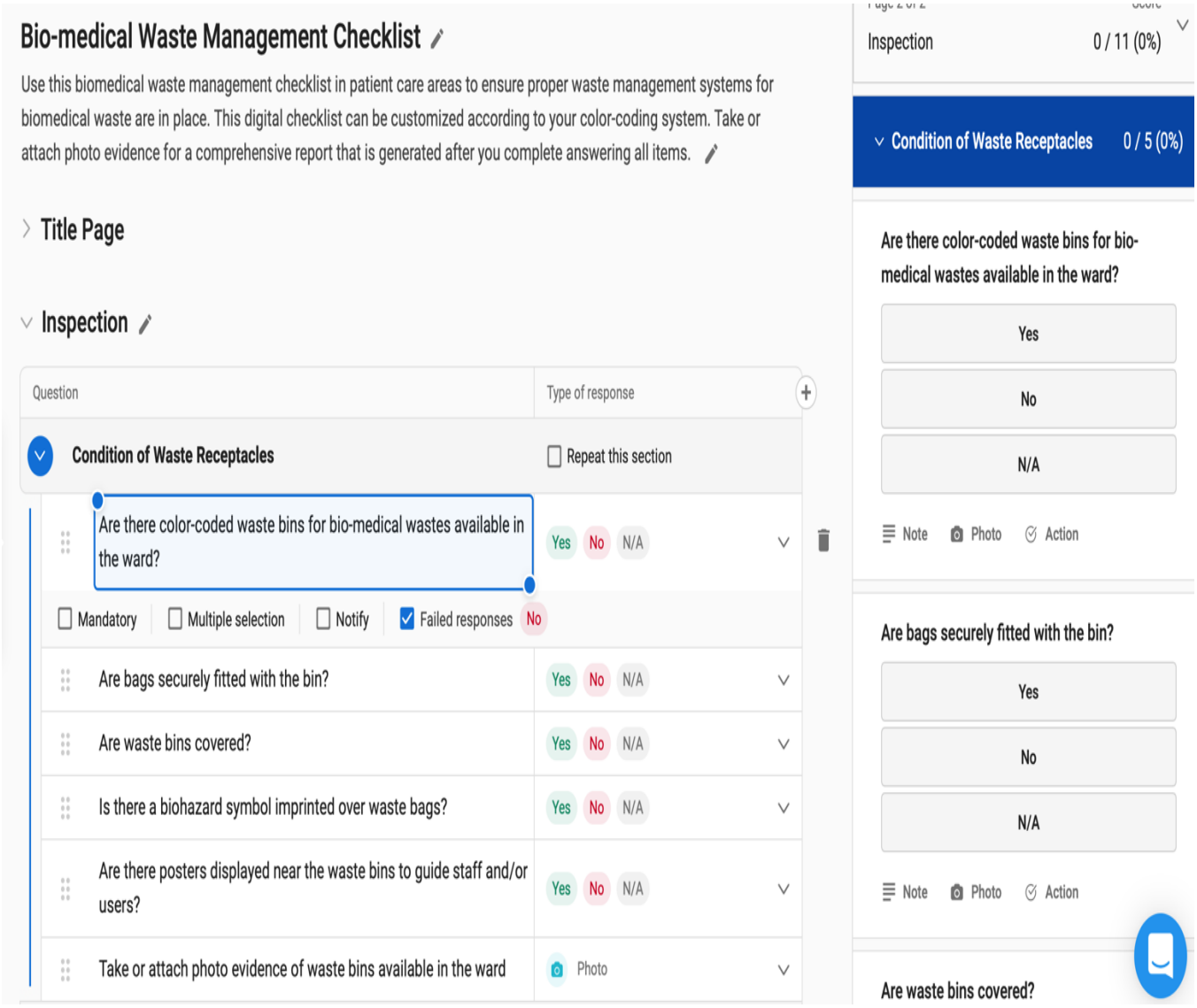
Priorities	What Needs to be Done
Develop formal monitoring and evaluation for Healthcare Waste Management	Give data collection templates and tools to officers for regular data collection and reporting.
Develop Healthcare Waste Management plans for all facilities/activities	Conduct workshops, give resources notify of timelines for development and assign responsible officers to develop, activate and implement plans
Establish National Healthcare Waste Management committee	Establish national committee with connection with external stakeholders linked to sub regional or hospital-based committees
Develop a dedicated Healthcare Waste Management budget	Ring fence a dedicated budget from healthcare waste management sufficient to correct the identified priorities. Include cost recovery and service-based approaches to improve financial sustainability.
Invest in system improvements for segregation, collection, transport and disposal	Replace and/or upgrade vehicles, incinerators and equipment (including PPE) to enable uninterrupted healthcare waste resources. PPE, signage, more colour coded bags, sharps containers and signage to be provided.
Increase capacity building and training program and awareness of Healthcare Waste Management	Institute both biannual and induction-based training with regular periodic training linked to career and personnel development
Improve ongoing operational maintenance and supply for Healthcare Waste Management	Ensure service contracts are in place for international expertise to be provided for effective healthcare waste treatment matched with an appropriate budget.
Develop regular formal reporting on implementation progress of the Healthcare Waste Management plan	Annual and regular report on implementations of the strategy is to be developed by government and formally reported.

ANNEX 1

Healthcare Waste Management checklist

Mobile phone and tablet-based healthcare waste management checklists are freely available and can be tailored for each facility. This assists greatly with minimising data entry and transcription errors and assists with record keeping through autosaving of the collected data to the designated folder and in generating automatic tailored reports matched to reporting requirements in the strategy.

The screen snapshot below shows one example that can be used from app.safetyculture.io but software such as Kobo Toolbox which is a free open-source tool for mobile data collection, available to all. It allows you to collect data in the field using mobile devices



ANNEX 2

Generic Healthcare Waste Management Audit Form

Table 6: Waste Audit Form

GENERAL /CLINICAL WASTE (circle appropriate type) Date:...../...../19.....

Waste Origin Eg. Path lab, Maternity	Total Weight (kg)	Clinical		General		Recyclable		Comments (a) Clinical (b) General (c) Recyclable
		Weight	%	Weight	%	Weight	%	
								a)
								b)
								c)
								a)
								b)
								c)
								a)
								b)
								c)
								a)
								b)
								c)
								a)
								b)
								c)
TOTAL								

AUDITOR:.....RECORDER:.....

ANNEX 3

Example of a Facility Healthcare Waste Management Plan

A template for a generic hospital level healthcare waste management plan developed by the Australian Government is attached in the hyperlink below as one example that can be modified for developing hospital and clinical level healthcare waste management plans.

https://www.health.nsw.gov.au/environment/clinicalwaste/Documents/generic-wmp.pdf

Further examples of healthcare waste management plans can also be accessed via ISWA, WHO, World Bank, the CDC and a number of other organisations.