# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Figures &amp; Tables</td>
<td>iii</td>
</tr>
<tr>
<td>Acronyms</td>
<td>iv</td>
</tr>
<tr>
<td>List of Appendices</td>
<td>v</td>
</tr>
<tr>
<td><strong>1.0 INTRODUCTION</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>2.0 PURPOSE AND SCOPE</strong></td>
<td>5</td>
</tr>
<tr>
<td>2.1 TERMS OF REFERENCE</td>
<td>5</td>
</tr>
<tr>
<td>2.2 METHODOLOGY</td>
<td>7</td>
</tr>
<tr>
<td>2.3 WHAT THIS POLICY DOES NOT ADDRESS</td>
<td>8</td>
</tr>
<tr>
<td><strong>3.0 DEFINITION - WHAT IS MEDICAL WASTE?</strong></td>
<td>9</td>
</tr>
<tr>
<td>3.1 REGULATED MEDICAL WASTE</td>
<td>9</td>
</tr>
<tr>
<td>3.1.1 Infectious Waste</td>
<td>10</td>
</tr>
<tr>
<td>3.1.2 Anatomical/Pathological Waste</td>
<td>11</td>
</tr>
<tr>
<td>3.1.3 Sharps</td>
<td>11</td>
</tr>
<tr>
<td>3.1.4 Chemical Waste</td>
<td>11</td>
</tr>
<tr>
<td>3.1.5 Pharmaceutical Waste</td>
<td>12</td>
</tr>
<tr>
<td>3.1.6 Genotoxic Waste</td>
<td>13</td>
</tr>
<tr>
<td>3.1.7 Cytotoxic Waste</td>
<td>13</td>
</tr>
<tr>
<td>3.1.8 Radioactive Material</td>
<td>13</td>
</tr>
<tr>
<td>3.1.9 Waste with High Heavy Metal</td>
<td>13</td>
</tr>
<tr>
<td>3.1.10 Pressurised Containers</td>
<td>14</td>
</tr>
<tr>
<td>3.2 NON-REGULATED MEDICAL WASTE</td>
<td>14</td>
</tr>
<tr>
<td><strong>4.0 BACKGROUND</strong></td>
<td>15</td>
</tr>
<tr>
<td><strong>5.0 SITUATION ANALYSIS</strong></td>
<td>18</td>
</tr>
<tr>
<td>5.1 EXISTING LEGISLATIVE FRAMEWORK</td>
<td>18</td>
</tr>
<tr>
<td>5.2 EXISTING POLICIES</td>
<td>20</td>
</tr>
<tr>
<td>5.2.1 Jamaica National Environmental Action Plan</td>
<td>20</td>
</tr>
<tr>
<td>5.2.2 National Solid Waste Management Policy of Jamaica</td>
<td>21</td>
</tr>
<tr>
<td>5.2.3 Other Policies and Programmes</td>
<td>23</td>
</tr>
<tr>
<td>5.3 INSTITUTIONAL FRAMEWORK</td>
<td>23</td>
</tr>
<tr>
<td>5.3.1 Ministry of Health</td>
<td>23</td>
</tr>
<tr>
<td>5.3.2 National Environment and Planning Agency</td>
<td>27</td>
</tr>
<tr>
<td>5.3.3 Ministry of Local Government, Community Development and Sport</td>
<td>29</td>
</tr>
<tr>
<td>5.3.4 Ministry of Land and Environment</td>
<td>30</td>
</tr>
<tr>
<td>5.3.5 Parish Councils/Local Authorities</td>
<td>31</td>
</tr>
<tr>
<td>5.3.6 Ministry of Agriculture, Veterinary services Division</td>
<td>31</td>
</tr>
</tbody>
</table>
List of Figures & Tables

**Figure 1:** Proposed Institutional Framework for Medical Waste  
Figure 2: Biomedical and Health-care Waste Management  
Table 1: Recommended Biomedical and Health-care Colour Coding System
## ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATNEEC</td>
<td>Best Available Technology not Entailing Excessive Cost</td>
</tr>
<tr>
<td>EHU</td>
<td>Environmental Health Unit</td>
</tr>
<tr>
<td>GOJ</td>
<td>Government of Jamaica</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immuno-deficiency Virus</td>
</tr>
<tr>
<td>JANEAP</td>
<td>Jamaica National Environmental Action Plan</td>
</tr>
<tr>
<td>JBS</td>
<td>Jamaica Bureau of Standards</td>
</tr>
<tr>
<td>KPH</td>
<td>Kingston Public Hospital</td>
</tr>
<tr>
<td>LDPE</td>
<td>Low-density polyethylene</td>
</tr>
<tr>
<td>MLGCD&amp;S</td>
<td>Ministry of Local Government, Community Development And Sports</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>MWMU</td>
<td>Medical Waste Management Unit</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environment and Planning Agency</td>
</tr>
<tr>
<td>NPHL</td>
<td>National Public Health Laboratory</td>
</tr>
<tr>
<td>NRCA</td>
<td>Natural Resources Conservation Authority</td>
</tr>
<tr>
<td>NSWMA</td>
<td>National Solid Waste Management Authority</td>
</tr>
<tr>
<td>NSWMP</td>
<td>National Solid Waste Management Policy</td>
</tr>
<tr>
<td>ODPEM</td>
<td>Office of Disaster Preparedness and Emergency Management</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Agency</td>
</tr>
<tr>
<td>PHA</td>
<td>Public Health Act</td>
</tr>
<tr>
<td>P&amp;RA</td>
<td>Pharmaceutical and Regulatory Affairs</td>
</tr>
<tr>
<td>PEU</td>
<td>Project Executing Unit</td>
</tr>
<tr>
<td>SRC</td>
<td>Scientific Research Council</td>
</tr>
<tr>
<td>UDC</td>
<td>Urban Development Corporation</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UTECH</td>
<td>University of Technology</td>
</tr>
<tr>
<td>UWI</td>
<td>University of the West Indies</td>
</tr>
<tr>
<td>WRA</td>
<td>Water Resources Authority</td>
</tr>
</tbody>
</table>
# APPENDICES

<table>
<thead>
<tr>
<th>Appendix #</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Excerpts from the National Solid Waste Management Policy</td>
</tr>
<tr>
<td>2</td>
<td>List of Reference Documents - Jamaica</td>
</tr>
<tr>
<td>3, 4 &amp; 5</td>
<td>Site Visits and Meetings &amp; Personal Consultations</td>
</tr>
<tr>
<td>6</td>
<td>Protest - Medical Waste Nuisance</td>
</tr>
<tr>
<td>7</td>
<td>References – Medical Waste Management - International</td>
</tr>
<tr>
<td>8</td>
<td>References - Medical Waste Developing Countries</td>
</tr>
<tr>
<td>9</td>
<td>List of Incinerators Inspected</td>
</tr>
<tr>
<td>10</td>
<td>Legislative Instruments Relative to Medical Waste</td>
</tr>
<tr>
<td>11</td>
<td>Stakeholders - Prioritised</td>
</tr>
<tr>
<td>12</td>
<td>Classification of Risks</td>
</tr>
<tr>
<td>13</td>
<td>Quantitative Assessment of Medical Waste in Public Sector, Jamaica and Summary of Management Methods</td>
</tr>
<tr>
<td>14</td>
<td>Summary of Quantitative Infectious Waste Data</td>
</tr>
<tr>
<td>15</td>
<td>Summary of Regulations and Regulatory Instruments</td>
</tr>
<tr>
<td>16</td>
<td>Calculation of Infectious Waste Production</td>
</tr>
<tr>
<td>16A</td>
<td>Summary of Health Centres by Categories</td>
</tr>
<tr>
<td>16B</td>
<td>Summary of Public Hospitals by Categories and Bed Compliment, 1996 and 1999</td>
</tr>
<tr>
<td>17</td>
<td>Ministry of Health Guidelines for Hospitals</td>
</tr>
<tr>
<td>18-19</td>
<td>Ministry of Health - Containers for Disposal</td>
</tr>
<tr>
<td>20</td>
<td>Picture of Approved Container for Sharps</td>
</tr>
<tr>
<td>21</td>
<td>Distribution of Pharmaceutical Disposal Methods by Type of Institution</td>
</tr>
<tr>
<td>22</td>
<td>List of Hazardous Pharmaceuticals</td>
</tr>
<tr>
<td>23</td>
<td>Disposal of Pharmaceuticals</td>
</tr>
<tr>
<td>24</td>
<td>Expiry of Pharmaceuticals</td>
</tr>
<tr>
<td>Page</td>
<td>Content</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>25</td>
<td>Categories of Pharmaceuticals Stocked in Jamaica by Type of Institution</td>
</tr>
<tr>
<td>26</td>
<td>Incineration and Options</td>
</tr>
<tr>
<td>27</td>
<td>Distribution of Incinerators</td>
</tr>
<tr>
<td>28</td>
<td>Information on Incinerators - manufacturer, ages, frequency of clearance</td>
</tr>
<tr>
<td>29</td>
<td>Photographs Showing Backlog of Waste for Incineration</td>
</tr>
<tr>
<td>30</td>
<td>Photographs of Incinerators</td>
</tr>
<tr>
<td>31</td>
<td>Photographs of Incinerators</td>
</tr>
<tr>
<td>32</td>
<td>Photograph of Incinerator - May Pen Hospital</td>
</tr>
<tr>
<td>33</td>
<td>Guidelines for Incinerators</td>
</tr>
<tr>
<td>34</td>
<td>Public Cleansing Guidelines</td>
</tr>
<tr>
<td>35</td>
<td>Excerpt from Illinois Waste Management Fee Schedule</td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

The primary aim of health-care is to protect and restore health and save lives. Wastes and by-products generated during the process of these health-care activities (medical waste) can, however, be hazardous to the health of the very population it should be protecting. The Government of Jamaica (GOJ) recognizes the role of the proper management of medical waste in the sustainable development of the country and seeks to establish and implement a policy that will encompass the management of waste from the points of generation to sites of final disposal.

**Source:** Medical waste is usually generated in health-care institutions such as: hospitals, health-care centres, dental clinics, medical laboratories, research centres, blood banks, nursing homes, pharmaceutical institutions, veterinary operations and mortuaries and autopsy centres. Two (2) external sources of medical waste are ships and aircraft.

**Characteristics:** The waste is classified as hazardous as it may constitute one or more of the following infectious agents, genotoxic and cytotoxic material, toxic, hazardous and radioactive chemicals. Pharmaceuticals and sharps including syringes, scalpels and glass are also be similarly classified.

**Public:** The exponential increase in AIDS has helped to sensitize the public to the infectious and hazardous nature of aspects of health-care waste and the potential threat to populations worldwide. Notwithstanding the fact that the viral Hepatitis disease has always been a significant threat. The Jamaican citizenry is demanding immediate action in the protection of lives from medical waste, both at the source of generation as well as at the point of final disposal in insecure landfills or dumps. For example, in December 2001 employees at the National
Public Health Laboratory (NPHL), in Kingston, demonstrated against the “pile up of smelly garbage and discarded body tissue” in the area of the malfunctioning incinerator. This problem also evoked adverse reaction from neighbouring residents (Appendix 6). Other reports have sensationalized sightings of body parts, chemicals and expired pharmaceuticals in dumpsites, where animals and human scavengers, including children, roam daily.

**Jamaican Scenario:** Quantitative and qualitative assessment of medical waste in Jamaica is very limited. So is general documentation. The Ministry of Health's study by Storrud in 1999, arrived at a quantity of approximately 6330 kg of clinical waste for six (6) institutions over three (3) weeks, or a daily equivalent of 301 kg. Incineration is the common method of treatment for medical waste in Jamaica. However, poor design and operation, as well as inadequate and irregular maintenance plague the present system. The implications are serious for all, but in particular, the waste handlers and scavengers at the open municipal dumpsites, where the residues of the wastes are disposed, in the absence of sanitary engineered landfills to receive such waste.

**Legislation:** The Government of Jamaica (GOJ) is desirous of a safe system for handling and treating medical waste, thus, the need for the production of a Policy for the Management of Medical Waste. This is alluded to in the Jamaica National Environmental Action Plan (JANEAP) 1999 – 2002, which is the GOJ’s 3-year Action Plan to address environmental issues. JANEAP states that Jamaica is urgently in need of a solid waste management system that is technologically appropriate, socially sensitive and economically sustainable.

Currently, Jamaica has no legislation that directly mentions medical wastes, whether clinical, laboratory or pharmaceutical. In the absence of such legislation, medical waste is regulated under the broad umbrella of public health and environmental regulations. Drafts of guidelines, policies and regulations on medical waste have been prepared on an ad hoc basis by the Ministry of Health,
the National Environment and Planning Agency (NEPA) and other regulatory agencies. These documents have remained in draft format for years awaiting legal or other administrative processes.

**Future Operation:** In planning for medical waste, it is evident that its comprehensive management will encroach on the operations of two (2) main Government Ministries, with monitoring support from other regulatory agencies/authorities. The **Ministry of Health** (MOH) has jurisdiction over the waste under The Public Health Act (1975) and its amendment (1976). Their (MOH) focus is mainly at the generating end of the waste but disposal as it relates to health must fall under their purview.

The **Ministry of Local Government Community Development and Sports** (MLGCD&S) is responsible for solid waste management across Jamaica and will regulate medical waste under the recent National Solid Waste Management Act, 2001 (NSWM Act).

The MLGCD&S has delegated its solid waste responsibility to the **National Solid Waste Management Authority** (NSWMA), which it established under the NSWM Act. This Authority has regulatory responsibility for solid waste management including generation, collection and disposal. This includes medical and hazardous waste. The National Solid Waste Management Policy (NSWMP) is the guide for the NSWMA. The **Policy for the Management of Medical Waste in Jamaica** must, therefore, be complementary to the NSWM Policy.

The Policy for the Management of Medical Waste will look at the waste in its broadest sense, from generation to final disposal. For effective management it will include the following key elements:
a. Legislative guidelines and institutional practices that include identification and segregation of waste
b. Safe transportation and method of storage of waste
c. Adequate treatment and disposal methods e.g. incineration and landfill
d. Documentation of quantities and categories of waste
e. Training of personnel in the safe handling of the waste and the operation of equipment
f. Development of the respective institutions to meet the requirements for safe management practices.
2.0

PURPOSE AND SCOPE

2.1 TERMS OF REFERENCE (TOR)

The Ministry of Local Government Development & Sports commissioned this Policy for the Management of Medical Waste in Jamaica. The terms of reference requires that the consultant should develop a concise policy for the disposal of Medical Waste, using all existing data and information. This policy should be complimentary to the NSWM policy and new regulatory and institutional arrangements.

The consultant is required to liaise with other Government Agencies, specifically:

- Ministry of Health
- Environmental Health Unit (EHU) - Ministry of Health
- National Environmental and Planning Agency (NEPA)
- Ministry of Land and Environment
- Hospitals (KPH, UWI, Medical Associates, Radiography Centres, Blood Banks, Dental Offices, Doctors Offices )

The consultant is mandated to:

- Assess and identify the relevant regulations, which would be required to implement the medical waste policy

- Assess, outline and prepare a plan for the Institutional Strengthening that would be needed by these agencies, specifically the MOH, to effectively address the handling of medical waste
Identify and address with the policy, the different types of waste to be disposed of. Specifically

- Infectious
- Pathological
- Used/unused sharps
- Pharmaceutical
- Genotoxic
- Chemical
- Waste with high content waste
- Pressurized containers - with radioactive waste
- Waste contaminated with blood
- Protective wear such as gloves, masks gowns etc

Address the various aspects of the life cycle of the medical waste. Specifically;

- The disposal of waste by generators
- The collection and disposal of waste by collectors
- The acceptance and final disposal by operators of the landfill

The consultant is further required to hold a review session for the members of the PEU to explain the policy to them.

The incumbent is further required to hold a stakeholders review session to present the draft policy prior to finalization.

Pending the review and approval by the PEU, MOH and other stakeholders, the consultant will be expected to prepare a final Policy document.
2.2 METHODOLOGY

In order to develop this policy, the Consultant attempted to acquire a total picture of medical waste disposal practices in Jamaica and extended beyond the scope of the TOR. There were: Inspections of incinerators and disposal sites; meetings and discussions with personnel at the MOH, MLGCD&S, NEPA, Ministry of Land and Environment, Veterinary Division of the Ministry of Agriculture, hospitals and clinics, private physicians and dentists, pharmaceutical importers and distributors, Pan American Health Organization (PAHO) and private citizens. Extensive research was done on the experiences of similar institutions in countries like Europe, U.S.A. and Canada (Appendix 7) and countries with similar economic and social conditions as Jamaica (Appendix 8).

Incinerators inspected during the project were those of five (5) public hospitals, two (2) laboratories and a veterinary clinic. The institutions include Kingston Public Hospital, Bustamante Children’s Hospital, University Hospital of the West Indies, National Chest Hospital, May Pen Regional Hospital, National Public Health Laboratory, Blood Bank and Veterinary Division of the Ministry of Agriculture (Appendix 9).

A review of all legislative instruments, drafts or legal documents that could impinge on the management of medical waste was done. Details of these may be seen in Section 5 and Appendix 10.

At every stage of the survey attempts were made to gather data on quantities of medical waste disposed or in storage for disposal (e.g. expired pharmaceuticals). Responses to such questions were almost always in the negative, in that there was very little recording of medical waste data, except for specific studies on clinical waste.
2.3 WHAT THIS POLICY DOES NOT ADDRESS

This **policy** will not cover the management of wastewater into sewers at health-care facilities, whether to soak-away pits, on-site wastewater treatment plants or municipal wastewater treatment plants. These include wastewater from sinks, bathrooms, laundries, laboratories and domestic sewage from toilets. Guidelines for liquid (and solid) wastes to sewers are addressed in the Trade Effluent Standards to the NRCA Act 1991.

Office and food wastes generated in the medical facilities (non-regulated medical waste) will not be addressed in this document either. These are accounted for in the NSWM Policy.
3.0

DEFINITION

WHAT IS MEDICAL WASTE?

Medical waste is generally defined as any solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biologicals, including but not limited to:

- soiled or blood-soaked bandages
- culture dishes and other glassware
- discarded surgical gloves-after surgery
- needles - used to give shots or draw blood
- cultures, stocks, swabs used to inoculate cultures
- removed body organs - tonsils, appendices, limbs, etc.
- lancets
- pharmaceuticals
- radioactive waste.

Of the total wastes generated by health-care activities, almost 80% are general waste comparable to domestic waste. The remaining 20% of the wastes are considered hazardous materials that may be infectious, toxic or radioactive. The hazardous waste is the section that is regulated.
3.1 REGULATED MEDICAL WASTE (RMW)

The following list (of 10) categorizes the diverse range of hazardous materials that constitute regulated medical waste:

3.1.1 Infectious Waste

All waste suspected to contain pathogens (bacteria, viruses, parasites or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts are considered infectious.

Infectious waste may contain a great variety of pathogenic microorganisms, but not all can be transmitted to humans and animals by contact. These pathogens in the waste may infect the human body (or animal) by absorption through a crack in the skin, absorption through the mucous membrane, by inhalation (rarely) or by ingestion. These include:

- All waste generated by patients, human and animal, whether suffering an infectious disease or not, that is, all human and animal surgical, obstetrical, gynaecological, diagnostic, laboratory, diagnostic, laboratory and autopsy waste including body tissues, blood, organs, bones, amputations, placentae, foetuses etc...
- All related swabs and dressings(wound dressings), syringe, needles, tubing, surgical accessories and other discarded items from patient care
- Laboratory wastes which presents the possibility of transmission of viruses, example, AIDs hepatitis etc, bacteria, fungi, parasites (nematodes, protozoans, etc). These include bacterial, fungal and viral cultures, and all tissue cultures.
Animal house bedding materials from infected or sick animals which pose significant risks to human or animal populations (risk should be assessed by the staff member in charge).

**Routine contaminated waste** may include:

- bed linen, towels and other materials used in non-invasive treatments
- protective wear such as laboratory coats, gowns, masks
- animal house bedding materials from healthy animals.

### 3.1.2 Anatomic/Pathological Waste

Recognizable body parts and animal carcasses are referred to as anatomic or pathological waste. This includes human or animal organs, tissues, body parts and fluids that are removed during surgery, autopsy or other medical procedures and specimens of body fluids and their containers.

### 3.1.3 Sharps

Sharps are objects or devises having corners, edges, points or protuberances capable of penetrating the skin. These include used or unused hypodermic needles (syringes), intravenous sets, Pasteur pipettes, disposable scalpels and blades and broken glass. Discarded sharps may be contaminated with blood, body fluids, microbiological materials, or toxic, cytotoxic or radioactive substances. Inoculation of people or animals generates contaminated sharps.

The immuno-deficiency virus (HIV) and hepatitis viruses B and C are of particular concern for humans as these viruses are usually transmitted through injuries from syringe/needles contaminated by human blood. Concentrated cultures of pathogens and contaminated sharps (particularly hypodermic needles) are probably the medical waste items that pose the most acute hazard to human
health. Interestingly, sharps are the medical waste items that are most often seen in municipal garbage.

### 3.1.4 Chemicals Waste

They are considered hazardous if they exhibit any of the following characteristics:

1. **Flammability** - \( \leq 140^\circ C \) flammability
2. **Corrosive** - \( pH \leq 2 \) or \( > 12.5 \)
3. **Reactivity** - Unstable, water reactive product, toxic gas
4. **Toxicity** -
   a) EP toxic – Toxic contamination due to heavy metals or specific chlorinated organic compounds
5. **Genotoxic** - Cytostatic drugs

The types of hazardous chemicals used in maintenance of healthcare facilities and hospitals and are most likely to be found in waste are;

- formaldehyde
- photographic chemicals
- solvents
- organic chemicals

Chemical infectious waste may contain a great variety of pathogenic microorganisms, but not all can be transmitted to humans and animals by contact. These pathogens in the waste may infect the human body (or animal) by absorption through a crack in the skin, absorption through the mucous membrane, by inhalation (rarely) or by ingestion.

### 3.1.5 Pharmaceutical Waste

This includes waste containing expired, unused and contaminated pharmaceuticals. They may be the drugs themselves (sometimes toxic and
powerful chemicals) or their metabolites, vaccines and sera. The category also includes discarded items used in the handling of pharmaceuticals, such as bottles or boxes with residues, gloves, and masks, connecting tubing and drug vials.

Pharmaceutical waste is generated from both manufacturer and distributor and includes pharmaceuticals that are: no longer used; expired; recalled; degraded or damaged due to the effects of heat, moisture or light and gifts from well intentioned donors in excess of demand or with little remaining shelf life. Items contaminated by or containing pharmaceuticals such as syringes and bottles also fall within the category of pharmaceutical waste.

### 3.1.6 Genotoxic Waste

This is highly hazardous as it may contain mutagenic, teratogenic or carcinogenic properties. Genotoxic waste may contain certain cytotoxic drugs and their metabolites, vomit, urine, or faeces from patients undergoing cancer treatment.

### 3.1.7 Cytotoxic waste

This includes waste, which can arise by the use, preparation or manufacture of pharmaceuticals with a cytotoxic effect. These chemical substances include anti-metabolites, antibiotics, plant alkaloids, hormones and others. A potential health risk to persons who handle cytotoxics results, above all, from the mutagenic and carcinogenic properties of these substances.

### 3.1.8 Radioactive Material

This includes items such as glassware contaminated with radioactive diagnostic material and radiotherapeutic materials, urine and excreta from patients treated or tested with unsealed radionuclides. Radioactive waste includes solid, liquid
and gaseous waste contaminated with radionuclides generated from in vitro analysis of body tissue and fluid, in body organ imaging and tumour localisation and investigative and therapeutic procedures.

Radionuclides used for medical purposes, either diagnosis or therapy have a half life ranging from a few minutes to many years; generally short lived radionuclides are used.

Radioactive waste from laboratories can cause serious side effects depending on the exposure. Such effects can range from headache, dizziness and vomiting to destruction of tissue and malformed foetuses.

### 3.1.9 Wastes with High Heavy Metal

Items with high metal content, such as mercury and lead are included. Mercury can be found in broken mercury containers and blood-pressure gauges. Waste containing mercury can be deleterious to the health of both humans and animals. This because it may cause severe respiratory irritation when burned and should, therefore, never be incinerated. It also causes digestive disturbances if ingested, great care should be taken in its disposal. Simple contact like touching can cause dermatitis.

Lead is usually found in lead batteries and can be hazardous to health, as it can affect the mental ability of children.

### 3.1.10 Pressurized Containers

This includes items such as gas cylinders, gas cartridges and aerosol cans. Aerosol can contain a variety of things including cytotoxic drugs.
3.2 'NON-REGULATED' MEDICAL WASTE

This category covers the following:

♦ Waste containing microbiological cultures used in food processing and any containers and devices used in the preparation and handling of these cultures

♦ Urine, feaces, saliva sputum, nasal secretions, sweat, tears and vomitus, unless they contain fluid blood

♦ Waste which is not bio-hazardous, such as paper towels, paper products, articles containing non-fluid blood, and other medical solid waste products commonly found in the facilities of medical waste generators

♦ Waste generated from normal veterinarian, agricultural and animal livestock management practices on a farm or ranch.
4.0

BACKGROUND

Legislation: The management of medical waste in Jamaica has received inconsistent attention over several years culminating in drafts of guidelines, policies and regulations but no gazetted legislation (Section 5). This is ultimately due to the shortage of lawyers assigned to the MOH and a lack of financial resources.

Up to 2001, the focus of medical waste was in the area of human clinical waste. Less attention was given to guidelines for pharmaceutical, laboratory, veterinary or other potentially hazardous medical waste, such as mortuary waste. In the absence of a sanitary engineered landfill, medical waste, whether treated or untreated, often ended up in unregulated municipal dumpsites across the country, resulting in negative incidents. The population was at risk to hazards inherent hazards in untreated or improperly treated medical waste.

Dumps: It is well known that in unregulated dumps there are human and animal scavengers searching for food as well as other spoils. Reports of various categories of medical waste such as pathological (human and animal body parts), sharps, expired pharmaceuticals and laboratory waste have been seen in dumps. This not only contributes to the increase in vectors such as rats, flies and cockroaches, but also is a serious health threat to scavengers and ultimately, the population at large. Items from dumps often resurface among the general public for sale, e.g. pharmaceuticals. The system of scavenging at dumpsites has its own informal organization and there are those who search specifically for discarded pharmaceuticals (e.g. aspirin and antibiotics).

The public always reacts in shock whenever such incidents are highlighted.
**RMW Incident:** The Daily Observer of July 20, 1999 carried an article captioned “Medical Dump found near housing scheme”. This dumpsite was in the Black River region. Among the items discovered were cases of contraceptive jelly, birth control tablets, Atropine and Dextrose Injections, Ventolin tablets and inhaler, Valium and others. Some were labeled “Medical Donations – Not To be sold”; an apparent case of disposal of expired pharmaceuticals.

**Incineration:** Another significant problem surrounding medical waste is the issue of incineration. A more recent incident was highlighted in a newspaper report in December 2001. Employees at the National Public Health Laboratory (NPHL) in Kingston were demonstrating against the “pile up of smelly garbage and discarded body tissue” (Appendix 6). The NPHL provides services for all public hospitals and clinics and some private institutions. The underlying cause of the problem was a malfunctioning incinerator at the Laboratory. Weeks of no incineration had resulted in a large backlog of body parts, biological samples and other waste for incineration. This not only caused discomfort to the workers but to the neighbouring communities of Hannah and Jones Town and threats of physical harm to the laboratory's staff were issued. Repair to the incinerator was effected but lasted for only a short period, thus, the Laboratory remained without a functioning incinerator for months. Although the neighbouring Blood Bank's incinerator provided some relief, the latter was, itself, already overburdened.

Emission from incinerator is also a significant problem to nearby residents or even within the compound of the health-care facility (e.g. at the University Hospital of the West Indies). In many cases, the incinerators were in existence before the neighbouring communities were established, however, the converse is that the incinerators are inadequate in their operations.

**New Approach:** The establishment of the new NSWMA with its responsibility for solid waste management gave a renewed driving force to the management of medical waste. Its portfolio for medical waste was not only for collection and
disposal of the waste but also for the major aspects of the management of the waste. Collaboration with the MOH would be necessary for some aspects of the waste management.

**Policy:** The Medical Waste Policy commissioned by the MLGCD&S will be the one that gives the greatest depth to medical waste disposal in Jamaica as it will address in detail the institutional and operational aspects of all stages of regulated medical waste. In so doing, there will be crossing over of responsibilities of a few Ministries and Regulatory Authorities.
5.0

SITUATION ANALYSIS

The situation with respect to medical waste has to be examined in eleven scenarios:

♦ Regulatory Framework
♦ Existing Policies
♦ Institutional Framework
♦ Studies and Data
♦ Review of Studies of Medical Waste by Sectors
♦ Review of the Existing Disposal Facilities (incinerators and landfills)
♦ Overview of Existing Medical Waste Management
♦ Stakeholders
♦ Status regarding the current knowledge and required training of relevant personnel
♦ Public education
♦ Enforcement

5.1 EXISTING LEGISLATIVE FRAMEWORK

Currently Jamaica has several pieces of legislation, which provide a framework under which medical waste can be governed namely:

I. The Public Health Act designating the responsibility and enforcement of the Local Board of Health and the Environmental Health Unit under the Ministry of Health regarding medical waste.
II. The Public Health Act (1974) sets the stage for the management of all generated waste. This also allows the establishment of fees and penalties for offences, and also licenses for contractors engaged in the collection and disposal of various types of waste. The Public Health Act (1985) replaced the 1974 Act.

III. The Natural Resources Conservation Act 1991 establishes the Natural Resources Conservation Authority (subsequently renamed the National Environment and Planning Agency (NEPA)). The Act provides the framework for addressing the disposal of all types of waste to include collection, storage and recycling where appropriate. This is done through issuance of permits for waste disposal and treatment facilities such as landfills and incinerators. The Act also provides a framework for disposal of effluent and air emissions from combustion sources. Fines for violations are stipulated under the relevant regulations.

IV. National Solid Waste Management Act, 2001 has also been developed to provide for the regulation and management of solid waste in the country through the establishment of the National Solid Waste Authority (NSWMA) having responsibility for all matters pertaining to solid waste management in the country.

Other Acts, which apply directly or indirectly to the management of medical waste but which do not specifically address the issue include:

V. The Dangerous Drug Act 1948 controls narcotics and controlled drugs, the only pharmaceutical wastes for which there are strict guidelines for disposal. The Act does not state how to dispose but relies on the International Narcotic Control Board (INCB), a United Nations organization providing guidelines to countries that are signatories to the Geneva Convention on narcotics.
V. The Food and Drug Act, 1964
VI. The Pharmacy Act 1966
VII. The National Health Services Act, 1997
VIII. The Water Resources Act, 1995
IX. The Disaster Preparedness and Emergency Management Act, 1993.

5.2 EXISTING POLICIES

5.2.1 Jamaica National Environmental Action Plan (JANEAP1999-2002)

The GOJ, as part of its national environmental policy (JANEAP 1999-2002), has adopted the global (Agenda 21) approach of environmental management for sustainable development, which is intended to encourage environmental, economic and social development in such a manner that would ensure that the quality of life for future generations is adequately maintained. It has therefore outlined a Comprehensive Environmental Policy Framework, which defines policies relating to:

- Natural resources and systems for initiating sustainable development
- Urban and rural infra-structural development and health
- Legal, regulatory, administrative and institutional systems.

To support this framework JANEAP proposes to adopt groupings of an integrated Environmental Economic Policy Instrument, namely:

- The polluter pays principle
- The user pays principle, and
- Incentive techniques.
JANEAP also aims to increase efforts at coordination and collaboration with public sector agencies. Further it intends to develop a closer working relationship with the private sector, thus effecting a more structured approach to environmental education and community outreach.

In an effort to address the problem of industrial effluents, hazardous waste and toxic chemicals JANEAP has identified action steps to maintain compliance. Working in conjunction with NRCA, NEPA and NSWMP they will address the establishment of guidelines and fee structures to enforce and maintain compliance.

5.2.2 The National Solid Waste Management Policy of Jamaica (NSWMP)

The NSWMP has been developed to address the management of solid waste through the conduct of several frameworks and functions. These include:

I. Regulatory framework
II. Institutional Framework
III. Cost recovery
IV. Operational issues relating to collection, transportation and final disposal
V. Waste minimization
VI. Waste processing
VII. Hazardous and medical waste
VIII. Public education
IX. Relationship to other national policies and legislation
X. Enforcement

These functions are governed by NSWMP and cover issues such as licensing, tipping, tipping fees, containerization, equipment, performance, criteria, dumping,
littering, recycling, waste processing, waste to air, air and sea ports waste, hazardous and medical waste. Legislation specific to solid waste management is incorporated into the new NSWM Act.

The Act requires that NSWMA be responsible for the management function, with the private sector assuming the responsibility for the operational functions.

The Board of Directors, appointed by the MLGCD&S will govern the Authority. Some of the functions would be regulated and monitored by major agencies such as the Office of Utilities Regulation, with regards to tariffs, tipping and fees. Licensing for effluent discharges, and permits for disposal and processing fees are to be addressed by NEPA.

NSWMP sets the stage for participation of the private sector in both collection and disposal through a competitive tendering process. Certified contractors would be invited to submit proposals and programmes in accordance with established and performance criteria developed by the (NSWMA). The policy proposes that the disposal function be conducted through the development of regional landfill sites supported by a series of strategically located transfer stations.

The policy also addresses the issue of cost recovery. Mechanisms such as property taxes, government grants, tipping and licensing fees, and income from recycling activities have been identified. This will be done in collaboration with the MLGCD&S, the Inland Revenue Department and the Ministry of Land and the Environment.

5.2.3 Other Policies

Other relevant policies or guidelines are within the MOH’s system but still in draft format. They include Ministry of Health Policy for the Management of Health-

5.3 INSTITUTIONAL FRAMEWORK

There are several institutions, which impact on the management of medical waste (Appendices 34 & 35):

- Ministry of Health (MOH) - sanitation and public health

- National Environment and Planning Agency (NEPA) - environmental management (formerly NRCA)

- Ministry of the Environment - overviews environmental management and headed by the Minister of Environment

- Ministry of Local Government Community Development and Sports - solid waste management

- Parish Councils/Local Authorities - public health and solid waste

- Water Resources Authority - surface and ground water quality monitoring

- Office of Disaster Preparedness Emergency and Management

- Inland Revenue Department

- Jamaica Bureau of Standards – packaging and labeling

- Urban Development Corporation (UDC) – project implementation
5.3.1 Ministry of Health (MOH)

HEALTH SECTOR REFORM 1988: The MOH currently has responsibility for medical waste and is itself a generator of the waste.

Significant changes were made in the health system in 1998 under the National Health Service Act 1997, which repealed the old Hospital Act. Health care institutions were transformed from central management to regional management. There are four (4) Regional Authorities, which are autonomous entities. Each Authority has more control in the delivery and management of its health care activities. Thus, the management of waste should be more direct and easier. Unfortunately, there are many problems preventing it from being achievable, such as lack of proper guidelines and policy on management of the waste, insufficient training of employees and lack of equipment, tools and support services.

The Public Health Inspector function moved from the Parish Councils to the core MOH. Relationship with the Councils was maintained by monthly reporting to the Local Board of Health. A few Public Health Inspectors were transferred to the Environmental Health Unit of the MOH, where the main functions are those of legislative monitoring and policy making.

The Environmental Health Unit guides the policy on medical waste management for the MOH. In the absence of defined legislation on medical waste, the Inspectors are empowered to take action under the Nuisance Regulations and Section 20 of the Public Health Act. This Unit liaisons directly with the all health-care institutions (veterinary also) and mortuaries. The Pharmaceutical sector is, however, administered by the Pharmaceutical and Regulatory Affairs Unit (P&RA) of the MOH for all aspects including disposal of unwanted pharmaceuticals.
**MOH and the Public Health Act:** The MOH administers and regulates health-care under the *1974 Public Health Act, (revised in 1996 and replaced in 1987)* (PHA). The fundamental basis of this Act is the protection of human health from whatever source and whatever risk. The PHA also covers pharmaceuticals and veterinary public health. However, there are no enacted regulations to the Act to regulate medical wastes, only drafts and empowerment under some Sections.

**Section 7** of the PHA links public health to the Local Boards giving them power to make regulations relating to various areas including solid waste and health care waste. The draft *Public Health (…..Local Board) (Health Care Waste) Regulation* is one such regulation.

**Section 14** of the PHA empowers the Minister to make regulations. *The Public Health (Nuisance) Regulations, 1995* relates to, among other things, waste related problems including those of health care facilities. A regulation to address health care wastes is in preliminary draft format. Regulation of medical wastes is also done under **Section 20** of the PHA, which gives the ‘right of entry upon private premises’.

Jamaica is a signatory to the *Basel Convention* on the transboundary movement of hazardous wastes. The MOH accepts the principles of the Convention and applies them to the local policy and guidelines, where appropriate. Specific to medical waste under the Basel Convention is the *Technical Guideline on the Environmentally Sound Management of Biomedical and Healthcare Waste*.

Relevant documents for the management of medical waste by the MOH are listed below. Most are in draft format at varying levels of review and declaration of target dates for completion is difficult to assess. The MOH needs institutional support to carry these documents to legal status and, in addition, requires major support in upgrading the health care facilities to compliance.
I. Draft “Guidelines for the Management of Medical/Infectious Waste Generated at Health Care Facilities” (1999). These guidelines set out steps on the management of all classes of hazardous waste generated at health-care facilities. They include segregation to treatment, transportation, safety, contingency planning and training. It is apparent that a great deal of work was put into this document but it is incomplete and needs to be comprehensively reviewed and finalized.

II. Draft Ministry of Health Policy for the management of Health-care Waste: This policy speaks to all human health-care facilities, dental practitioners, nursing homes, home treatment, ambulance services and veterinary centres.

III. Draft “Public Health (……..Local Board) (Health Care Waste) Regulations, 2001 (under section 7)”. This has been evolving since 1996 and is at the stage of review by the Legal Advisor of the MOH. When that occurs the regulation will be submitted to Cabinet and then reviewed by the Chief Parliamentary Counsel. MOH requires assistance for the process to be advanced.

iv. The Public Health (Nuisance) Regulations, 1995, which relate to solid and sanitary wastes, among others nuisances

v. Draft Regulation for Nursing Homes.

Other MOH Acts and Regulations that would infringe on the management of pharmaceutical waste but do not specifically address the subject include:

- the Dangerous Drug Act 1948
- the Food and Drug Act 1964
The Food and Drug Regulations 1975
- the Pharmacy Act 1966
- the Pharmacy Regulations and
- the National Health Services Act 1997.

5.3.2 National Environment and Planning Agency (NEPA)

NEPA (formerly the Natural Resources Conservation Authority – NRCA) administers the NRCA Act 1991. The Act does not specifically refer to solid waste but it is regulated in the general waste section, primarily as it relates to the environment. For the specific area of medical waste, the following apply:

I. “Guidelines for the Management of Medical Waste (Draft 3)”, which concisely lays out for the MOH, the scope for the management policy on regulated and non-regulated medical waste. It guides on segregation, packaging and labeling, collection, storage, treatment and disposal alternatives and regulatory requirements of NRCA Act.

II. The NRCA (Permits and Licenses) Regulations, 1996 impacts on both generators of the medical waste and receivers of the waste for land disposal. Licenses and Permits will be required. However, NEPA has not yet started to license air emissions from incinerators or leachate from landfill sites and will notify the facilities of their intent to do so.

Existing Waste Generator: where the generator of medical waste operates an existing incinerator, a License will be required for air emissions to be discharged or for discharge of effluent (leachate).

All Waste Generators: A Permit will be required for the installation and operation of any new incinerator and a License will be required for air emissions.
**Landfill Operator:** A Permit will be required for the establishment and operation of a sanitary landfill and a License will be required for effluent (leachate) discharge.

### III.

Draft **NRCA (Air Quality) Regulations, 2001**, which was scheduled to come into effect in September 2003, is not yet gazetted. The Regulations refer to “Significant Facility” and specifies on seventeen (17) categories of stationary sources of air emissions in this grouping, biomedical waste incinerators being one. Owners of existing incinerators will have eighteen (18) months following publication in the Gazette to apply for a Licence. March 2004 was the original deadline. New owners will have no grace period and will need to apply for a Permit to construct and a License to operate immediately after promulgation of the regulations.

The Licence will cost $10,000 and will be for a period of five (5) years. A Pollutant Fee in the order of $100 - $200/tonne/year/pollutant will be charged, where the emissions exceed the standard of the Significant Category Group. An annual report submission will also be required.

The application for a Licence will include an estimate (based on a model given by NEPA) of the air emission discharges (tonnes/year) and any facility, which falls within 75% of the standard, will be required to conduct periodic stack emission monitoring. Biomedical incinerators are expected to fall within the standards.

### iv.

Draft **Procedures and Requirement for Permitting and Operating of Waste Disposal Facilities**, which refers to solid waste.

### v.

Draft **Guidelines for the Selection and Siting of Hazardous and Solid Waste Disposal Facilities in Jamaica**.
No guidelines for radioactive waste exist but guidelines are being developed.

5.3.3 Ministry of Local Government Community Development and Sports (MLGCD&S)

Solid waste management is under the jurisdiction of the Ministry of Local Government Community Development and Sports and is the direct responsibility of the National Solid Waste Management Authority. The National Solid Waste Management Act 2001 guided by the National Solid Waste Management Policy (NSWMP) places medical waste under the heading of “Hazardous and Medical Waste”. The rules are as follows:

I. **Haulage Contract Licence**: The NSWMA will have responsibility for the award to provide waste collection services. The NSWMA will also be the vehicle to administer payment for the services provided.

II. **Vehicle Licence**: Companies collecting solid waste will be licensed by NSWMA. Each truck will be licensed to haul a specific type of waste (e.g. medical waste).

III. **Disposal Facilities**: In the short term, the NSWMA will operate disposal sites until they are divested to private contractors. A Licence will be issued to the operator by the NSWMA. This also applies to the network of transfer stations that will be established.

The NSWMA will upgrade waste disposal sites to sanitary landfills, resulting in four (4) or (5) regional landfills and a network of transfer stations.
Standards and performance criteria for operating landfills and transfer stations will be established by the NSWMA.

IV. **Haulage Fees:** Industrial and commercial waste generators will pay a haulage fee to licenced waste haulage companies to collect and dispose of their waste.

V. **Tipping Fees:** Private sector operators of landfill facilities will earn their revenue by the charging of Tipping fees. The haulage contractors will pay the tipping fee.

VI. **Waste Processing Facilities Licence:** NSWMA will license the operators of waste processing facilities for hazardous and medical waste.

VII. **Monitoring of Licence:** NSWMA will monitor those licensed to collect and dispose of hazardous and medical waste.

VIII. The **Standards for Public Cleansing Activities** (Appendix 36), Section 5 of the **Solid Waste Collection and Sweeping Guidelines of the Metropolitan Parks and Markets**, also applies to solid waste.

### 5.3.4 Ministry of Land and Environment

The Minister of Land and Environment appoints the NRCA (re-named NEPA) to carry out the function of management of the environment through the NRCA Act. The Environmental Division of the Ministry is promulgating the **Policy Framework for the Management of Hazardous Waste in Jamaica** in accordance with the Basel Convention.
5.3.5 Parish Councils/Local Authorities

Parish Councils have close committee and reporting relationships with the MOH and the MLGCD&S. The Local Board of Health has a Sanitation Committee to which the MOH reports monthly through the Public Health Inspectors of each of the four (4) health regions. This is a statutory obligation as the Public Health Act empowers the Local Board, under Section 6(b), to carry on all activities, which appear to be requisite, advantageous or convenient in the interest of public health. Section 7 of the Public Health Act also enables the Local Authority to make regulations relating to solid waste, nuisance, sanitation and other areas. The draft Public Health (........ Local Board)(Health Care Waste) Regulations, 2001 was produced since 1996.

3.3.6 Water Resources Authority (WRA)

The Water Resources Authority (WRA) has responsibility for monitoring and regulating the use of surface and ground water resources of the country. The Water Resources Act 1995 applies to the Riverton landfill site, and others.

3.3.7 OFFICE OF DISASTER PREPAREDNESS AND EMERGENCY MANAGEMENT (ODPEM)

The Office of Disaster Preparedness and Emergency Management (ODPEM) operates under the Emergency, Disaster Preparedness and Emergency Management Act, 1993. ODPEM would interface with medical waste only in the event of an emergency or significant disaster. The Act does not refer specifically to medical waste but such emergencies would be addressed through the Hazardous Material Spill Response Plan, which is a sub-plan of the National Disaster Plan. The plan also covers hazardous waste.
5.3.8 INLAND REVENUE DEPARTMENT

The tariffs associated with disposal of waste at landfills will be stipulated by the NSWMA and the Inland Revenue Department will do collection.

5.3.9 BUREAU OF STANDARDS (JBS)

The Packaging and Labeling Section of the Jamaica Bureau of Standards (JBS) includes in its portfolio the labeling of hazardous waste. The JBS regulates packaging and labeling under the Standards Act 1969.

5.4 STUDIES AND DATA

Without exception, Jamaica faces the task of adequately decontaminating and disposing of all categories of medical waste. Few studies (3) have attempted to quantify and qualify the volumes of waste generated in some hospitals. Two (2) frequently quoted studies for hospital waste estimated averages of 0.24 kg/bed/day (Storrud) and 1.0 kg/bed/day (Pinnock). These compare favourably with data from the World Health Organization (WHO)(Oct. 2000), which gives the total waste from health-care activities to be in the region of 0.5 – 3.0 kg. The hazardous section is divided into the following percentages:

- Infectious and anatomic wastes 15%
- Sharps 1%
- Chemicals and pharmaceuticals 3%
- Genotoxic waste, radioactive matter and heavy metal 1%
- General Waste 80%

Appendices 13,14,15,16 refer to the most recent study on quantification of infectious waste in hospitals (Storrud) in which Ministry of Health Institutions were selected and proposed incinerators sized. Utilizing this data and
extrapolating to hospitals islandwide the quantity of (pre-incinerated) waste generated in public hospitals is roughly estimated as 1,361kg/day (except pharmaceuticals)

No data was available for the veterinary and laboratory sectors and for the pharmaceuticals an estimate is expected by the end of February from the central pharmaceutical distributor for the government institutions and others. Whatever data is received will be crude estimates and it is recommended that a special investigation be carried out to determine this vital information.

5.5 REVIEW OF STATUS OF MEDICAL WASTE BY SECTORS

5.5.1 Hospitals

Hospital management takes responsibility for the management of medical waste (Appendix 17) utilizing the guidelines of the Ministry of Health. There is separation at source of infectious and non-infectious wastes in most hospitals and larger health-care facilities. Other hazardous waste is not necessarily isolated. The Ministry of Health (MOH) stipulates the use of red plastic bags for infectious waste (Appendices 18 & 19) and durable containers for needles and other sharps. Observations in most public institutions are that red plastic bags are not always available. By utilizing the regular black bags for all wastes, misplacement of infectious waste occurs.

Sharps for disposal are frequently stored in high-density cardboard boxes; however, puncture of the boxes still occurs occasional resulting in injury to the maintenance staff. In cases, where plastic or glass containers are used, the waste handler is requested to return the container, thus, exposing him/her to injury in the emptying of the container.
Identification of the type of waste and source is seldom done. Transportation to the incinerator’s building is sometimes in non-standard trolleys and the frequency of waste collection is sometimes ad hoc (no specific times).

Storage of waste varies across institutions, but it is often housed in the incinerator’s building and may there for more than four (4) days or more, depending on the frequency of incineration and the status of the incinerator. This waste includes pathological waste (body or organ parts). In larger hospitals, like the Kingston Public Hospital, incineration may occur up to twice daily. In smaller hospitals, such as the National Chest Hospital, incineration is twice weekly. At the May Pen Regional Hospital pathological waste is refrigerated until the time of incineration while at the National Medical Laboratory it is stored in formaldehyde.

Incineration is the method of disposal at source for all hazardous medical waste (infectious, pharmaceutical, plastic, laboratory, pressurized container occasionally). Most public and private hospitals, the central medical laboratory, blood bank and national medical stores have small brick-type incinerators/ovens. The majority of these are, however: old, out-dated in technology, undersized, improperly managed, functioning without temperature gauges or control, and operating at low efficiencies or not functioning at all.

The residue from incineration is transported with municipal garbage to the local dumps for burial via trucks/carriers, which may also transport other municipal garbage.

Personnel handling medical waste throughout the institutions are, for the most part, untrained (formally) in the risks and handling of waste or the operating of incinerators. There are no written guidelines in circulation. The use of personal protective equipment (clothing, masks, gloves, shoes) seems to be of low priority among operators or inadequate in their distribution.
5.5.2 Private Institutions

Medical waste management is not well structured in other health-care institutions (if at all) such as private physicians’ offices, infirmaries, nursing homes, and dental offices. From investigation it seems that most of the waste goes directly to the regular municipal garbage bins. Sharps are usually the only infectious or hazardous waste that is given attention. These are stored in bottles or other durable containers but, unfortunately, many still end up in the municipal solid waste stream without being rendered innocuous. Owners of incinerators indicate that few medical practitioners request the services of their incinerators for sharps and other infectious waste.

There are private waste management companies that offer the service of delivery, retrieval and disposal (incineration) of specialised containers for sharps. The Occupational Safety and Health Authority (OSHA) of the United States of America (Appendix 20) approve these containers. This offers a safer approach to the handling management of sharps. Feedback from the suppliers is that, in the absence of legislation, enthusiasm is low among private medical practitioners. Dental and veterinary practitioners and medical clinics show the greatest interest.

5.5.3 Veterinary Institutions

Prior to 1992, the Veterinary Division of the Ministry of Agriculture used to offer clinical veterinary services to the whole island. Incinerators were then commissioned to handle the large volume of medical and other waste at major clinics, e.g. Hope Gardens, in Kingston and Bodles Agricultural Research Centre in St. Catherine. Now only small amounts of waste are generated from the laboratories, which are refrigerated until incineration. In Hope Gardens, the incinerator has become a source of major nuisance to the neighbouring residential communities.
Veterinary medical waste is now generated mainly in private veterinary clinics and larger meat processing institutions. Feedback from that sector indicates that in urban areas, incineration of waste (mainly sharps) is done at off-site incinerators (hospital or laboratory). In the rural areas, however, incineration is by open burning and there is a high probability that used sharps are ending up in small dumps or in fields. No data on pharmaceuticals (vaccines etc.) was available.

The veterinary sector could not respond to a disaster in animal disease at this time. The Ministry of Agriculture has submitted a project document to upgrade the incinerator at the Quarantine Division, on the Palisadoes Road by the Norman Manley International Airport. The incinerator will provide service mainly for the destruction of agricultural imports through the airport but will be available for support when required.

5.5.4 Mortuaries

Mortuary waste is not regulated. Feedback from such institutions indicate that bloody and embalming waste is sent to the sewerage system while anatomical parts are returned to the body for burial. Some leading funeral homes have been in communication with the MOH to formulate guidelines for the operation of the institutions. Waste disposal was not part of the discussion.

5.5.5 Pharmaceutical Institutions

The pharmaceutical industry similarly needs guidance with the disposal of wastes. Incineration, crushing and flushing, liquid to drains or straight dumping are the practised methods of disposal (Appendix 21). The end result of the methods of disposal is that the residue is disposed in a landfill. Some common pharmaceuticals considered hazardous are listed in Appendix 22. In the management of pharmaceutical waste, some distributors operate on guidelines
of their foreign parent company, while others seek help from the Ministry of Health.

The **Pharmaceutical and Regulatory Affairs (P&RA)** Unit of the Ministry of Health requires that the pharmaceuticals to be disposed must be inspected and the destruction witnessed by a representative from the Ministry. A certificate is issued on destruction (Appendix 23). Less than fifteen (<15) such requests are received annually. This figure does not represent the true picture of pharmaceutical waste disposal island-wide and the Ministry believes that the lack of requests is influenced by inventory control, ignorance of the interventions offered by the P&RA Unit or by inappropriate methods of disposal. The Pharmaceutical Sector seems to be awaiting legislative guidelines for compliance. Guidelines and policy for the destruction and disposal of pharmaceutical waste are in the developmental stage (*Appendix 23*).

The old Government Medical Stores is under the new management of the Health Corporation Limited since 1994. The largest stock of expired gifts was in the government system and stored in the Medical Stores warehouse; however, under new management most of the waste stock was disposed of. Currently only about 1% of Health Corporation’s average inventory per month falls into the waste category (weight data being reviewed by the company).

The UTECH study by Reid, Kerr and Green found that manufacturers stocked only raw materials, human drugs and herbal products. Vaccine and sera were not stocked by the retail pharmacies generally and very few stocked cytotoxic drugs. Gifts, consisting of general pharmaceuticals were stocked by the government health centres and showed 100% rate of expiry. Also in these health centres, the incidence of expired general human pharmaceuticals (67%) and narcotics/controlled drugs (64%) was high. In general, flammable products had the lowest incidence rate of expiry (*Appendices 24 &25*). It, thus, suggests
that the quantification of pharmaceutical waste for disposal should begin in health centres.

5.6 REVIEW OF EXISTING TREATMENT AND DISPOSAL FACILITIES

5.6.1 Incinerators

There are a variety of technologies available for medical waste disposal and these include incineration, steam autoclaving, plasma technology, microwave disinfecting, chemical processing (reduction) and electro-thermal deactivation. In Jamaica, steam autoclaving is widely used mainly for instrument sterilization. It is easy to use, low in toxic by-products and generally effective in the destruction of pathogens. It is not suitable for medical waste in Jamaica, however, because for 100% efficiency, all surfaces must be exposed to the steam uniformly and further, it does not reduce the volume or change the appearance of the waste.

Incineration is the accepted method for medical waste disinfecting and disposal in Jamaica and is widely used for all categories of medical waste (Appendices 26 & 27). Effective incineration burns bulk medical waste at high temperatures and reduces it to ash. This is particularly good when waste is to be landfilled. Incineration has come under increasing criticism in the USA, and for sure in Jamaica, because of its airborne emissions. These emissions can contain pollutants severely harmful to health such as dioxins, furans, carbon monoxide, mercury, lead, cadmium and other toxins. Some of these are due to the plastics in the waste. The fly-ash by-product of incineration is effectively a hazardous waste.

Incinerators found in the public medical system in Jamaica are extremely essential for the clearance of medical waste but they seem to be given very low priority and physically and theoretically operate in the ‘back end’ of the institutions. Studies by B.Sc. Pharmacy students at the University of Technology
indicate that the problem is similar in the private sector (*Appendices 28 & 29*).

Many problems are associated with the incinerators in the public sector:

- Many are old (up to > 50 Years), under-sized and with outdated technology for medical waste, having single stage combustion as opposed to two (2) stage and higher temperatures

- Incinerators are not fitted with temperature gauges

- Operators are burning without written and/or posted guidelines for operating the incinerators

- Combustion is inefficient and there are questions as to the efficiency of (single stage) incineration with regards to rendering the waste innocuous. Single stage incinerators are not suitable for cytotoxic or pharmaceutical waste. Operators report that sharps do not always disintegrate to powder and these are sent to the dump nevertheless

- Emission stacks are low (approx. 36’) (should be 2.5 times the height of the surrounding buildings) and emissions of heavy black soot and odours are common during incineration. The caps are missing from some stacks and the suspension broken in others but the operators seem to be less concerned about that end of the incinerators.

- Maintenance is non-routine, thus, causing frequent downtimes and the downtimes last for months, thus causing a large backlog of waste and forcing the institution to seek alternative incineration facilities. The alternative facilities then become overburdened. Inherent in the large stock of over-due waste is the agitation of employees and also neighbouring communities (*Appendices 30 & 31*).
• No monitoring of stack emissions is done to verify compliance with the emission standards of the draft NRCA Air Quality Regulations

• Almost all were close to communities and complaints were frequently received of nuisance from soot and offensive odours and fear of infection

• Safety in the clearance of the residue after combustion is low and accidents do happen. Explosive pharmaceuticals, chemicals and compressed canisters that end up in the incinerators also pose a severe safety hazard for operators. Explosions have been known to occur even after the door is opened, causing injury to the operators

• Storage of waste prior to incineration is usually on the ground in the limited space around the incinerator.

• Storage of the residue from incineration varies among institutions but generally needs improvement. Storage containers include cardboard boxes, drums, garbage bags and/or any available container. The frequency of collection of these storage containers varies from daily to weekly and often they are left to the elements until collection by the garbage truck.

Arising from the Urban Development Corporation’s (UDC) 1996 review of Hospital Waste Disposal under the Health Services Rationalization Project, new incinerators were recommended, installed and commissioned at three (3) hospitals: May Pen Hospital, Mandeville Regional Hospital and St. Ann’s Bay Hospital (Appendix 32). These incinerators were based on the ‘Best Available Technology Not Entailing Excessive Cost (BATNEEC). During commissioning, dedicated personnel were trained in operation and basic maintenance of the incinerators.
The type of incinerator is the controlled air/semi pyrolitic incinerator. It consists of two (2) combustion stages, operating at 650 to 750 °C in the primary chamber and greater than 1000 °C in the secondary chamber. A control panel is used in its operation. It is also capable of rendering unrecognizable, sharps, human tissue, organs and body parts and rendering all discharges sterile. Under normal operating conditions, there is low entrainment of ash in the flue gas. Feedback from the hospitals on the performance of the incinerators has been good. Residue from incineration has been reduced by 50% and sharps are reduced to ash. There has also been a significant reduction of complaints from the neighbouring communities. In the event that there is a breakdown, however, there have been cases where downtimes have extended into months due to lack of replacement parts.

5.7 Transportation to Final Disposal

Incinerated residue is usually sent off the compound to a landfill via private garbage disposal companies. These trucks/carriers are usually dedicated to garbage and are not specific to the carriage of specialized waste.

5.8 FINAL DISPOSAL/LANDFILL

Burial is the most common form of final disposal of incinerated medical waste. Some hospitals with large compounds bury the residue on site (e.g. Bustamante Children's Hospital and National Chest Hospital) while others send the residue to municipal dumps, where scavengers await the arrival of garbage trucks. No record of point of burial is maintained.

To date there has been no sanitary engineered landfill to receive medical waste. However, the MLGCD&S through the NSWMA is reserving cells for medical waste in the new Riverton Disposal Site (under construction). The Authority will be partly responsible for the management of medical waste, necessitating the
commissioning of this policy development to ensure safe management of medical waste.

5.9 OVERVIEW OF MEDICAL WASTE MANAGEMENT

The current status on medical waste management in Jamaica can be summarised as follows:

- There is no specific legislation in place for the management of medical waste
- There are not enough incinerators with or without the best available technology for incinerating medical waste
- There is no current sanitary landfill (only dump sites) for final disposal of the waste
- There is very little documentation, in any sector, on the quantities of waste that are generated, incinerated or sent for final disposal
- Transportation of medical waste is not done by dedicated vehicles (or carriers) leaving room for risk of injury or contamination, either within the compound at the source of generation or off-site to final disposal
- The labeling, storing and handling of waste at all stages of the cycle is inadequate
- There is a low level of knowledge among operators on the safe handling of medical waste
- There is no isolation system in morgues and mortuaries; body waste goes either to the sewerage system or to the regular dump.

From observations, there is no huge backlog of clinical medical waste in the public health system. This is assumed for the private sector also because the offensive nature of the waste forces the institutions to seek alternate means of disposal (proper or improper) in the short term. Health-care institutions with incinerators assist each other with incineration of medical waste when problems arise in one or the other system. There is dire need for larger and more efficient
incinerators across the country. Owners of incinerators have indicated that they continually receive requests for incineration from medical and other institutions. In many cases the institutions have had to turn down the requests, which suggests that those waste eventually go to the landfill untreated.

The National Solid Waste Management Authority (NSWMA) of the MLGCD, having responsibility for solid waste management (Section 2.0), is now constructing the new Riverton City solid waste management site (sanitary landfill), which will include cells for medical waste. The NSWMA’s portfolio for medical waste is not only for collection and disposal of medical waste but also for all aspects of medical waste management. The policy for the management of medical waste must, therefore, be all encompassing and must examine in detail the institutional and operational details in all stages of the life cycle of the waste.

To date there has been no sanitary engineered landfill to receive medical waste. However, the MLGCD&S through the NSWMA is reserving cells for medical wastes in the new Riverton Disposal Site (under construction). The Authority will be partly responsible for the management of medical waste, necessitating the commissioning of this policy development to ensure safe management of medical waste.

Undoubtedly, therefore, medical waste disposal in Jamaica needs major support in the legislative framework and in implementation at the institutional level.

5.10 STAKEHOLDERS

There are many stakeholders in the management of medical waste. They include regulators, generators of the waste, persons handling the waste, suppliers of goods and services and the general public. It can be said that all are at risk from exposure to hazardous medical wastes. Stakeholders may be categorized (Appendices 11 & 12) as follows:
• Regulatory Authorities – enactment of laws and regulations, monitoring of waste management and support to institutions
• Policy Makers
• Medical staff - Doctors and Nurses
• Owners/operators of health-care facilities, laboratories and pharmaceutical establishments
  ▪ Employees of health-care facilities – medical doctors, nurses, health-care auxiliaries and hospital maintenance personnel, laboratory personnel
  ▪ Patients in health-care establishments or receiving home care
  ▪ Visitors to healthcare establishments
  ▪ Workers in support services allied to health-care establishments, such as laundries, waste handling and transporting
  ▪ Owners/operators of dental-care facilities
  ▪ Laboratory staff
  ▪ Owners/operators of veterinary facilities
  ▪ Waste Treatment And disposal staff
  ▪ The Shipping Association of Jamaica – ship generated waste
  ▪ The Port Authority of Jamaica – ship generated solid waste
  ▪ The Airport Authority of Jamaica – plane generated waste
  ▪ Contractors to the Parks and Markets Agencies that use Government owned trucks to collect municipal garbage (contractors will be to the NSWMA in the future)
  ▪ Private solid waste collectors
  ▪ Scavengers
  ▪ Suppliers of goods and services for medical waste disposal (e.g. delivery and collection of specialized sharps containers), and
  ▪ The general public, in particular scavengers at landfill sites.
6.0
RECOMMENDED POLICY GUIDELINES

The application of the best framework for the management of medical waste should be seen within the wider context of the GOJ's commitment to ensuring the development of sustainable waste management options in Jamaica. This vision should include among other things:

- Social progress that acknowledges the needs of all
- Effective protection of the health of the nation
- Effective protection of the environment.

Social progress and needs
The GOJ acknowledges its responsibility to ensure a life of dignity and well being for all of Jamaica. The fundamental goals would include attaining complete physical, mental and social comfort for all, and appropriate and relevant empowerment of all citizens by way of education and training so as to ensure their survival.

Protection of Health
Since medical waste is a potential threat to the health of all, the GOJ will institute regulatory systems that will ensure that workers in health-care and other relevant sectors, as well as the general public, are safely protected. This will include careful handling, treatment and disposal of the waste.

Protection of the environment
To live in an environment of quality is the right of every human being. Once medical waste is produced, dealing with it has an impact on the environment. As a result we should seek to achieve minimization, possibly by incinerating the waste, thus reducing the volume sent to landfills. We should also seek to render
this waste innocuous prior to sending it to landfills so as to alleviate the possibility of injury or infection and harmful effect to the wider environment.

**6.1 POLICY OBJECTIVES**

This policy seeks to achieve a shift in national cultural practices in the perception and management of medical waste. To this end, the specific objectives of this policy will be:

1. To minimize the amount of infectious/hazardous medical waste by segregating and treating this waste prior to disposal
2. To provide safe storage, handling, transportation and disposal of waste
3. To minimize any harmful effects to persons and the environment
4. To identify funding responsibilities for the disposal of waste
5. To state the responsibilities of the generators
6. To state the responsibilities of the transporters
7. To state the responsibilities of the temporary storage operators and landfill operators
8. To provide the means for Jamaica to comply with all local, regional and international regulations and conventions. To identify adequate implementation and enforcement mechanisms
9. To sensitize health-care workers, waste handlers and the general public to the importance of the proper management of medical waste.
6.2 LEGISLATIVE FRAMEWORK

Two (2) laws govern medical waste management in Jamaica, these being the current Public Health Act (1985) and the National Solid Waste Management Act (2001). The Ministry of Health and the Ministry of Local Government, Community Development and Sports administer these Acts.

The PHA is fundamentally for the protection of human health while the NSWM Act provides for the regulation and management of all solid waste. In addition to the PHA and NSWM Act, several other pieces of legislation are pertinent to the safe management of medical waste. These are listed below.

- The NRCA Act, 1991
- The Dangerous Drug Act 1948
- The Food and Drug Act, 1964
- The Pharmacy Act 1966
- The National Health Services Act, 1997
- The Water Resources Act, 1995
- The Disaster Preparedness and Emergency Management Act, 1993
- The Standards Act, 1969
- The National Health Service Act, 1997

These and the two main Acts all have significant deficiencies and gaps with respect to medical waste. It is best that these gaps be addressed utilizing the guidelines set out in this Policy for the Management of Medical Waste in Jamaica.
Figure 1: PROPOSED INSTITUTIONAL FRAMEWORK FOR MEDICAL WASTE

GOVERNMENT OF JAMAICA

MINISTRY OF LOCAL GOVERNMENT COMMUNITY DEV. & SPORTS
(Solid Waste Operations - Medical Waste Policy at the Local Level)

NATIONAL SOLID WASTE MANAGEMENT AUTHORITY
(Solid Waste management)

PARISH COUNCILS
Public Health & Local Operations (Monitoring)

MINISTRY OF LAND AND ENVIRONMENT
Hazardous Waste Policy

MINISTRY OF HEALTH
Oversees National Health Care Facilities and Policy for Medical Waste

ENVIRONMENTAL HEALTH UNIT
Public Health Inspectors (Monitoring role)

PHARMACY & REGULATORY AFFAIRS UNIT
Pharmaceuticals

NATIONAL ENVIRONMENT AND PLANNING AGENCY
Issuance of Permits, Air and Effluent regulations, Environmental Impact assessment review

Bureau of Standards
Product and Material Standards and Guidelines

OFFICE OF DISASTER PREPAREDNESS RESPONSE
National Accident & Emergency Response

MINISTRY OF AGRICULTURE
Veterinary Division

WATER RESOURCES AUTHORITY
Surface and Ground Water quality Monitoring

INLAND REVENUE DEPARTMENT
Collection of tariffs

PRIVATE SECTOR
(Collection, transportation and disposal facility operations)
6.3 INSTITUTIONAL FRAMEWORK

Fig. 1 represents the proposed institutional framework for the management of medical waste.

The Ministry of Health shall maintain overall regulatory responsibility for medical waste by:

- instituting appropriate guidelines and policy
- ensuring the establishment of a management system by generators
- monitoring for protection of environmental health at all stages
- enforcing health regulations according to the Public Health Act and its regulations.

The National Solid Waste Management Authority of the Ministry of Local Government and Community Development shall have regulatory responsibility for solid waste management, which includes medical waste, in accordance with section 4-(1) of the National Solid Waste Management Act, 2001. Section 4-(1) states inter alia, that the Authority shall take all steps as are necessary for the effective management of solid waste in order to safeguard public health. This will encompass all matters relating to the collection, storage, transportation and disposal of medical waste.

**Policy Ownership:** The National Solid Waste Policy will seek to achieve enactment of Regulation under MLGCD&S. The NSWMA will, therefore, operate in conjunction with the Ministry of Health, which can also seek enactment of its Regulations by utilizing the relevant sections of the Policy

An integrated effort is, therefore, necessary to set-up and commission safe practices for medical waste management in all sectors to ensure its smooth functioning over the next five- (5) years.
The NSWMA will retain responsibility for the management of the national system. Their responsibility would include:

- The licensing of companies with the responsibility for collection and transportation of medical waste;
- Licensing of vehicles assigned to transport medical waste;
- Licensing of operators of medical waste and disposal facilities;
- Monitoring of licensed service providers contracted to collect, transport and dispose of medical waste;
- Promoting public awareness of the need for efficient medical waste management;
- Advising the Minister on matters of general Policy relating to medical waste management in Jamaica;
- Setting and regulating tariffs for haulage and tipping fees.

In performing their function the NSWMA will have the authority to

- Convert existing dumps to sanitary landfills;
- Designate, develop and manage new landfills and other medical waste disposal operations;
- Develop, implement, and monitor a national plan and other plans relating to medical waste management;
- Formulate standards, guidelines and codes relating to medical waste management and monitor compliance with them;
- Conduct seminars and provide appropriate training programmes and consulting services and gather and disseminate information relating to medical waste management;
- Introduce cost recovery measures for services provided.
Management Function: A Function possibly, known as the Medical Waste Management Unit (MWMU), should be established in the NSWMA to ensure the achievement of this goal.

Continuous collaboration is required between the MLGCD&S, MOH, NEPA and the Ministry of Land and Environment as the core institutional groups in developing the specific policies.

The policies, regulations and guidelines under the (relative) legislative instruments should be reviewed to ensure that there is dedicated reference to medical waste and its management thereof. The Function (MWMU) in the NSWMA shall ensure that the various ministries, authorities and agencies conduct their respective reviews.

6.4 SETTING A NATIONAL PLAN

The NSWMA shall set up an annual or a biannual Medical Waste Management (MWM) Plan. This plan should be approved by the MOH before implementation.

The annual MWM plan should contain:

- A review of all the healthcare facilities generating medical waste in the island with information on the quantities and categories produced during the year;
- An inventory of existing treatment and disposal facilities in each healthcare facility, with a view to upgrading where necessary;
- Data on incidents/accidents and results of inspection programme;
- Recommendations, compilation of the needs for each healthcare facility;
- An estimation of the budget to be allocated for medical waste management, especially as it relates to the treatment facilities, in the coming year;
- Middle and long-term objectives to improve medical waste management in the healthcare facilities, and in particular, the public health and environmental risks associated with mismanagement of medical waste.

The NSWMA shall also ensure that healthcare facilities prepare and implement a proper medical waste plan. They shall support them in the definition and the implementation of this plan by providing technical advice, supplying adequate material and allocating sufficient financial and human resources.

The NSWMA shall set up periodic training programmes, review programmes in the Hospitals, Faculty of Medicine, Nursing Schools and Public Health Department to ensure that adequate training on medical waste is given.

**6.4.1 Inspection**

The NSWMA shall liaise with the MOH to ensure that treatment and disposal facilities comply with the regulations.

They (NSWMA) shall ensure that the medical waste plan of each hospital is in conformity with National guidelines. They shall have regular monitoring and control procedures.

Public Health Inspectors, who will inspect all hospitals, healthcare facilities, treatment or disposal facilities to ensure that the provisions of the National guidelines are being complied with, shall do monitoring of medical waste for compliance. Any contravention should be reported to the NSWMA and the MOH simultaneously.

For medical waste treatment, NSWMA shall approve all contracts settled between a healthcare facility and a contractor. In particular, great care shall be paid to safety of personnel and procedures relating to offsite transportation.
6.5 INSTITUTIONAL STRENGTHENING

In order to achieve efficient management of medical waste in the shortest term (3-5 years), it will be necessary for the institutions involved to be supported in the development of systems and of personnel at almost every stage. The desire and will to achieve safe management of their medical waste is high among generators and certain stakeholders but the infrastructure to support them is weak. Support to these institutions will require manpower as well as substantial funding, in some cases. In order of priority the following are recommended:

1. Principal among the agencies that will need support is the Ministry of Health. There are policies and guidelines in draft for completion and preparation of legislation but the Ministry has an overload on their legal Function. Without the regulations compliance and enforcement are difficult (Appendix 10).

2. The absence of medical waste data in all sectors makes it difficult to plan for the final disposal of medical waste. Studies in four areas should be commissioned: Pharmaceutical, (Human) Medical, Veterinary Medical and other Groups including mortuaries and small health care operations.

3. The MOH will also need administrative support in the development of the regulations and in monitoring for compliance. All health institutions will rely on the Ministry of Health for support to develop their waste management plans and upgrade their facilities to compliance standard. Upgrading the public health-care sector alone will be an overburden for the MOH in the short or medium term.

4. The Ministry of Local Government and Community Development, having solid waste under its jurisdiction, will require significant strengthening to manage the portfolio. The management of medical waste is only in its infant stage,
thus, support in manpower and training will be required to effectively implement the plans in the medium term.

5. Incinerators are critical to medical waste management in the Jamaican context. A special project will be required to audit all incinerators in the island, medical and others. An action plan will need to be developed subsequently to carry incinerators to compliance or to replace the system. The Audit should also lead to decisions on the alternative of central incinerators in the four- (4) health sectors.

The NSWMA should spearhead this audit. Reference to the UDC’s Study should be made in effecting the audit.

6. Training across all sectors will be a fundamental component in the medical waste management plan. Training will begin with the regulatory agencies and then be extended to the wider medical system, beginning with the regional hospitals. Included in the groups for training will be those in the waste collection group, whether public or private sector. Landfill owners and operators will also be trained in safe handling of medical waste as it relates to that group.

Both NSWMA and MOH have training units so a collaborative effort will be required to disseminate the information across the sectors. The WI School of Public Health in conjunction with the University of Technology may be incorporated in the training programme.

7. Pharmaceuticals will require special attention in developing a comprehensive management plan. This will include management of radioactive waste for which incineration is not an alternative and for which there is no guideline.
The Pharmaceutical Regulatory Affairs Unit of the MOH should spearhead the study towards the management plan.

8. The procurement section of the MOH and medical institutions will also be an important group to be trained in the acquisition of material that will have special requirements for disposal.

9. The veterinary, mortuary, shipping and aircraft sectors are at base line with respect to handling and disposal of regulated medical waste. The EHU of the MOH should investigate and document operations in these sectors in order for support to be given to them.

Collaboration with the NSWMA will be required overall. Other collaborations will be required with the Veterinary Division of the Ministry of Agriculture and The Scientific Research Council (for the shipping sector).

10. The NEPA will require technical support in the generation of regulations for radioactive waste. The MOH is currently taking steps in this direction through the Kingston Public Hospital (KPH) (Dr. C. Miller).

11. The preparation of a national emergency plan for medical waste will require the co-ordination of the Office of Disaster Preparedness and Management (ODPEM), the MOH and NSWMA as well as other agencies such as NEPA. Currently, the ODPEM has no system in place to respond to a major emergency involving medical waste. Support will be required in the training of personnel at the ODPEM.

12. Finally, a sensitization programme on the hazards of medical waste will have to be carefully presented to the public in order to achieve all targets in the safe management of medical waste for Jamaica. An aggressive media campaign (similar to the HIV-AIDS campaign) may be utilized for quick
results. Sensitization through the various existing environmental training programmes across Jamaica (ENACT, TPDCO, Parish Council, NGO and schools, to name a few).

6.5.1 Management Plan

**Registration:** It should be a requirement that all generators register with the Ministry of Health and the Ministry of Local Government, Community Development and Sports, or its designated authority National Solid Waste Management Authority, for each site producing waste.

A **Generator Registration Number** should be issued to simplify record management and the completion of the manifest. The information submitted for registration should include the name of the organization, the generating site and a company official.

**Training:** The plan for medical waste over the next three years will be to strengthen the existing management system in order to ensure safety for humans and animals and protection of the environment through all stages of the life cycle of the waste.

In order to effect safe management of medical waste it is essential that there be adequate training of personnel throughout the system. There should also be commitment of management, effective leadership and required legislation.

**Landfill:** Disposal to a sanitary landfill shall be the choice of final disposal of medical waste after it has been rendered innocuous or non-hazardous. Co-disposal of medical waste and domestic waste shall be strictly prohibited. However, where special isolated cells are prepared this shall be acceptable.
Quantities: In the short to medium term other studies should be done to acquire data on the quantities of medical waste in the different sectors. These studies can be done in conjunction with the Faculty of Health and Applied Sciences of the University of Technology (UTECH), which continually seeks projects for its student body (for example). The West Indies School of Public Health is now an off-campus school of UTECH.

Waste Management Plan: Each producer of medical waste must implement a written operating plan to manage medical waste in accordance with the Ministry of Health and the National Solid Waste Management Authority. This plan shall be available for review by the department and facility personnel. The plan shall include the following:

- The duties of and responsibilities for each of the different categories of healthcare facility (HCF) staff members who will generate healthcare waste or be involved in its management;
- A manual outlining all the procedures for the management of medical waste with reference to the specific treatments required. The manual should contain timetables showing frequency of waste collection from each ward and department, map of the facility showing collection points, storage and treatment locations;
- Monitoring procedures to trace waste inside the facility and ensure NSWMA as well as MOH rules are respected;
- Awareness and indications of the procedures to be followed which should be displayed at strategic points i.e. nurse rooms, bin locations, temporary and central storage points;
- Operation and maintenance procedures pertaining to the treatment facilities
- Contingency plan pertaining to the breakdown of disposal/treatment facility.
The Plan should further ensure that:

- There is a description of training for personnel who handle medical waste, as well as the managers and supervisors of such personnel,
- refresher training courses are conducted periodically,
- personnel are aware of the correct procedures for segregating, labeling, packaging, transporting, storing, and treating medical waste,
- there is substitution of less hazardous chemical agents, where practical, with less hazardous substances e.g. in the phasing out of mercury thermometers etc.
- there are procedures in place for decontaminating medical waste spills
- there is a contingency plan for emergencies.

The plan should be developed under the direction of a properly trained waste management officer designated by NSWMA in conjunction with the MOH.

**Monitoring:** A monitoring program must be implemented, by the MOH, utilizing Public Health Inspectors. Facilities that have multiple specialty services shall include procedures specific to each specialty if procedures vary.

**Plan review:** Plans shall be updated when regulations change.

**Protection:** Personal protective equipment (PPE) shall be provided for all handlers of medical waste, including maintenance operators. This should include thick gloves, masks, plastic aprons, trousers and boots (where appropriate). Special arrangements for laundering of clothing shall be made to prevent the operator from taking the clothing off the property.

**Immunization:** Appropriate immunization for maintenance staff is required.
6.6 MEDICAL WASTE MANAGEMENT

The objective of an effective medical waste disposal policy is the identification and segregation of waste, knowledge of the risks involved in handling, precautions during on-site as well as off-site transportation and a safe method of storage. It also involves an adequate treatment method (incineration, chemical disinfection, autoclaving, microwave irradiation), a training scheme for the operatives and final disposal of the waste products.

Experience has proven that medical waste when properly managed generally poses no greater risks than properly treated municipal waste. Generally, the waste management policy should follow a basic framework as shown below:

- Identification of waste
- Minimization of waste
- Segregation of waste
- Packaging, labeling, transporting and storing waste
- Treatment and disposal of waste
- Training of all relevant personnel
- Personal protection of operatives
- Review methods used to contain accidental spillage
- Method and procedure for the operation of the incinerator
- Method of final disposal of residual waste

6.6.1 Identification

All generators should identify waste as stated in Section 3.0 "What is Medical Waste".
6.6.2 Minimization of Waste

A general reduction in the generation of medical waste should be encouraged by the implementation of the policies and practices. These include:

Source reductions
- purchasing reductions - selecting supplies that are less wasteful or less hazardous, example in the case of mercury thermometers. These should be phased out and replaced due to their effect on the environment
- use of physical rather than chemical cleaning methods (e.g. steam disinfecting instead of chemical disinfecting)
- prevention of wastage of products, e.g. in nursing and cleaning activities
- use of recyclable products

Management and control measures
- centralized purchasing of chemicals
- monitoring of chemical flows within the health facility from receipt as raw materials to disposal
- managing stocks of chemical and pharmaceutical products
- making frequent orders of relatively small quantities rather than large amounts at one time, especially in the case of unstable products
- using products on a first in first out basis
- using all the contents of a container
- checking the expiry date of all products at time of delivery
Fig 2: Biomedical and Health care Waste Management

- **Non-Risk Waste**
- **INFECTIOUS**
  - Risk: Infectious
  - Treatment: Incinerate
- **SHARPS**
  - Risk: Physical/Infectious
  - Treatment: Incinerate
- **BIOLOGICAL ANATOMICAL**
  - Risk: Ethical/Religious
  - Treatment: Incinerate
- **DRUG REAGENTS CHEMICAL**
  - Risk: Toxic
  - Treatment: Incinerate
- **RADIOACTIVE COMPOUNDS**
  - Risk: Radioactive
  - Treatment: Incinerate
- **PRESSURIZED CONTAINERS**

- Municipal waste disposal
- Sanitary landfill disposal
- Separate specific disposal options
6.6.3 Segregation

The key to effective disposal of waste is segregation and decontamination at the point of generation. Failure to follow segregation protocols, as a whole is both potentially infectious and hazardous. The greatest risk is to the workers who handle the waste (hospital workers, municipal workers, and pickers). The risk to the general public is secondary and occurs in three ways: (1) accidental exposure from contact with the waste, (2) exposure to chemical or biological contaminants in the water, (3) exposure to chemical pollutants like mercury during incineration of the waste.

Generators are responsible for ensuring that the waste is placed in the correct receptacles. This is crucial because the generator may often be the only person who fully appreciates the risks the waste poses. Waste should be segregated on the basis of the major or primary hazard that they pose. Generators need to make this assessment and decide if further segregation is necessary because of secondary hazards associated with the waste.

Infectious wastes
All waste identified as infectious and/or hazardous must be segregated at the point of generation (source) from the general waste stream, that is, on the ward, at the bedside, operating theatre, laboratory, delivery room or other point. This represents any waste, known to have the potential of transmitting infections to humans or animals.

The segregation shall include separating the different types of waste into appropriate containers (rigid, leak resistant etc.) as specified in the MOH's Guidelines for the Management of Medical/Infectious Waste Generated at Health Care Facilities (MOH-GMMW).
Infectious waste that is segregated must not be contained at the facility of generation for more than four (4) days and at temperatures above 32 °C.

**Sharps**
Sharps are also categorized as infectious waste. They however warrant separate, special attention due to the ease with which injury from these can occur.

Sharps must always be placed in single use puncture proof containers (not glass and never cardboard boxes) immediately after use. (see MOH-GMMW for details).

Sharps containers must not be compacted or emptied into ordinary waste streams.

**Anatomical/Pathological waste**
Anatomical/ Pathological waste should ideally be autoclaved prior to collection and should also be stored in rigid leak resistant bags, pending incineration or burial.

**Pharmaceuticals**
Pharmaceuticals should be stored in plastic bags or containers for incineration or return to the suppliers.

**Genotoxic and other highly toxic chemical contaminated clinical waste**
These represent clinical waste, which are contaminated with toxic materials, in particular cytotoxic drugs, and should be segregated from other types of clinical waste. This is because unwitting exposure to these drugs could be both hazardous and toxic, as these drugs are extremely irritating and have harmful local effects. Further, any discharge of such waste could have disastrous ecological consequences.
**Radioactive waste**

Human or animal tissue wastes or other biological wastes which are also radioactive should be segregated by the generator from all other wastes. If they are potentially infectious, these wastes require dedicated facilities for autoclaving. Because of the radioactive contamination they usually cannot be incinerated immediately.

All radioactive waste should be stored in lead containers and labeled with the radioactive symbol.

**Waste containing heavy metals**

These should be segregated from the rest of the waste due to the potential hazards associated with them.

**Pressurized containers**

Pressurized containers should be separated due to the hazards relating to their contents, as well as those associated with their disposal.

**6.6.4 Packaging, Labeling, Transporting and Storing**

**Labeling**

The containers must be properly labeled with the basic information of waste category, date of collection, place where generated and destination. The United Nations symbol and classification should be marked on the container. Colour coding of plastic bags or containers is also recommended due to its convenience as well as the ease with which each category of waste can be identified.
## 6.6.4 Packaging, Labeling, Transporting, and Storing

**Fig. 3: Recommended Biomedical and Health-care Colour Coding System**

<table>
<thead>
<tr>
<th>Type of waste</th>
<th>Colour of container and markings</th>
<th>Type of container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Infectious waste</td>
<td>Red, marked &quot;HIGHLY INFECTIOUS&quot;</td>
<td>Strong, leak-proof plastic bag, or container capable of being autoclaved</td>
</tr>
<tr>
<td>Other Infectious waste, pathologica and anatomical waste destined for autoclaving</td>
<td>Orange</td>
<td>Temperature resistant plastic bag or container. Must be strong and leak-proof</td>
</tr>
<tr>
<td>Sharps</td>
<td>Red, marked &quot;SHARPS&quot;</td>
<td>Puncture proof containers</td>
</tr>
<tr>
<td>Chemical and pharmaceutical waste</td>
<td>Brown</td>
<td>Strong leak-proof plastic bag or container</td>
</tr>
<tr>
<td>Waste with heavy metal content</td>
<td>Orange</td>
<td>Strong plastic bag</td>
</tr>
<tr>
<td>Radioactive waste</td>
<td>Yellow</td>
<td>Lead box, labeled with the radioactive symbol</td>
</tr>
<tr>
<td>Low level infectious radioactive waste</td>
<td>Yellow</td>
<td>Strong leak-proof plastic bag</td>
</tr>
<tr>
<td>Cytotoxic waste</td>
<td>Red</td>
<td>Strong leak-proof plastic bags</td>
</tr>
<tr>
<td>Chemotherapy waste</td>
<td>Orange</td>
<td>Strong plastic bag</td>
</tr>
<tr>
<td>Pressurized containers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-risk healthcare waste</td>
<td>Black</td>
<td>Garbage bags</td>
</tr>
</tbody>
</table>
Packaging and Labeling

Red plastic bags will be used for isolating infectious waste and shall be stored inside a frame or be placed inside a sturdy labeled container, preferably of similar colour.

Colour coding of plastic bags or containers is also recommended due to its convenience as well as the ease with which each category of waste can be identified. Fig. 3 outlines the colour code. The actual colours can be varied as long as a different colour is used for each category as stated.

The containers must be properly labeled with the basic information of waste category, date of collection, place where generated and destination. The United Nations (UN) symbol and classification should be marked on the container.

A list of contents should be enclosed between the inner and outer packaging, and the outer packaging should be appropriately labeled.

The label must state: the waste material, the Department, date and the name of the person responsible for the waste.

All sharps should be placed in sharp containers before being placed in red bags. These are rigid leak and puncture resistant containers, designed primarily for the containment of sharps, which should be clearly labeled.

All packages containing medical waste shall be visibly identifiable with the international biological symbol and one of the following phrases: "BIOLOGICAL WASTE", "BIOHAZARDOUS WASTE", or "INFECTIOUS WASTE". The background colour should contrast with that of the symbol.
All plastic bags for use in the incinerator should be made of low-density polyethylene (LDPE), which does not contain chlorine, as most incinerators do not properly destroy plastic bags containing chlorine.

A lid should be provided to cover the opening of the container. Prevention of leaks is essential.

Posters indicating symbols and signs as well as colour coding for identification of the waste should be placed on walls as easy reminders.

**Transporting (on site)**
Waste must be collected from the point of generation before the bag is three quarters full and transferred to the site of storage and/or treatment. For hospitals and facilities with incinerators, the storage point should be in the vicinity of the incinerator. Health-care facilities without treatment should make arrangements with the closest medical care treatment facility.

On-site transportation of the waste shall be in the form of a leak-proof; wheeled container fitted with cover.

The route to the storage point shall be such that it avoids casual contact with the public and at no time should it be left unsecured.

Carts should be maintained by cleaning and disinfecting daily, and repairing when necessary.

Collectors of such wastes must be informed/trained in the execution of their duties. This includes wearing the personal protective equipment (PPE) and transporting the waste in a manner that reduces the risk of exposure.
Storing
On arrival at the incinerator storage compound, the various classes of waste shall be separated from each other and grouped before incineration.

The facility should be located so as to minimize potential risks from earthquakes, floods, windstorms and fires.

The structure should be designed to criteria appropriate to the local seismic risk, wind loading or any other dynamically imposed loads associated with and geological factors inherent at the location.

The structural engineers and architect should provide certification of the criteria used.

Fire prevention systems should be provided to prevent the release of hazardous material to the environment.

The storage facilities should be secured from unauthorized access. They should, however, be easily accessible to the sanitary staff. They should be inaccessible to animals insects and birds. They should be easy to clean with an impermeable hard-standing base, good water supply, drainage and ventilation.

6.6.5 Treatment of Waste

Steam (autoclaving), incineration, or an alternative process shall treat all biomedical waste.

Types of Treatment – incineration, autoclaving, disinfecting

Incineration
Incineration shall be the common form of treatment because it allows for the reduction of large waste volumes into small quantities of ash. This is adequate,
provided it is carried out at the correct temperature and under the right conditions.

Incineration must be done by a trained operator and monitoring of the air emissions as well as regular maintenance of the equipment should also be done.

The waste must be weighed on receipt at the point of incineration and the amount entered into the logbook together with the date, time and category of waste.

The appropriate Permits for incineration and for disposal of the waste must be acquired from NEPA, as stipulated in Section 5.3.2 of this policy.

The operator of the incinerator shall ensure that complete combustion of the raw medical waste is achieved.

The operator shall wear the appropriate personal protective equipment (PPE) in carrying out his/her duties and these PPE shall be left at the property for laundering.

**Incinerator**

Based on the experience of the three- (3) hospitals and also the specifications of the Ministry of Health Guidelines for the Management of Medical/Infectious Waste Generated at Health Care Facilities, the following are the recommended guidelines for medical waste incinerators (burning limited amounts of pharmaceuticals). The incinerator shall (Appendix):

- Be designed and constructed to destroy as completely as possible all combustible components of the waste
- Be designed for an economic useful life of at least twenty (20) years
• Be of controlled air and, where practicable, the continuous type having automatic feed and ash extraction

• Consist of at least two (2) zones, primary and secondary. The solid waste shall be burned in the primary zone (760 – 800 °C), and only gaseous and particulate products of combustion shall be burned in the secondary zone (>1,000 °C)

• Have rates of combustion controlled, such that the heat release rate of 350 kW/cu m is not exceeded within any zone

• Result in residue in which the combustible material shall not exceed 5% by mass (See section 5.3.2-NEPA)

• Have stack height at least 2.5 times the height of building which are likely to be influenced by emission from the stack.

• Be operated by a trained "technician " to ensure adequate temperatures are maintained thus guaranteeing total destruction of infectious and pathogenic material.

Residues from the incinerator shall be cooled to below 400 degrees C before discharge into any steel vessel not lined with refractory. On further cooling (room temperature) it should bagged for disposal into the landfill.

The ash shall further be put in bins that have lids, dust proof joints and robust casters for easy manual maneuverability.

**Autoclaving**

This is a wet thermal decontamination procedure whereby items are subjected to steam treatment at very high temperatures. It is very effective in destroying bacteria and viruses providing certain conditions of temperature, pressure and treatment time are met.

Each steam treatment unit should be equipped to continuously monitor temperature and pressure during the entire process of the treatment cycle.
Failing this, each package of medical waste to be treated must have a temperature tape or equivalent test material, such as, a chemical indicator placed on a non-heat conducting probe at the centre of each treatment container in the load. This will indicate whether the temperature and pressure have been reached.

Waste shall not be considered treated if the indicator fails to show a temperature of at least 250 degrees F (121°C) was reached during the process.

A written log shall be maintained for each treatment unit and evaluation results should be maintained onsite and available for review.

The following shall be recorded for each usage:

1. The date, time, and operator's name.
2. The type and approximate amount of waste treated
3. The post-treatment confirmation - the temperature, pressure and length of time of treatment.
4. The parameters determined from testing, that provides consistent treatment, such as exposure time, temperature, and pressure.
5. Identification of standard treatment containers and placement in the steam treatment unit.

This treatment may be used for items that need to be recycled like surgical equipment, culture dishes, infected clothing etc. It should also be used for treating pathological waste especially where there are religious considerations.

**Disinfection**

Disinfection of medical waste is a precautionary measure aimed at ensuring protection during handling and transporting.
Disinfection can be carried out by means of common disinfectants such as Glutaraldehyde, lysoform, Orthophenylphenol, and formaldehyde, which are added to the containers before they are sealed.

Sodium hypochlorite is not advisable when the waste is to undergo incineration. Each single product contains indications regarding the dose of disinfectant needed and manufacturers' maximum guidelines for infectious titre and average weight should be adopted.

Clearly, where possible, autoclaving is always preferable over disinfecting.

**Treatment of Waste by Sector**

**Hospitals**

**Infectious waste and sharps**
Incineration is the preferred method of treatment for infectious waste due to its effectiveness in destroying microorganisms. Highly infectious waste, such as cultures and stocks of infectious agents should be sterilized by wet thermal treatment e.g. autoclaving, at the earliest stage possible, if materials are to be stored prior to incineration. For other infectious healthcare waste disinfection is adequate.

All used sharps must be incinerated at high temperature to ensure total combustion.

**Anatomical/Pathological Waste**
Incineration is also the preferred treatment method for pathological materials. Ideally they should be autoclaved prior to incineration. In situations where there are religious considerations sterilization or autoclaving and burial is permitted under close supervision and monitoring.
**Pharmaceuticals**
Pharmaceuticals especially cytotoxic and genotoxic drugs may be incinerated if it is not practical to return these materials to the suppliers. This should however only be attempted if total combustion can be achieved (as in a properly constructed incinerator).

**Waste with Heavy metal content**
These should never be incinerated due to the concentrations of contaminants emitted during burning as well as the deleterious effect these may have on both humans and animals.

Mercury from thermometers, blood pressure gauges and other equipment or laboratory agents should be recovered for recycling and or special treatment. In the case of spent batteries these may be retrieved and stored in a safe place for: return to the suppliers, transfer to an approved exporter for recycling or other method of disposal as dictated by NEPA. Where none of the above is feasible, arrangements should be made with the NSWMA for special disposal in a sealed landfill.

**Pressurized containers**
Used, large and pressurized cylinders like oxygen tanks should be stored for return to the suppliers. Storage should be in accordance with the standard practice as supplied by the manufacturer.

Aerosol cans should be disposed of in sanitary landfill.

**Other Areas of the Health sector**

**Small rural health centres**
Health centres may store infectious waste for transfer to a central hospital incinerator under cool conditions but not longer than two (2) days.
On site burning chambers may be used by small rural health centres for treatment of waste. These should, however, only be for such combustible material as swabs, dressings gloves etc. They should not be used for glass, plastic bottles, metals or body parts.

The chamber should be enclosed to keep out animals and closed when not in use.

Complete burning should be done daily in ideal weather conditions. Burning should be done on a mesh or grill that allows the ash to fall through to the lower section.

After each burning the ash should be allowed to cool then removed with a shovel or rake and stored in bags for delivery to an approved landfill.

Where access to landfill is very difficult, arrangements could be made with the NSWMA for burial in a pit (protected from animals and children). A daily covering of soil should be placed on ashes in the pit.

All other waste should be transported to the nearest incineration facility.

**Other health centres**

All infectious waste should be double bagged in red plastic bags and transported daily to the nearest hospital incinerator for burning. The maximum period for storage under cool, isolated conditions should be 48 hours.

Particular attention needs to be paid to pharmaceuticals, as a survey has shown that small health-care clinics carried the highest volumes of expired drugs. An inventory system should be established to monitor inflows and outflows, expiry, damage or spoilage and stock.
Incoming gifts or stocks of pharmaceuticals in the event of emergencies (e.g. hurricane) should be carefully monitored to ensure timely usage and to prevent expiry of large volumes.

Small quantities of vaccines and other pharmaceuticals should be stored and disposed in the nearest hospital incinerator.

Large volumes of pharmaceuticals for disposal should be returned to the suppliers, where possible, or arrangements should be made with the PRU of the MOH for their disposal.

Used sharps such as needles, lancets and others should be stored in hard plastic bottles or other commercial containers for transfer to the incinerator when full. Storage of the containers should be in a secure place.

Private Medical and Dental Practitioners
Private medical and dental practitioners represent numerous scattered sources of medical waste, including contaminated sharps. Infectious waste and sharps should be segregated and stored in bags and impervious containers respectively (see details above).

Special arrangements should be made with a hospital or clinic for incineration of the waste.

Research Facilities
Waste produced in these facilities range from small items such as culture dishes to large animal carcasses. It may also include soiled bedding, sharps and radioactive waste. The waste is often highly infectious. Heads of research units are responsible for the training of personnel and for ensuring proper segregation of waste. Because of the nature of the waste generated in these facilities, the following precautions should be taken:
- Highly infectious waste should be autoclaved or incinerated on site whenever possible and should be handled only by trained and authorized personnel.

- If onsite treatment is impossible, cooled storage facilities should be provided and there should be regular collection and transfer of the waste to an incineration facilities.

- Animal carcasses that cannot be destroyed immediately after experimentation should be stored at a temperature below (-20)°C.

- Any contractual arrangement for research by persons outside the establishment should include adequate provisions for the handling and disposal of waste.

**Nursing Homes and Hospices**

Waste from nursing homes consists of mainly swab, soiled dressings, sharps stoma bags and incontinence pads. The head of each establishment is responsible for the training of all personnel and for implementing segregation practices.

Needles, syringes, lancets and other sharp objects should be stored in hard plastic or metal containers and be incinerated at intervals.

All other infectious waste should be stored in double plastic bags for transfer to an incinerator.

Adequate arrangements should be made with a hospital or clinic for the treatment (incineration) and final disposal of all medical waste generated by these institutions.
Home Treatment
The amount of medical waste produced at a patient's home will be very small. It may consist of items contaminated with blood, incontinence pads, dressings or syringes and hypodermic needles.

Medical waste except sharps should be double packed in plastic bags and then disposed of with household refuse. Where possible and for highly infectious waste, effort should be made to contact the nearest hospital to arrange for incineration of the waste.

Diabetics and other sharps users should store hypodermic needles (and other sharps) in hard plastic or metal bottles. These containers should be taken to the nearest health centre, hospital or to their private physician for the incineration to be done.

The containers should be labeled "NOT FOR RECYCLING" to avoid recycling, should there be disposal to the municipal garbage.

Medical waste produced by chemotherapy treatments at home, such as needles from infusion sets or syringes, and protective gloves, contaminated with cytotoxic drugs, should be packaged safely in hard containers and transferred to the nearest hospital for incineration.

Ambulance Services
Ambulance services and the hospitals they serve should have a policy for the safe disposal of medical waste. Ambulance staff should be trained in the safe handling of medical waste.

Ambulances should be equipped with puncture proof containers of appropriate size, mainly for infectious waste and sharps. Sealed bags and
containers should be deposited at the hospital emergency department on arrival for disposal according to the hospital's code of practice.

**Veterinary Centres**

Discarded material including carcasses, body parts, body fluids, blood or bedding originating from animals known to be contaminated with infectious agents or from animals inoculated during research or pharmaceutical testing with infectious agents should be incinerated. They should be placed in red plastic bags and transported to the veterinary incinerator or to the nearest hospital incinerator for incineration.

Leftover vaccines or other small quantities of pharmaceuticals should be stored for incineration.

Large quantities of pharmaceuticals for disposal due to expiry or other reason should be returned to the suppliers or be disposed by special arrangement utilizing the guide for disposal of pharmaceuticals.

**Radioactive Waste**

Most low-level radioactive materials can be stored in lead containers and allowed to decay until safe for disposal as non-radioactive material.

Infectious or pathogenic material, which is also radioactive, should be sterilized prior to storage.

Radioactive waste should be inspected for unwanted material such as tissue or infectious material prior to (on or off-site) storage for decay. They should be autoclaved in autoclaves used exclusively for that purpose.
Radioactive healthcare waste usually contains radionuclides of short half-lives like $^{32}\text{P} (\beta, 14.3 \text{ days half-life})$, $^{57}\text{Co} (\beta, 271 \text{ days half-life})$ or $^{99}\text{Tc} (\gamma, 14.3 \text{ days half-life})$ and loose their activity quickly. For this reason it is necessary to distinguish between short-lived and long-lived radionuclides in order to determine the period of decay.

The general principles of on-site treatment are based on the fact that it is impossible to disrupt or change the radioactivity of a signed material; the only feasible treatment that can be made on site consists of:

- Limiting the volume as far as possible
- Fixing the radionuclides on another support
- Diluting the activity thus obtaining acceptable concentrations for disposal (If the total annual activity released is lower than permitted limits).

During on-site storage of radioactive waste (decay), there must be no risk of a chemical reaction that might cause an explosion or the release of chemically toxic or radioactive gasses.

This is usually accomplished by taking the following precautions:

I. liquids must be neutralized (pH 6 to 8) prior to placement in the waste container
II. containers of volatile compounds must be sealed to prevent airborne activity
III. highly reactive materials (such as metallic sodium and potassium) must be reacted to completion before storage.

Adequate space (properly shielded, ideally ventilated and taking fire risks into consideration) should be made available for storage of radioactive waste by decay.
Decay may be used as a solution to the handling of contaminated bedding, clothing and equipment. Usually after a sufficient period, 10 half-lives, and following checks with appropriate instrumentation, these materials can be classified as non-radioactive and released from restriction after the removal or destruction of the radioactive signs and labels.

Certain therapeutic procedures require the use of radionuclides with longer half-lives like $^{60}\text{Co}$ (β, 5.3 years) or $^{226}\text{Ra}$ (β, 1600 years half-life), which are usually conditioned as pins and may be reused on other patients after sterilization. Once decayed and before disposal, radioactive waste must be treated as conventional waste i.e. classified depending on the contents of the waste, chemical or toxic contaminants.

6.6.6 Tracking System

A system for tracking the waste from ‘cradle to the grave’ is to be established through the NSWMA.

This is to be by documentation and sign-off with consignment notes as the waste is transferred from one handler to the next.

At the point of segregation a report should be completed of each type of waste generated (Infectious, pathological etc.) This report should include the quantity of the waste generated daily as well as the on site storage methods for the waste. See 6.6.10 Documentation/Consignment Note.

There should be similar documentation regarding the treatment of the waste. This should include:
- the type of treatment;
- the date, time and operators name;
- the approximate amount of waste treated;
- the parameters regarding treatment, such as exposure time, pressure (where applicable) temperature and length of time of treatment.

Copies (3) of this report should be given to the haulage contractor. The contractor should keep one copy and the other should be given to the landfill operator.

6.6.7 Waste Generator without Facility for Incineration

The waste generating facility that has no facility for incineration shall isolate and contain the waste as prescribed in the section for Waste Generator with Facility for Incineration.

The packaged waste shall be stored in a manner to prevent putrefaction and to prevent infectious agents from coming in contact with the air. Unless a refrigerated storage room is available, storage times for health care waste (i.e. delay between production and treatment) should not exceed the following:

- 48 hours during the cool season
- 24 hours the hot season


The waste shall be transported to a facility with incinerator for destruction by heat.

The final disposal of the residue shall take the same path as the residue from incineration as mentioned in the previous sections.
6.6.8 Collecting and Transporting to Landfill

The incinerating facility shall make the appropriate arrangements for the transport of the residue from incineration to the Riverton sanitary landfill. This will be the only sanitary landfill in the island in the medium term.

Transportation should be done in a vehicle licensed by the NSWMA, which is dedicated to the transportation of medical/hazardous waste and that will meet the requirements currently being developed by the MLG&CD under the NSWM Act 2001.

The haulage company will be licensed by the NSWMA to transport medical waste.

6.6.9 Transfer/Storage Centres

Medical waste originating in Kingston and adjacent Parishes shall have appropriate transfer/storage centres established in each collection zone, by the NSWMA.

The residue of the medical waste shall be stored at such transfer centres until it can be transferred to the Riverton landfill or other landfill designated by the NSWMA.

No untreated waste shall be taken to the transfer stations.

Monitoring of transfer stations should be done by the MOH for public health reasons.

Storage of waste at the transfer station shall not be longer than four (4) days and shall be done in a cool environment.
6.6.10 Documentation/Consignment Note

A Consignment Note for the Transportation and Disposal of Hazardous Waste shall be established. (See section 6.6.6)

On transfer of the residue to the truck/carrier, the operator should complete the section assigned to him/her. This form shall indicate the date, time, general description of waste, source of waste and quantity.

After the final journey, the driver/transporter shall complete the part of the assignment note that is reserved for him/her and return a copy to the generator.

A copy should be left at the disposal site.

6.6.11 Disposal in Landfill

Medical waste shall be delivered to the operator of the Riverton landfill site, which will have cells dedicated to the disposal of medical waste.

The operator of the landfill site must have a permit from NEPA for the operation of the waste disposal facility and a license for the discharge of effluent (leachate). The operator will also have to have a license to operate a disposal site from the NSWMA.

The operator of Riverton landfill shall sign the section of the Consignment Note for the Transportation and Disposal of Hazardous Waste assigned to him/her in order to record receipt of the waste. Each party shall maintain the appropriate section.
The operator of the landfill shall sign-off on the waste when disposal occurs. A copy of the fully completed form shall be sent to the NSWMA and to the MOH’s Environmental Health Unit.

The operator of the landfill shall carry out the necessary monitoring of the facility in order to comply with section 17 of the NRCA Act, the permit/license requirements of NEPA and the licensing requirements of the NSWMA.

6.6.12 Training

A policy for the management of healthcare waste cannot be effective unless it is applied carefully, consistently and universally. Training healthcare personnel in implementing the policy is critical if a waste management program is to be successful. The overall aim of training is to develop awareness of the health, safety and environmental issues relating to health-care waste and how these affect employees in their daily work.

All medical personnel, including doctors and dentists should be trained regarding the hazards, precautions and procedures for the handling of potentially harmful medical waste. They should be convinced of the need for a comprehensive management policy.

The degree of training should be dependent on each employee's task and work area.

Separate training activities should be designed for, and targeted to the four main categories of personnel:

- Hospital managers and administrative staff responsible for implementing regulations on health-care waste management
- Medical doctors
- Nurses and assistant nurses
- Cleaners, porters, auxiliary staff and waste handlers.

The training course should provide an overview of the waste management policy and the underlying rationale and information on practices relevant to the targeted group of trainees. For personnel who provide healthcare, waste segregation should be the key element in their training.

Training should incorporate information from the Medical Waste Policy. Personnel should be trained in environmental, as well as, health and safety matters including accident prevention, safe lifting practices, safe waste handling practices, and proper control and maintenance of equipment and facilities where appropriate.

Training should include the need;

- for record keeping
- to generate reports at each stage of the medical waste cycle
- to be knowledgeable as to their preparation

Training should also include emergency response, including the location and proper use of emergency equipment and sterilizing solutions, use of personal protective equipment, procedures for raising the alarm and notifying emergency response teams, and proper response action for each foreseeable emergency situation.

Basic personal hygiene is important for reducing the risks from handling medical waste, therefore convenient washing facilities should be available for personnel involved in the task. This is particularly important at storage and incineration facilities. It should also be stressed at all training sessions.
**Waste handlers**
Among staff who routinely handle medical waste, awareness of the need for safety may decrease over time, with increase risk of injury. Periodic refresher training is therefore recommended.

**Medical waste management operators**
Training for these operators should include:

- information on the risks associated with the handling of medical waste
- procedures for dealing with spillage and other accidents
- instructions on the use of protective clothing

**Staff who transport waste**
Drivers and other waste handlers should be aware of the nature and risk of the transported waste. They should be trained in the procedures listed below;

- Correct procedures for handling, loading and unloading waste bags and containers.
- Procedures for dealing with spillage or other accidents; written instructions should be posted in the transport vehicle
- The need for wearing protective clothing at all times.
- The need for ensuring that the dedicated collection vehicles always an extra supply of plastic bags, protective clothing, cleaning tools and disinfectant, in the event there is spillage.
- Documentation relating to the medical waste in their possession.

**Treatment plant operators**
Qualified operators are needed for incinerators autoclaves or other treatment centres. If no qualified operators are available, training should be provided for the designated operator. They should receive training in the following areas;
- general functioning of the treatment facility
- health, safety and environmental implications of the treatment operations
- technical procedures for operating the plant
- emergency response in case of equipment failures and alarms
- maintenance of the plant and record keeping
- surveillance of the quality of ash and emissions according to specifications
- the duration of treatment and temperature necessary to achieve total destruction of pathogens

**Landfill operators**

The training of landfill operators is important for limiting the risks associated with medical waste, in relation to both scavenging and the quality of the ground water. Landfill operators should therefore be trained regarding the following:

- health risks relating to medical waste
- hazards relating to the sorting of medical waste
- the use of protective equipment, and personal hygiene
- safe procedures for landfilling the waste
- Procedures for emergency response

**The public in General**

A national public awareness strategy needs to be developed to educate the public on the inherent risks associated with the mismanagement of medical waste. This strategy should instill in the public the need to protect themselves from the hazards involved in handling, using, or ingesting (as in the case of discarded drugs) medical waste. They should also be educated on the need to protect the environment.

This national public awareness strategy will be broad in scope, and will include a variety of media such as radio and television, print, billboards and music. The strength of these activities lies in disseminating knowledge and information,
thereby increasing the levels of awareness, though they can, over time, produce changes in attitudes and behaviour as well.

Community based strategies can also be instituted. These are characterized as having more depth since they involve face-to-face meetings, interaction and implementation of projects and the building of empowered groups. The strength of community learning is the potential to create significant change in the individuals leading to long-term, sustained impacts. This community based strategy can be instituted through the Public Health Departments in the Health Sector Regions and/or in conjunction with the environmental education campaign being promoted by the ENACT Unit of NEPA.

6.6.13 Record Keeping and Reporting

Each medical facility should institute a record keeping system detailing the amount and type of medical waste generated daily and its movement throughout the facility. This should be done at each stage of the waste cycle.

A monthly report should be prepared from the compilation of these records, which should be sent to the MOH. This can be used as means of:

- monitoring the medical waste
- determining the monthly or annual requirement of resources such as safety boxes, bags, containers, collection trolleys and protective clothing.

The need for these resources can be determined by using the information on waste generated and projecting future demand.

The quantities of disinfectants, necessary spare parts for medical waste treatment can be similarly budgeted. This will ensure that there are no shortages of the relevant resources.
The facilities should also maintain records of:

- significant environmental matters
- monitoring data,
- accidents and occupational illnesses
- spills, fires and other emergencies.

This information should be reviewed and evaluated to improve the effectiveness of the medical waste program.

6.7 FEES AND FINES

There are several fees associated with the business of medical waste management. Likewise, there are fines for violations of the codes of practice. The MLGCD and NEPA shall be the principal collectors of fees and fines. Appendix 37 describes fees that are stipulated elsewhere.

MLGCD

Fee for licence haulage contractor company
Fee for licence of vehicle to transport waste (per unit)
Fee for licence to operate sanitary landfill
Fee for licence to operate transfer station
Fee for disposal of waste to landfill (tipping fee)
Fee for haulage of waste from generator to disposal site
   (Haulage fee)
Fine for violation of haulage licence
NEPA

Fee for licence to operate incinerator  S10,000
Fee for permit to construct and install new incinerator
Fee for licence to operate landfill site
Fine for violation of air emission standards
($/tonnes/yr./pollutant)  $100-200
APPENDIX 10

**Guidelines, Policies, Acts and Regulations relating to**

**The Management of Medical Waste – Jamaica**

**MINISTRY OF HEALTH**

2. (Draft) Public Health (…. Local Board) (Health Care Waste) Regulation
   Section 20 – Right of entry to premises
5. (Draft) Ministry of Health Policy for the Management of Health Care Waste
6. (Draft) Regulations for Nursing Homes
7. Food and Drug Act, 1964
8. Food and Drug Regulations, 1975
9. Pharmacy Act, 1966
10. Pharmacy Regulations
11. National Health Services Act, 1977

**NATIONAL ENVIRONMENT AND PLANNING AUTHORITY (NEPA)**

1. Natural Resources Conservation Authority (NRCA) Act
2. NRCA (Permits and Licences) Regulations, 1996
3. (Draft) NRCA Air Quality Regulations, 2001
4. Guidelines for the Management of Medical Waste (Draft 3)
5. (Draft) Procedures and Requirement for Permitting and Operating of Waste Disposal Facilities
APPENDIX 10 (Pg. 2)

MINISTRY OF THE ENVIRONMENT

MINISTRY OF LOCAL GOVERNMENT AND COMMUNITY DEVELOPMENT (MLGCD)
1. National Solid Waste Management Act 2001
2. Standard for Public Cleansing Activities

WATER RESOURCES AUTHORITY (WRA)
1. Water Resources Act, 1995

OFFICE OF DISASTER PREPAREDNESS AND EMERGENCY MANAGEMENT (ODPEM)
1. Emergency, Disaster Preparedness and Emergency Management Act, 1993
2. Hazardous Material Spill Response Plan

JAMAICA BUREAU OF STANDARDS (JBS)
1. Standards Act, 1969

INTERNATIONAL CONVENTIONS
3. World Health Organization
4. Narcotics
APPENDIX 2

REFERENCES

MANAGEMENT OF MEDICAL WASTE

1. Quantification of Infectious Waste and Sizing of Incinerators For Selected Ministry of Health Institutions, Final Draft – Heather Storrud, Environmental Control Div, Ministry of Health, 28 February 1999

2. Chapter 64E-16, Florida Administrative Code Biomedical Waste

3. Guidelines for Safe Disposal of Unwanted Pharmaceuticals In and After Emergencies, WHO

4. Safe Management of Wastes from Health-care Activities
   Edited by A. Pruss, E. Giroult, P. Rushbrook


6. Illinois Waste Management Fees

7. An Ordinance to Provide Solid Waste Collection Licensing in Washington County, Maryland

8. List in Appendix 10
APPENDICES 3, 4, & 5

FIELD VISITS, MEETINGS AND CONSULTATIONS

1. Incinerators:
   - Kingston Public Hospital
   - University Hospital of the West Indies
   - National Chest Hospital
   - May Pen Hospital
   - Blood Bank
   - National Public Health Laboratory
   - Ministry of Agriculture – Veterinary Division

2. Meetings & Consultations:
   - Meeting between Ministry of Health, NEPA, MLGCD, Consultant (notes attached)
   - Meeting between Consultant and Health Corporation Ltd.
   - Meeting with FISH
   - Meetings with various Agents of NEPA to discuss Legislative Instruments
   - Meetings with Ministry of Health:
     - Environmental Health Unit (Mr. Ambrose Fuller, Mr. L. Brady, Mr. Larry Watson)
     - Public Health Department (Mr. Linton, Public Health Inspector)
     - Pharmaceutical Dept. & Regulatory Affairs (Mrs. G. Gibbs, Chief Drug Inspector)
   - Meetings with Ministry of Agriculture, Veterinary Division
   - Meeting with Private Supplier of Health-care (sharps) Containers
   - Meeting with the Ministry of Environment
   - Meeting with Private Dentist and Doctors
APPENDICES 3,4, & 5 (pg. 2)

- Consultation with Health Department of Bauxite/ Alumina Company – (WINDALCO)
- Consultation with ODPEM
- Consultation with the Packaging and Labeling Section of the Jamaica Bureau of Standards
- Numerous Web site searches – UK, USA, Canada, Australia, WHO, India,
### Appendix 11

**STAKEHOLDERS IN THE MANAGEMENT OF MEDICAL WASTE AND THE LEVEL OF IMPACT TO THE STAKEHOLDER**

<table>
<thead>
<tr>
<th>STAKEHOLDER</th>
<th>IMPACT</th>
<th>LEVEL of IMPACT</th>
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Regulatory Authorities – enactment of laws and regulations, monitoring of waste management and support to institutions

- Owners/operators of health-care facilities, laboratories and pharmaceutical establishments
  - Employees of health-care facilities – medical doctors, nurses, health-care auxiliaries and hospital maintenance personnel, laboratory personnel
  - Patients in health-care establishments or receiving home care
  - Visitors to healthcare establishments
  - Workers in support services allied to health-care establishments, such as laundries, waste handling and transporting
  - Owners/operators of dental-care facilities
• Owners/operators of veterinary facilities

• The Shipping Association of Jamaica – ship generated waste

• The Port Authority of Jamaica – ship generated solid waste

• The Airport Authority of Jamaica – plane generated waste

• Contractors to the Parks and Markets Agencies that use Government owned trucks to collect municipal garbage (contractors will be to the NSWMA in the future)

• Private solid waste collectors

• Suppliers of goods and services for medical waste disposal (e.g. delivery and collection of specialized sharps containers), and

• The general public, in particular scavengers at landfill sites.

**Footnote:**

Highest Impact to Health - 1

No Impact to Health - 4

High Impact to Health - 2

Possible Hazard to Health - 3