

**INTEGRATED SOLID WASTE MANGEMENT PROJECT  
(ISWMP)**

***AN ASSESSMENT OF THE EXISTING POLICIES  
AND LEGISLATIVE FRAMEWORK FOR THE  
MANAGEMENT OF SOLID WASTE: THE CASE OF  
NAIROBI CITY, KENYA***

*A Report on the assessment of the Existing Policies and Legislative Framework for  
Solid Waste Management in Nairobi City Submitted in Partial fulfillment of the  
Requirements for the Development of An Integrated Solid Waste Management Plan for  
Nairobi City (Kenya)*

***NOVEMBER, 2009***

## **ABSTRACT**

*Solid waste management in Nairobi City has for over the years been one of the sources of pollution for the City's environment. The City's solid waste management system is faced with a number of challenges. One of these challenges is the policy problems and legislative framework aimed at governing the management of the solid waste cycle. It was on this foundation that this exercise was designed to collect and collate the existing policies and legislative framework for the management of solid waste relevant to the City of Nairobi. In so doing, two types of data were collected; primary and secondary. The collection of such data involved the use of different instruments as well as the employment of various sampling methods as explained in chapter two of this report. The analysis of the collected data reveals that the solid waste management system is riddled with a number of challenges such as non-compliance with the laid down provisions, lack of incentives for best practices in solid waste management, conflicting roles played by some institutions, low public awareness on the Dos and the DONTs in the solid waste management sector, inadequate infrastructure for solid waste management among others.*

## TABLE OF CONTENTS

### PRELIMINARIES

Abstract.....	2
Table of Contents.....	3
List of Abbreviations.....	5

### CHAPTER ONE: OBJECTIVES, SCOPE, TERMS OF REFERENCE AND CHALLENGES

1.1 Objectives.....	6
1.2 Scope.....	6
1.3 Terms of Reference.....	6
1.4 Challenges.....	6

### CHAPTER TWO: STUDY DESIGN AND METHODOLOGY

2.1 Introduction.....	7
2.2 Nature and Sources of Data.....	7
2.2.1 Primary Data.....	7
2.2.2 Secondary Data.....	7
2.3 Population Description.....	7
2.4 Sampling Methods.....	7
2.5 Methods of Data Collection.....	8
2.5.1 Questionnaire Administration.....	8
2.5.2 Oral Interview Schedule.....	8
2.5.3 Non-Participant Observation.....	8
2.5.4 Review of Documented Information.....	9
2.5.5 Photography.....	9
2.6 Data Analysis and Presentation.....	9
2.6.1 Descriptive Statistics.....	9
2.6.2 SWOT Analysis.....	9

### CHAPTER THREE: ANALYSIS, DISCUSSION AND PRESENTATION OF FINDINGS

3.1 Introduction.....	10
3.2 Existing Laws, Acts and Regulations.....	10
3.2.1 Environmental Management and Co-ordination Act.....	10
3.2.2 City Council of Nairobi By-Laws on Solid waste Management.....	14
3.2.3 The Factories Act.....	18
3.2.4 The Local Government Act.....	18
3.2.5 The Occupational Safety and Health Act.....	19
3.2.6 The Building Code of 1987.....	20
3.2.7 The Radiation Protection Act.....	21
3.2.8 The Traffic Act.....	21
3.2.9 The Transport Licensing Act.....	21
3.2.10 The Scrap Metal Act.....	21

3.3 Existing Regulations and Standards.....	22
3.3.1 Water Quality Regulations.....	22
3.3.2 Waste Management Regulations.....	22
3.4 Policies and other Planning Documents.....	31
3.4.1 Sessional Paper No. 1 of 1999.....	31
3.4.2 Vision 2030.....	31
3.5 Economic Instruments.....	32
3.6 Enforcement.....	33
3.7 Conclusion.....	34
3.8 Recommendations.....	34

## APPENDICES

Appendix A: List of the Documents Collected and Reviewed.....	36
Appendix B: Questionnaire for Solid Waste Generators.....	40
Appendix C: Interview Schedule for Regulators.....	43
Appendix D: Work Plan.....	44

## **LIST OF ABBREVIATIONS**

<b>CBD</b>	Central Business District
<b>CCN</b>	City Council of Nairobi
<b>CBO</b>	Community Based Organization
<b>COYA</b>	Company of the Year Award
<b>EIA</b>	Environmental Impact Assessment
<b>EA</b>	Environmental Audit
<b>EMCA</b>	Environmental Management and Co-ordination Act
<b>NEMA</b>	National Environment Management Authority
<b>PPP</b>	Public-Private Partnership
<b>UNEP</b>	United Nations Environment Programme

## **CHAPTER ONE: OBJECTIVES, SCOPE, TERMS OF REFERENCE FOR THE STUDY AND CHALLENGES FACED DURING THE STUDY**

### **1.1 Objectives of the Study**

The study was conducted to identify and review existing laws, regulations, economic instruments and enforcement mechanisms relevant to the management of solid waste in Nairobi City while identifying their strengths, weaknesses and gaps therein with an ultimate goal of making appropriate recommendations to inform the development of an Integrated Solid Waste Management Plan for the City.

### **1.2 Scope of the Study**

The exercise was limited to assessing the existing policies (laws, regulations economic instruments and enforcement mechanisms) relevant to the management of solid waste with a primary focus on Nairobi City, which for the purpose of this project comprises a total of ten zones namely: Makadara, Westlands, Kasarani, Kamukunji, Starehe, Embakasi, Dagoreti, Lang'ata, CBD and Dandora Dump Site. The policies reviewed had either a local or a national dimension but with a common denominator of enhancing sustainable management of solid waste for a better environment.

### **1.3 Terms of Reference**

The following were the terms of reference for the study

- Collecting of all the Laws and Acts, regulations, economic instruments relevant to solid waste management.
- Reviewing the collected laws, acts, regulations and economic instruments in light of source reduction of generated solid waste at either production or consumption level, segregation of waste at source, primary storage and collection of solid waste, transportation and transfer stations, treatment, landfills, incineration and recycling of solid waste. Other parameters that also guided the review process included resource recovery, hazardous solid wastes from industries, healthcare facilities and other sources as well as construction and demolition wastes.
- Identifying the enforcement mechanisms available for the enforcement of laws and regulations at various levels of the solid waste management chain.
- Identifying the existing gaps.
- Conducting field visits to ascertain the situation on the ground.
- Making appropriate recommendations for the improvement of the current policy situation for a better solid waste management system for Nairobi City.
- Compile a report on the findings of the exercise to inform the development of a solid waste management plan.

### **1.4 Challenges**

- Limited time for carrying out the exercise and limited finances to cover transport expenses.
- The expansive nature of the area of study made the process of data collection tiring.
- Inadequate tools for carrying out the exercise and unwilling respondents.

## **CHAPTER TWO: STUDY DESIGN AND METHODOLOGY**

### **2.1 Introduction**

The exercise was designed to identify the existing policies and legislative framework for the solid waste management with a view to identify the gaps and make appropriate recommendations to inform the development of an integrated solid waste management plan for Nairobi City. In order to realize these objectives, the following design and methodology was employed.

### **2.2 Nature and Sources of Data**

To meet the set objectives, two types of data were collected namely; primary data and secondary data.

#### **2.2.1 Primary Data**

The primary data were obtained from households (within high, medium and low income residential areas), field observations and interviews from regulators and service providers in the solid waste management sector.

#### **2.2.2 Secondary Data**

These consisted of published and unpublished information about policies, laws, regulations and enforcements, EA and EIA reports and the City Council of Nairobi By-laws on solid waste management.

### **2.3 Population Description**

The population sampled was finite and was provided by the true households, high risk industries, health facilities, institutions, commercial enterprises and construction sites. A total of 30 households were sampled with the high, medium and low income residential areas producing 10 households each. The National Environment Management Authority (NEMA) and the City Council of Nairobi (CCN) formed a special and critical respondent group hence were part of the universe. Other respondents included service providers in the solid waste management sector such as transporters, recyclers and Community Based Organizations (CBOs) involved in solid waste collection within residential zones.

### **2.4 Sampling Methods**

Several sampling techniques were employed by the exercise. This ensured a truly representative sample and adequate coverage of the area. These included the following:

#### **a) Purposive Sampling**

Purposive sampling was used to select the regulators and other relevant lead agencies in the solid waste management sector to obtain their views on the current policy situation for solid waste management in the City of Nairobi.

### **c) Simple Random Sampling**

A total of thirty households were chosen at random with ten households from every three clusters (high, medium and low income residential zones). The same method was also used to sample five high risk industries, five commercial enterprises, three health facilities, two institutions and two construction and demolition sites.

### **d) Stratified Random Sampling**

The area of study was classified into three strata namely; high income residential zone, medium income residential zones and the low income residential zones. From these strata, neighborhoods falling within the desired zones were randomly picked from which a total of thirty households were randomly sampled.

### **d) Other Sampling Methods employed**

In cases whereby initial respondents with the desired characteristics were identified using purposive sampling technique and then responded by identifying yet other respondents they knew had the required characteristics, snowball sampling technique was then given a chance. Convenient or accidental sampling technique was also used during the data collection exercise to select respondents who were available and willing to volunteer data during the study. The inclusion of such respondent depended on whether or not the information they intended to volunteer was in keeping with the objectives of the exercise.

## **2.5 Methods of Data Collection**

This subsection discusses the methods used to gather data. They included questionnaire administration, oral interviews, reviews of documented literature, photography and guided observations.

### **2.5.1 Questionnaire Administration**

With the help of the City Council of Nairobi Officials and the area residents, questionnaires for solid waste generators and service providers were administered to the selected respondents.

### **2.5.2 Oral Interview Schedule**

Oral interview schedules were used to obtain information from households, regulators, service providers and other relevant lead agencies in the solid waste management sector. From these interviews, the gaps in the existing policies and legislative framework for the solid waste management were identified.

### **2.5.3 Non-Participant Observation**

Non-participant observation method was used to obtain information on the current practices in the solid waste management in Nairobi City. This was intended to provide a platform on which first hand comparison between the practices and the legal provisions which in turn helped in identifying the existing gaps. The observation schedule was used for this purpose. This is because observation increases range of relevance and reliability of data (Piel, 1982).



#### **2.5.4 Review of Documented Information**

Documented information also formed part of the data gathering methods. The documents visited included the Acts of parliament relevant to solid waste management, the solid waste management regulations, building codes, Vision 2030 among others.

#### **2.5.5 Photography**

Still photographs were also used to capture the relevant scenes.

### **2.6 Data Analysis and Presentation**

The data was analyzed and presented using the following methods:

#### **2.6.1 Descriptive Statistics**

The data collected was analyzed and presented by use of descriptive statistics and other quantitative methods such as averages, percentages and rankings.

#### **2.6.2 SWOT Analysis**

The strengths, weaknesses, opportunities and threats were used to gauge the capacity and efficiency of the existing solid waste management system in ensuring sustainable solid waste management in the city of Nairobi.

## **CHAPTER THREE: ANALYSIS, DISCUSSION AND PRESENTATION OF FINDINGS**

### **3.1 Introduction**

The management of solid waste is dealt with under several laws, By-laws, regulations and Acts of parliament, as well as policy documents and it is not possible to bring all those statutes under one heading. This section is therefore aimed at assessing the existing policies and legislative framework, economic tools and enforcement mechanisms for the management of solid waste at different stages. In so doing, the discussion will be based on the following legislations:

### **3.2 Existing Laws and Acts of Parliament**

#### **3.2.1 Environmental Management and Co-ordination Act (EMCA) No. 8 of 1999**

##### ***a) Solid Waste Segregation and Reduction at Production and Consumption Levels***

EMCA is an Act of parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto. Section 87 of this Act prohibits against dangerous handling and disposal of wastes. As encapsulated in section 87(4), every person whose activities generate wastes shall employ measures essential to minimize wastes through practices such as waste treatment, reclamation and recycling. Sub-section (5) of the same section observes that any person who contravenes this provision shall be guilty of an offence and liable to imprisonment for a term of not more than two years or to a fine of not more than one million shillings or to both such imprisonment and fine. In this context, the Act provides for the reduction of solid waste in this case at source level. However, the Act is not clear on how to go about the segregation of such solid waste.

##### **b) Primary Storage, Collection, Transportation and Transfer Stations**

Section 87(2), paragraphs (a) and (b) of EMCA provides that no person shall transport any waste other than- in accordance with a valid license to transport waste issued by the Authority; and to a waste disposal site established in accordance with a license issued by the Authority. Pursuant to section 90 of the Act, the National Environment Management Authority may apply to a competent court for orders compelling any person to immediately stop the generation, handling, transportation, storage or disposal of any wastes where such generation, handling, transportation, storage or disposal presents an imminent and substantial danger to public health, the environment or natural resources. Section 87(1) provides that no person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such manner as to cause pollution to the environment or ill health to any person.

(2) No person shall transport any waste other than –

(a) in accordance with a valid license to transport wastes issued by the Authority;

No person shall pursuant to section 7(1), be granted a license under the Act to Transport waste unless such person operates a transportation vehicle approved by the Authority upon recommendation from(3) the vehicles for transportation and other means of

conveyance of waste shall follow the Scheduled routes approved by the Authority from the point of collection to the disposal site

(4) he or his agent(s) possess at all times during transportation of the waste, a duly filled tracking document as set out in Form III of the First Schedule to these Regulations and shall produce the same on demand to any law enforcing officer. During the field visits, out of the 20 private wastes transporting Lorries only 2 Lorries had carried the tracking documents as required by the law. Another challenge is that the CCN owned trucks do not comply with the provisions set herein. The inspection of the waste transporting trucks is never carried out as there are very few inspectors in the field; in fact NEMA only has a total of 10 inspectors currently. This therefore makes the inspection process inefficient.

### **c) Treatment and Landfills**

Section 87(5) of the Environmental Management and Co-ordination Act (EMCA) emphasizes the need to treat the waste that is generated by any source. In this section, the Act provides that every person whose activities generate wastes shall employ measures essential to minimize wastes through treatment, reclamation and recycling. The Act also has several provisions governing the disposal of solid waste. These provisions include: section 86(2) stipulates the standards for waste disposal and states that the Standards and Enforcement Review Committee established under section 70 shall, in consultation with the relevant lead agencies, recommend to the Authority measures necessary to: prescribe standards for waste, their classification and analysis, and formulate and advise on standards of disposal methods and means for such wastes. However, during the field visits conducted to Dandora area, which is the Municipal disposal area, indicated that these standards are not adhered to even though they are clearly encapsulated in the Act. Section 87 Prohibits dangerous handling and disposal of wastes. According to subsection (1), no person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such manner as to cause pollution to the environment or ill health to any person. Section 87(3) prevents anybody from operating a wastes disposal site or plant without a license issued by the Authority. These two provisions are not fully complied with. This was evidenced from observations made from dumping in the rivers adjoining the informal settlements and cases of open dumping in other restricted places such as roads. Section 87(6) of the Act provides measures to be taken against anyone who breaches these provisions. It observes that any person who contravenes any provisions of this section shall be guilty of an offence and liable to imprisonment for a term of not more than two years or to a fine of not more than one million shillings or to both such imprisonment and fine. The missing link here is that it is difficult to quantify the offence and the penalty. Any person intending to transport wastes within Kenya, operate a wastes disposal site or plant or to generate hazardous waste is required under section 88(1) to apply to the Authority in writing for the grant of an appropriate license. Such a license according to (2) may only be granted subject to the payment of the appropriate fee and any other license that may be required by the relevant Local Authority. However, this exercise established that Dandora dumpsite does not have a NEMA license in accordance with section 88(1) and (2). Even though NEMA on its part states that the dumpsite has been in existence way back even before the establishment of the institution (NEMA), this is in contravention with section 89 that states that any person who, at the commencement of this Act, owns or operates a waste disposal site or plant or generate hazardous waste,

shall apply to the Authority for a license within six months after the commencement of the Act. This section has therefore not been adhered to in the event that the dumpsite has been operating without a license since even after this Act commenced. The authority has also not exercised the powers conferred under section 90 in the case of Dandora dumpsite, which allows it NEMA to cease an operation that is not to the standard. Under this section, the Authority may apply to a competent court for orders compelling any person to immediately stop the generation, handling, transportation, storage or disposal of any wastes where such generation, handling, transportation, storage or disposal presents an imminent and substantial danger to public health, the environment or natural resources.

#### **d) Incineration and Recycling of Solid Waste**

Section 78 (1) paragraphs (a)-(f) mandates the Standards and Enforcement Review Committee, in consultation with the relevant lead agencies to:-

- (a) advise the Authority on how to establish criteria and procedures for the measurement of air quality;
- (b) recommend to the Authority –
  - (i) ambient air quality standards;
  - (ii) occupational air quality standards;
  - (iii) emission standards for various sources;
  - (iv) criteria and guidelines for air pollution control for both mobile and stationary sources;
  - (v) any other air quality standards;
- (c) advise the Authority on measures necessary to reduce existing sources of air pollution by requiring the redesign of plants or the installation of new technology or both, to meet the requirements of standards established under this section;
- (d) recommend to the Authority guidelines to minimize emissions of green house gases and identify suitable technologies to minimize air pollution;
- (e) advise the Authority on emissions concentration and nature of pollutants emitted;
- (f) recommend to the Authority the best practicable technology available in controlling pollutants during the emission process .

The relevance of this section is that it highlights the issues that may have negative impacts on the air quality such as the process of incineration.

Section 137 under paragraphs (a)-(h) is relevant to the monitoring and supervising of incinerators and recycling plants as it makes it an offence for any person who –

- (a) hinders or obstructs an environmental inspector in the exercise of his duties under the Act or regulations made there under;
- (b) fails to comply with a lawful order or requirement made by an environmental inspector in accordance with this Act or regulations made there under;
- (c) refuses an environmental inspector entry upon any land or into any premises, vessel or motor vehicle which he is empowered to enter under this Act or regulations made there under;
- (d) impersonates an environmental inspector;
- (e) refuses an environmental inspector access to records or documents kept pursuant to the provisions of the Act or regulations made there under;
- (f) fails to state or wrongly states his name or address to an environmental inspector in the course of his duties under this Act or regulations made there under;

(g) misleads or gives wrongful information to an environmental inspector under this Act or regulations made there under; or

(h) fails, neglects or refuses to carry out an improvement order issued under this Act by an environmental inspector. Such a person on conviction shall be liable to imprisonment for a term not exceeding twenty four months, or to a fine of not more than five hundred thousand shillings, or both. This is a disincentive on the parts of solid waste operators and thus can be used to ensure that incinerator operators and recyclers in the solid waste sector operate with the provisions of the law.

Under section 119(10), (2) and (3), the Director-General of NEMA may, by Notice in the Gazette, designate a given number of laboratories as he may consider necessary, analytical or reference laboratories for the purposes of the Act. Such notice shall state the specific functions of the laboratory, local limits or subject matter which the laboratory shall serve and the persons appointed as analysts in respect of that laboratory. The Authority shall, on the advice of the Standards Enforcement Review Committee, prescribe the form and manner in which samples will be taken for analysis. Section 120(1) provides that a laboratory designated as an analytical or reference laboratory under section 119 shall issue a certificate of analysis of any substance submitted to it under the Act. Section 120(2) states that the certificate of analysis shall state the methods of analysis followed and shall be signed by the analyst or the reference analyst, as the case may be. Pursuant to subsection (3), the certificate issued under subsection (1) and complying with subsection (2) shall be sufficient evidence of the facts stated in the certificate for all purposes under the Act. Subsection (4) has it that the results of any analysis made by the laboratory shall be open to inspection by all interested parties. These sections therefore stipulate the legal provisions for the inspection and auditing of incinerators through the collection of samples for analysis to check whether they are complying with the set standards. However, the gap here is that regulatory bodies do not really do environmental auditing to the existing incinerators. Nonetheless, there is no impromptu collection of samples and analysis by the environmental officers.

#### **e) Resource Recovery and Construction and Demolition Waste**

There are not many law or regulation governing specifically resource recovery as a subject on its own but the general provision in the waste management regulations states that a waste generator shall minimize the waste generated by enabling the recovery and re-use of the product where possible and reclamation and recycling. Section 87(4) of EMCA states that every person whose activities generate waste shall employ measures essential to minimize wastes through treatment reclamation and recycling. Any person who contravenes any provision of this section shall be guilty of an offence and liable to imprisonment for a term of not more than two years to fine of not more than one million shillings or both imprisonment and fine

#### **f) Hazardous Wastes**

On biomedical wastes, the regulations provide the following: Section 36 requires for an Environmental Impact Assessment from bio-medical waste generator while section 37 states the approval of biomedical waste generating facility by a lead agency and the Authority. Segregation of biomedical waste at the point of generation and at all points

and securing and packaging of bio-medical waste according to the set standards in part 1 & 2 of the Eighth schedule are addressed in sections 38 and 39 respectively. The treatment of biomedical waste according to the conditions set out in the Ninth schedule, monitoring by lead agency and storage of biomedical waste should be not more than 0 degrees and disposed off in 48 hours are encapsulated in sections 40, 41 and 42 respectively. Sections 43, 44, 45 and 46 address the transportation of biomedical waste without a valid license and in a vehicle designed for the same, transfer Stations, requirement of Environmental Impact Assessment for biomedical waste disposal site or plant and license to operate and requirements of Environmental Audits. Standards for Biomedical Waste disposal sites or plants: License to operate such a facility will only be issued after compliance with regulations of the third and Tenth schedule pursuant to section 47.

The third schedule (26) and (46) provides the standards for treatment and disposal of wastes. It goes on to classify incinerators and provide the specifications with which to construct and operate all classes of incinerators. The fourth schedule regulation 22 defines wastes that are considered hazardous. It provides a list of 45 articles each describing a specific component considered to be hazardous. The fifth schedule (22) provides a list of characteristics of substances considered hazardous according to the UN code characteristics class.

Example: UN code 1 class H1 is an Explosive

: UN code 12 class h16 is carcinogenic waste which might lead to development of cancer in

Humans and animals.

The sixth schedule (27) and (30) provides the forms to be filled for purposes of transboundary movement of wastes. They include Form 1 and 2 while the seventh schedule (38) defines the categories of biomedical wastes. Example include: sharps; this consists of needles, infusion sets, scalpels, knives etc. it includes both used and unused Genotoxic waste; waste containing substances with genotoxic properties e.g. cytostatic drugs. The eighth schedule (39) provides the colour codes and specifications for biomedical waste storage adopted from the WHO colour code. Example; PATHOLOGICAL waste is put in YELLOW strong leak proof plastic bags with BIOHAZARD symbol.

### **3.2.2 City Council of Nairobi (Solid Waste Management) By-Laws of 2007**

#### ***a) Solid Waste Segregation and Reduction at Production and Consumption Levels***

The City Council of Nairobi is charged with the primary duty of regulating and managing the solid waste that is generated within its jurisdiction. In exercise of the powers conferred on the Local Governments by section 201 of the Local Government Act (Cap 265) of the laws of Kenya, the City Council of Nairobi in 2007 came up with a raft of solid waste By-Laws to aid the regulation and management of all the solid waste that is generated its area of jurisdiction. Section 4(7) of the By-laws states that the occupier or owner of any residential dwelling or trade remises within area of jurisdiction of the City Council shall deal with the waste arising from the premises in accordance with the

directions issued by the Council either specifically or under the scheme or arrangement established by the Council under these By-laws for the management of domestic and trade waste arising in the area where the particular occupier or owner resides or carries on business or other activities. This provision therefore provides a platform for the management of solid waste within the city as it can be relied on by the council to introduce into the city's solid waste management system those directives that aim at reducing the amounts of solid waste generated whether at production or consumption levels. On segregation of both domestic and commercial waste, section 8(9) states that occupiers of domestic and trade premises shall separate waste which can be recycled and place it in a different container provided by the council or the waste operator. According to section 8(4), it shall be the duty of every occupier and every owner of premises wherein any hazardous waste or clinical waste is generated to make suitable arrangements, including the separation of such waste from other non-hazardous waste or non-clinical waste, to the satisfaction of the council. However, even though the concept of segregating the solid waste at source level is clearly articulated in the sections therein, field visits conducted for purposes of ground truthing during this exercise indicated that about 95% of the households surveyed especially in the low and medium income zones do not separate the waste as required by the law. This they blame on the sizes of the liner bags given by the waste operators as well as inadequate space for storing the segregated waste. In many commercial premises and institutions, the generated solid waste is never separated pursuant to section 8(9) thereof. In cases where hazardous wastes are generated, most owners prefer mixed burning of such waste than separating the hazardous ones from the non-hazardous ones as separating the waste generated comes with additional costs. Therefore the missing link is an alignment between the provisions of the By-laws and what is practiced on the ground.

**b) Primary Storage, Collection, Transportation and Transfer Stations**

Section 8 (1) mandates the City Council to arrange for the collection, treatment and disposal of, or otherwise dealing with, all domestic waste and street and other litter generated or otherwise arising within its area of jurisdiction and to take all necessary and reasonably practicable measures to maintain all places falling within its area of jurisdiction in a clean and sanitary condition at all times.

- (2) For the purposes of carrying out its duty under subsection (1) above, the council may enter into such agreements with third parties as it deems appropriate including contracts, franchises, and concessions.
- (3) It shall be the duty of the person who generates trade waste or on whose premises trade waste otherwise arises to arrange for the collection, treatment and disposal of or otherwise dealing with all trade waste generated by him and to take all necessary and reasonably practicable measures to ensure that the trade waste is not released into the environment so as to cause pollution thereof.
- (4) It shall be the duty of every occupier and every owner of premises wherein any hazardous waste or clinical waste is generated, to make suitable arrangements, including the separation of such waste from other

non-hazardous waste or non-clinical waste, to the satisfaction of the Council, for the proper management of the waste and in doing so shall comply with any directions issued by the Council.

- (5) It shall be the duty of every occupier and every owner of premises wherein bulk waste is generated to make suitable arrangements for the disposal of such waste and in doing so shall comply with any directions of council.
- (6) Every occupier and / or tenant of any residential dwelling shall provide and maintain, to the satisfaction of the Council, a container for domestic waste of a sufficient size, and fitted with a good and effective lid and shall daily cause to be placed within such container the domestic waste from the said residential dwelling in so far as the said container shall be sufficient to contain the same;
- (7) Every occupier and /or tenant of any trade premises shall provide and maintain to the satisfaction of the council a container for trade waste of a sufficient size, and fitted with a good and effective lid, and shall daily cause to be placed within such container the trade waste from the said premises in so far as the said container shall be sufficient to contain the same.
- (8) If it appears to the Council that there is likely to be situated on any premises in its area trade waste of a kind or in quantities which, if the waste is not stored in containers of a particular kind, is likely to cause a nuisance or to be detrimental to the amenity of the locality in which the premises are situated the Council may, by notice served on the occupier, require him to provide at the premises, containers for the storage of such waste which are of a kind and number reasonably specified in the notice.
- (9) Occupiers of domestic and trade premises shall separate waste which can be recycled and place them in a different container provided by the Council or the waste operator as the case may be for the purpose.

As an attempt to help regulate the services of transporting solid waste, section 6(1) provides that it shall be an offence for any person who is not a registered transporter of solid waste or a permit holder in the course of any business of his or otherwise with a view to profit to transport any solid waste within the area of jurisdiction of the Council unless he belongs to a category of transporters who have been exempt by the Council from registration. Sub-section (2) mandates the Council to make provision for the registration of waste transporters. Applicants are to be provided with information regarding their physical address and their financial and technical capability to transport waste. The Council pursuant to sub-section (3) may require registered waste transporters to execute a bond as a condition for registration. In determining whether it is desirable for any individual to be or to continue to be authorized to transport waste the Council shall, in accordance with sub-section (4), have regard, in a case in which a person other



than the individual has been convicted of an offence under these By-laws, to whether that individual has been party to the carrying on of business in a manner involving the commission of an offence under these By-laws. Sub-section (5) states that the Council may revoke the registration of a person who has been convicted of an offence under the By-laws. If it appears to a duly authorized officer of the Council that any waste is being or has been transported in contravention of these regulations he may, pursuant to sub-section (6), in the presence of a police officer, stop any person appearing to him to be or to have been engaged in transporting that waste and require that person to produce his authority or, as the case be, his employer's authority, for transporting that waste and search any vehicle that appears to him to be a vehicle which is being or has been used for transporting that waste. Sub-section (7) provides that for the purposes of this sub-rule a person's authority to transport waste is his certificate of registration as a transporter of waste or a certified copy thereof or evidence that he is not required to be registered as a waste transporter. Section 7(1) provides for the registration of the transporters of solid waste. Under this section, the Council shall maintain a register containing prescribed particulars of all waste operator's permits and registrations of transporters which are for the time being in force. Sub-section (2) of the By-Laws be stores the responsibility of ensuring that the register is open to inspection at its principal office by members of the public free of charge at all reasonable hours. According to sub-section (3), the Council is required to accord members of the public reasonable facilities for obtaining, on payment of reasonable charges, copies of entries in the register. Even though these provisions are intended to provide a system through which the public can access the information concerning to those involved in the transportation of solid waste, many members of the public rarely get access to such information. There does not exist a well established information system for solid waste in the City.

### **c) Treatment and Landfills**

Section 8 of the By-Laws mandates the council to arrange for collection, treatment and disposal of all domestic waste and street and other litter generated or otherwise arising within its area of jurisdiction and to take all necessary and reasonably practicable measures to maintain all places falling within its area of jurisdiction in a clean and sanitary condition at all times. According to section 4(5) any person who disposes of waste to has a duty of care. Section 9(1) ensures that there is no illegal dumping in areas other than an approved disposal facility. Pursuant to section 9(4) a person operating a disposal plant must maintain a record of all waste loads disposed of at the facility. The form in which the records in 4 above shall be taken is provided in section 9(5). Section 9(6) ensures that a permit holder stick to the laws provided in the By Laws in operating the plant. Finally, section 9(7) prevents any persons from sorting over or disturbing anything deposited at the facility. However, it was observed that all the above provisions are not being complied with as the street children were seen sorting the waste deposited at the disposal plant. The By-Laws also clarify that it is the duty of the council to arrange for collection, treatment and disposal of, or otherwise dealing with, all domestic waste and street and other litter generated or otherwise arising within its area of jurisdiction and to take all necessary and reasonably practicable measures to maintain all places falling within its area of jurisdiction in a clean and sanitary condition at all times.

#### **d) Incineration and Recycling of Solid Waste**

Section 8(9) of the By-Laws requires the occupiers of domestic and trade premises to separate waste which can be recycled and place in a different container provided by city council or the waste operator as the case may be for the purpose. This provision therefore ensures that every generator of solid waste separates wastes which can then be recycled and put in separate containers. The gap here is that the households and commercial enterprises do not separate waste as they put all the waste together. This is attributed to the fact that the service providers only provide them with one liner bag which do not encourage the practice of separating the waste as per the requirements of the law. The enforcement of this provision is also weak.

#### **e) Resource Recovery and Construction and Demolition Wastes**

According to section 9(8), the council shall make provision for small scale resource recovery activities to be undertaken by organized groups at designated sites before disposal. However, a survey conducted to ascertain the practice on the ground indicated that the council does not provide for such activities as said in the by-laws even though it does not charge any levies to the people who recover resources, they take that as an informal activity meant to help people who recover the resources and help the council to reduce solid waste.

#### **f) Hazardous Wastes**

Section 8(4) of the CCN By-Laws on solid waste management defines the duty of an occupier of a premise that produces hazardous waste/clinical waste to make arrangement for separation from non-hazardous waste to the satisfaction of the council

### **3.2.3 The Factories Act (Cap 514 of the Laws of Kenya)**

#### ***a) Solid Waste Segregation and Reduction at Production and Consumption Levels***

The Factories Act is one of the existing laws that deal with those sectors that generate solid waste. Section 13 of this Act makes it mandatory for every factory owner to ensure that the factory environment is kept in a clean state and free from effluvia arising from any drain, sanitary convenience or nuisance and without prejudice to the quality of the foregoing provision. The foregoing provision as outlined in paragraphs (a) and (b) of this section include accumulations of dirt and refuse which shall be removed daily by a suitable method from the floors and benches of the workrooms, and from the staircases and passages. The floor of every workroom is to be cleaned at least once a week by washing or, if it is effective and suitable, by sweeping or by any other method. Even though the Act provides for a section to ensure that the factory environment is kept clean, it does not clarify or provide a section on reduction of the waste generated by such factories or the segregation of the waste cleaned from the stated parts of the factory rooms.

### **3.2.4 The Local Government Act (Cap 265 of Laws of Kenya)**

The Local Government Act is one of the Acts in Kenya that establishes and governs Local Authorities. The Act spells out wide ranging powers and functions of Local

Authorities. Most functions undertaken by local authorities include the provision of public services such as garbage collection. According to this Act, decision making powers rest with councilors as policy makers. They make decisions that guide among other things the development of a solid waste management system Section 207 of the Act provides that a copy of every by-law which has been approved by the minister is to be deposited at the offices of the local authority which made the by-law and shall at all reasonable hours be open to public inspection without payment, and the local authority shall on application of any person furnish to such person a copy thereof for which in its discretion the local authority may make a charge of such amount no exceeding five shillings as it may determine. The missing link here is that most of the stakeholders in the solid waste management sector especially the households are not aware of the existing laws governing the sector. This is due to the fact that most of them tend to have limited access to the Council's records of information particularly those pertaining solid waste management. The consequence of this gap is that most of the stakeholders do not understand the role they are expected to play in the solid waste management sector.

### **3.2.5 The Occupational Safety and Health Act of 2007**

#### **Incinerators**

Part V11 section 55 of the occupational safety and health act, 2007 requires that all plant machinery and equipment whether fixed or mobile for use either or as a workplace shall only be used for work which they are designed for and be operated by a competent person. This section is therefore a legal provision for regulating the operation of incinerators. Part V11 section 58(1) of this act provides that every dangerous part of any machinery other party prime movers and transmission shall be securely fenced provided so far as the safety of a dangerous part of any machinery cannot by a reason of any nature of the operation secured by means of a fixed guard, the requirement of this subsection shall be deemed to have been complied with if a device is provided which automatically prevents the operator from coming with the part. This applies to the fencing and safeguarding of incineration machines. Section 60 states that all fencing or other safeguards provided in pursuance of the provisions of this part shall be of substantial construction constantly maintained and kept in a position while part required to be fenced or safeguarded are in motion or use. However, Section 81 subsection (1) of the act provides that in every workplace or workroom there shall be;

(a) Provided and maintained and conspicuously displayed and free for extinguishing fire, which shall be adequate and suitable having regard to the circumstances of each case and  
(b) Present persons trained in the correct use of such means of extinguishing fire during all working hours.

According to sub-section (2), every workplace shall be provided with adequate means of escape in case of fire for persons employed therein having regard to the circumstances of each case.

(3) All means of escape provided in subsection 2 shall be properly maintained and kept free from obstruction. The section addresses the provision of fire fighting. However, the gaps here is that a few incinerators have fire fighting equipments

Section 99 prohibits any person from being employed at any machine or in any process ,being a machine or process liable to cause ill health or bodily injury, unless he has been fully instructed as to the dangers likely to arise in connection therewith and the precautions to be observed and ;

(a) has received sufficient training in work at the machine or in the processor

(b) is under adequate supervision by a person who has thorough knowledge and experience of the machine or process. The gap is that many incinerators have no supervisor to supervise the operators

### **3.2.6 The Building Code of 19987**

Construction and demolition waste is not provided for in most of the Kenyan acts but the building code does provide for its handling. Section 239(1) provides that any person who except either the prior consent of the council deposits or causes or permits to be deposited any builder's debris upon any street shall be guilty of an offence. Sub-section (2) has it that if any building materials etc are deposited on a street in contravention of subsection of this by-law, the council without prejudice to its right to take proceedings in repeat of such contravention shall have power to remove the same and may if it thinks fit to sell such material, plants and debris. Any expenses incurred by the council in removing any material, plant or debris as aforesaid(after deducting any amount realized by the sale of the whole or part thereof) shall be recoverable as a civil debt from the person who's deposited or caused or permitted to be deposited such materials, plant or debris upon the street pursuant to sub-section (3). Section 240(4) states that the owner or contractor shall on completion of the demolition ensure that all materials and debris not forming part of any remaining structure or in any way supporting any other structure are removed from the site and that the site is left in a clean and tidy condition.

Section 257(1) has it that a person who contravenes or fails to comply with any of the provision of these by-laws shall be guilty of an offence. According to sub-section(2), any person who's guilty of an offence under these by-laws shall be liable to a fine to a fine not exceeding two thousand shillings or imprisonment for a term not exceeding six months or to both such fine and such imprisonment and of the offence is of a continuing nature to a further fine not exceeding twenty shillings for every day or part thereof during which such offence shall continue but in any event the aggregate of such fine imposed shall not in any case of any one continuing breach of the by-laws exceed two thousand shillings. The gap here is that the law does not provide for disposal of construction and demolition waste thou section 142(1) says that before a certificate of completion is issued in respect of any building, by the council, the means of refuse disposal shall be completed and the receptacles or containers provided. So there is no exactly a written law that shows exactly were construction and demolition waste should be disposed. Going by the information attained during field visits, demolition and construction in Nairobi is disposed where all the rest of solid waste is disposed at the Dandora dumpsite .Any one found dumping elsewhere is guilty of an offence and is therefore arrested by the city councils enforcement officers. Contractors on completion of the project contract other contractors to collect and dispose the waste. However the council has the duty to dispose any waste from a demolished building within the Central Business District as provided by the law.

### **3.2.7 The Radiation Protection Act (Cap 243)**

Section 7(d) of the Act gives the power to the board to keep a register of owners of radioactive material and to license disposal of radioactive waste. Section 2(1) describes the duty of a license i.e., he shall be responsible for ensuring exposure to radiation from transport, storage and disposal shall be kept reasonably low. Section 16(2) of the Act outlaws disposal of irradiating devices radioactive material or any other sources of ionizing radiation without being in possession of a valid license a contravener will be guilty of an offence and liable to imprisonment for not more than two years. Nonetheless, section 18(b) requires the minister in consultation with the board to make regulation for/and methods for disposing radioactive waste products from any source

### **3.2.8 The Traffic Act (Cap 403 Laws of Kenya)**

Section 55(1) of the Traffic Act states that no vehicle shall be used on a road unless such vehicle and all parts and equipments thereof, including lights and tyres comply with the requirements of the Act and such parts and equipments shall at all times be maintained in such a condition that the driving of the vehicle is not likely to be a danger to other users of the road or to persons travelling on the vehicle. However, most of the vehicles being used to transport solid waste within the city are in conditions which are not inconsonance with this provision. Most of the trucks are not covered and so as they move, the carried waste spills over on the road. Some lack basic parts like lights and reflects and therefore pose great danger to other road users contrary to the provision of section 55(1). Nonetheless, most of these trucks are normally overloaded and this is against section 56(1) of the Act which states that no vehicle shall be used on a road with a load greater than the load specified by the manufacturer of the chassis of the vehicle or than the load capacity determined by an inspector under the Act.

### **3.2.9 The Transport Licensing Act (Cap 404 Laws of Kenya)**

Any police officer in uniform in accordance to section 26 of the Transport Licensing Act may stop any vehicle or ship and may inspect any vehicle or ship with a view to ascertain whether or not the provisions of this Act or of any regulation made there under are being complied with, and may demand for inspection the production of any license, certificate, document or record of any description whatsoever which may, under the provisions of this Act or any regulation made there under be required to be carried on such vehicle or ship. The field visits established that this provision is not being adhered to as most police officers tend not to stop the trucks carrying the solid waste even though such trucks are not normally compliant with the section herein. This is perhaps due to the claim that these trucks are normally uncovered and produce obnoxious smell and so stopping such trucks would therefore affect the officers and other road users.

### **3.2.10 The Scrap Metal Act (Cap 503 Laws of Kenya)**

No person shall Section 22(2) of the Act prohibits anybody from exporting any scrap metal unless he has given to the public officer in charge of the police station nearest to the premises in which the scrap metal is stored immediately before its being dispatched for export not less than seventy-two hours notice in writing of his intention to export the scrap metal, specifying in such notice the premises and time at which the scrap metal may

be inspected. However, this provision is not being adhered to as most people transport scrap metals contrary to these provisions.

### **3.3 Existing Regulations and Standards for Solid Waste Management**

There exist a number of regulations in the domain of solid waste management both locally and nationally. Such regulations include:

#### **3.3.1 The Environmental Management and Co-ordination (Water Quality) Regulations, 2006**

##### ***a) Solid Waste Segregation and Reduction at Production and Consumption Levels***

In exercise of the powers conferred by section 147 of the Environmental Management and Co-ordination Act of 1999, the Minister of Environment and Mineral Resources in consultation with the relevant lead agencies developed these regulations in 2006 to help in protecting and improving the water quality in the country. Section 4(2) of the regulations prohibits anybody from throwing or causing to throw into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution. Nonetheless, section 11 of the regulations observes that no person is suppose to discharge or permit any person to dump or discharge poison, toxic, noxious or obstructing matter, radioactive waste or pollutant that do not comply with the standards set in the third schedule of these regulations. The third schedule of the regulations outlines the standards of effluent discharge to be allowed into the environment. However, with reference to the previous observations and those made during this exercise indicated that a lot of hazardous solid wastes are still being dumped into the aquatic environment contrary to these regulatory provisions. This is a possible indication of non-compliance to the set provisions for the segregation of generated hazardous waste from the non-hazardous ones from the sources of origin as stipulated in the waste management regulations of 2006 discussed hereafter.

#### **3.3.2 The Environmental Management and Co-ordination (Waste Management) Regulations, 2006**

##### ***a) Solid Waste Segregation and Reduction at Production and Consumption Levels***

In exercise of the powers conferred by sections 92 and 147 of the Environmental Management and Co-ordination Act No. 8 of 1999, the Minister of Environment and Mineral Resources, on recommendation of the National Environment Management Authority and upon consultation with the relevant lead agencies came up with the waste management regulations to prescribe the procedure and criteria for handling categories of waste. Sections 1, 2 and 3 of the general provisions of the regulations outline the responsibilities of the waste generators. These provisions prohibit any person from disposing of any waste on public places. Section 2 requires all the waste generators to collect segregate and dispose or cause to be disposed of the waste generated as per the provisions of the regulations. All the waste generators have an obligation under section 3 of the provisions to ensure that the waste generated is transferred to a licensed transporter and that the transferred waste is disposed of in a designated disposal facility.

On the segregation of the waste, section 4 of the regulations states that any person whose activities generate waste, shall segregate such waste by separating hazardous waste from non-hazardous waste and shall dispose of such waste in such facility as is provided for by the relevant Local Authority. The regulations also provide for cleaner production principles under section 5. On this, any waste generator shall minimize the waste generated by adopting a number of cleaner production principles spelt out in the regulations. Such principles include:

- Improvement of the production process by conserving raw materials and energy, eliminating the use of toxic raw materials within such time as may be prescribed by the authority (NEMA) and by reducing the toxic emissions and wastes.
- Monitoring the product cycle from the beginning to the end by identifying and eliminating potential negative impacts of the product, enabling the recovery and re-use of the product where possible and by reclamation and recycling.
- Incorporating the environmental concerns into the design, process and disposal of a product.

For the industrial wastes, every trade or industrial undertaking has a general obligation under section 17(1) to mitigate the pollution as a result of generated waste by installing at their premises an anti-pollution technology for the treatment of such generated wastes. Section 17(2) clarifies that the installed anti-pollution technologies pursuant to section 17(1) shall be based on the best available technology not entailing excessive costs or other measures as may be prescribed by the NEMA. This provision is there very useful in enhancing good solid waste management practices at the industrial and commercial levels as it provides for pre-treatment of solid wastes at their points of generation thus minimizing the effect of pollution such wastes would have on the environment. In this regard, the amount of solid waste that finally gets to the final disposal facility is reduced. Biomedical waste according to section 38 of the of the regulations is supposed to be segregated by the generator at all stages in accordance with the categories provided under the seventh schedule of the waste management regulations, which outlines the various categories of the biomedical wastes.

#### **b) Primary Storage, Collection, Transportation and Transfer Station**

Section 24(1) of the Environmental Management and Co-ordination (Waste Management) Regulations of 2006 provides that every generator of hazardous waste shall ensure that every container or package for storing hazardous wastes is secure and labeled in easily legible characters written in English or Kiswahili. Su-section (2) paragraphs (a)-(f) of the Regulations clarify the kind of information to be provided in the labels. Such information include: the identity of the hazardous waste, the name, physical address and telephone contact of the generator of waste, waste composition and total weight of waste, the normal storage stability and methods of storage and the name and percentage of weight of active ingredients and names and percentages of weights of other ingredients or half-life of radioactive material. Paragraph (f) also provides for the inclusion of warning or caution statements in the labels.

### **c) Treatment and Landfills**

The regulations contained in this document that govern treatment of solid waste include section 13 which provides that any operator of a disposal site or plant shall apply the relevant provisions on waste treatment under the Local Government Act (Cap265 Laws of Kenya) and Regulations there under to ensure that such waste does not present any imminent and substantial danger to public health, the environment and natural resources. Section 18 of the regulations prohibits any owner or operator of a trade or industrial undertaking from discharging or disposing of any waste in any state into the environment, unless the waste has been treated in a treatment facility and in a manner prescribed by the Authority in consultation with the relevant lead agency. Pursuant to section 26(1), every person who generates toxic or hazardous waste is required to treat or cause to be treated such hazardous waste using the classes of incinerators prescribed in the Third Schedule to these Regulations or any other appropriate technology approved by the Authority. Section 40 provides that any person who generates waste shall treat or cause to be treated all biomedical waste in the manner set out in the Ninth Schedule to these Regulations, before such biomedical waste is stored or disposed of. However, most generators such as high risk industries still discharge their waste into the environment without carrying out primary treatment as provided in the sited sections.

On the disposal of solid waste, section 11(1) provides that any person granted a license under the Act (EMCA) and any other license that may be required by the relevant Local Authority to operate a waste disposal site or plant, shall comply with all conditions imposed by the Authority to ensure that such waste disposal site or plant operates in an environmentally sound manner.

According to subsection (2) of the regulations, an application for a license to operate a waste disposal site or plant shall be in Form IV of the First Schedule to these Regulations and shall be accompanied by the prescribed fee set out in the Second Schedule. A license issued under the Act for the operation of a waste disposal site or plant shall be as in Form V as set out in the First Schedule to these Regulations. Section 12 has it that any person who before the commencement of these Regulations was carrying on the business of operating a waste disposal site or plant shall apply to the Authority for a license as prescribed in these Regulations within ninety days after the commencement of these Regulations. Section 14 stipulates the period for which a license to operate a waste disposal site or plant shall be valid. The validity for such license shall be for a period of one year from the date of issue and may be renewed for a further similar period on such terms and conditions as the Authority may deem necessary or impose for purposes of insuring public health and sound environmental management. No person according to section 45 shall own or operate a biomedical waste disposal site or plant without an Environmental Impact Assessment license issued by the Authority under the provisions of the Act and an operating license issued by the Authority. Pursuant to section 47 of the regulations, no person shall be issued with a license to operate a biomedical waste disposal site or plant unless such site or plant complies with the requirements set out in the Third and Tenth Schedule to these Regulations, which articulate the standards for treatment and disposal of wastes and waste autoclaving respectively. However, sections 11 to 14 of these regulations have since been totally ignored by operators of solid waste disposal facilities such as in Dandora. Moreover, the law enforcer; NEMA, is reluctant in exercising these provisions.



**d) Incineration and Recycling of Solid Waste**

Section 26(1) provides that every person who generates toxic or hazardous waste shall treat or cause to be treated such hazardous waste using the classes of incinerators prescribed in the Third Schedule to these Regulations or any other appropriate technology approved by the Authority. Such classes are:

*Class 1: Industrial Plants Burning Waste as an Additional/Alternative Fuel*

These are those incinerators in which the waste serves as the fuel or supplementary fuel in an industrial process (e.g. the use of cement kilns or any other industrial boilers or furnaces for the disposal of noxious or hazardous materials).

*Class 2 Industrial Incinerators*

The incinerators are further subdivided into two namely:

- a) Class 2A: Commercial: Incinerators for the disposal of waste that contains hazardous, potential hazardous and bio-medical waste where the operator exceeds 100 Kg/day.
- b) Class 2B: Small Scale Incinerators for Private Use: Incinerators for the disposal of hazardous, potential hazardous and bio-medical waste where the operator does not exceed 100 kg/ day.

*Class 3: General waste Incinerators:*

Incinerators for general waste that is non toxic, non hazardous, non medical or does not contain organic halogens, i.e., selected customs, police, contraband goods, offices waste, commercial waste and industrial wastes) where the operator does not exceed 1 ton/ day.

Section 31(1) provides that an applicant for a permit issued under the Act and these Regulations, shall satisfy the Authority that he or she has subscribed to an insurance policy covering the risks likely to arise out of the activity for which the license is required. Under subsection (2), a generator of waste which has been characterized as toxic or hazardous under these Regulations, shall upon written instructions from the Authority, subscribe to an insurance policy to cover the risks caused by the waste. Section 45 prohibits any person from owning or operating a biomedical waste disposal site or plant without an Environmental Impact Assessment license issued by the Authority under the provisions of the Act and an operating license issued by the Authority. No person pursuant to section 47 shall be issued with a license to operate a biomedical waste disposal site or plant unless such site or plant complies with the requirements set out in the Third and Tenth Schedule to these Regulations. These provisions shall also apply to recycling plants according to section 16 of the Regulations. The following are the Parameter Standards, Guideline, Criteria and procedures for an incinerator.

No.	Parameter	Standards, Guideline, Criteria and
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		Procedures
1	Basic design	<p>An approved plant must have four distinct sections that demonstrate three principles of <b>Turbulence</b>, <b>Residence Time</b> and <b>Temperature</b> are inbuilt in the plant design .The regulated sections may include but not limited to:</p> <p>Overall plant layout.  Feed chamber/ charging  Primary Combustion Chamber.  Secondary Combustion Chamber.  Particulate Scrubbers  Acid Gas Scrubbers  The stack/ chimney.</p>
2	Feeding and charging	<p>Controlled hygienic, mechanical or automatic feeding methods have to be used which will not influence the air temperature in the primary and secondary chambers of the incinerator negatively.</p> <p>No waste is to be fed into the incinerator:</p> <ol style="list-style-type: none"> <li>1. Until the minimum temperatures have been reached.</li> <li>2. If the minimum combustion temperatures are not maintained.</li> <li>3. Whenever the previous charge has not been completely combusted in the case of batch feeding.</li> <li>4. Until such time as the addition of more waste will not cause the design parameters of the incinerator to be exceeded.</li> </ol>
3	primary combustion chamber	The primary combustion chamber must:

		<ol style="list-style-type: none"> <li>1. Be accepted as the primary combustion zone.</li> <li>2. Be equipped with a burner/s burning gas/fuel or low sulphur liquid fuels. Other combustion methods will be judged on merits.</li> <li>3. Ensure primary air supply is controlled efficiently</li> <li>4. Ensure minimum exit temperature is not less than 850oC</li> </ol>
4	Secondary combustion chamber (after burner	<p>The secondary combustion chamber must:</p> <ol style="list-style-type: none"> <li>1. Be accepted as secondary combustion zone.</li> <li>2. Be fitted with secondary burner/s burning gas or low sulphur liquid fuel or any suitable fuel.</li> <li>3. Ensure secondary air supply is controlled efficiently.</li> <li>4. Ensure flame contact with all gases is achieved.</li> <li>5. Ensure residence time is not less than two (2) seconds.</li> <li>6. Ensure the gas temperature as measured against the inside wall in the secondary chamber &amp; not in the flame zone, is not less than 1100oC.</li> <li>7. Ensure the oxygen content of the emitted gases is not less than 11%.</li> <li>8. Ensure both primary and the combustion temperatures are maintained until all waste has been completely combusted</li> </ol>
5	Particulate removers	A mechanical particulate collector must be incorporated after

		secondary combustion chamber for removal of particulate pollutants entrained in the flue gas stream. The particulate collectors may include any of the following or a combination
6	Chimney /stack	<ol style="list-style-type: none"> <li>1. The chimney should have a minimum height of 10 meters above ground level and clear the highest point of the building by not less than 3 meters for all roofs. The topography and height of adjacent buildings within 50 meters radius should be taken into account.</li> <li>2. If possible the chimney should be visible to the operator from the feeding area.</li> <li>3. The addition of dilution air after combustion in order to achieve the requirement of these guidelines is unacceptable.</li> <li>4. The minimum exit velocity should be 10 m/s and at least twice the surrounding wind speed (Efflux velocity = wind speed x 2) whichever is higher to ensure no down washing of exiting gases.</li> <li>5. Point for the measurement of emissions shall be provided</li> </ol>
7	Instrumentation	<p>Instrument for determining the inside wall temperature and not burner flame temperature <b>must</b> be provided for both primary and secondary chambers.</p> <ol style="list-style-type: none"> <li>2. An audible and visible</li> </ol>

		<p>alarm <b>must</b> be installed to warn the operator when the secondary temperature drops to below the required temperature.</p> <p>3. In addition to the above the following instruments <b>may</b> also be required.</p> <p>A carbon monoxide and/or oxygen meter/recorder</p> <p>A smoke density meter/recorder</p> <p>A gas flow meter/recorder</p> <p>A solid particulate meter/recorder</p> <p>Any other instrument or measurement that may be considered necessary</p>
8	Location /sitting	<p>1. Must be sited in accordance with the relevant local municipal authority planning scheme, the topography of the area and be compatible with premises in the neighborhood,</p> <p>2. Must be housed in a suitably ventilated room.</p>
9	Emission limits	<p>1. Combustion efficiency: Combustion efficiency (CE) shall be at least 99.00% The Combustion efficiency is computed as follows; C.E= <math>\frac{\% \text{ CO}_2}{\% \text{ CO}_2 + \text{CO}}</math> x 100</p> <p>2. The temperature of the primary chamber shall be <math>800 \pm 50^\circ \text{C}</math></p> <p>3. The secondary chamber gas residence time shall be at least 1 (one) second at <math>1050 \pm 50^\circ \text{C}</math>, with 3% Oxygen in the stack gas.</p> <p>4 Opacity of the smoke must not exceed 20% Viewed from 50 meters</p>

		<p>with naked eyes</p> <p>5. All the emission to the air other than steam or water vapour must be odourless and free from mist, fume and droplets.</p> <p>6. The Authority may require that the certificate holder have tests carried out by an accredited institution to determine stack and/or ground level concentrations of the following substances.</p>
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These provisions are therefore relevant to the solid waste management as they specify the standards and conditions for operating an incinerator while taking into consideration the health risk an incinerator may be exposed to through insurance covers. However, ground truthing exercises carried out on some incinerators established that most of these provisions are not adhered to by the operators and in some cases the regulators. Most of those operating such incinerators are not protected and the incinerators they operate are in bad states.

**e) Hazardous Wastes**

Part four of the waste regulations of 2006 deal with the handling of hazardous waste. This part defines Hazardous wastes in detail. ie according to the Fourth Schedule and Fifth Schedule, outlaws any activity likely to generate any hazardous waste without a valid Environmental Impact Assessment license issued by Authority. Section 24(1) requires labeling of any hazardous material written in English and Kiswahili. Sub section (2) defines the constituents of the label of hazardous material. Section 26(1) requires generators of toxic/ hazardous to treat or cause to be treated such hazardous waste using the classes of incinerators prescribed in the Third Schedule or any other appropriate technology approved by the Authority. Sub-section (2) describes the treatment of leachate from such a facility while sub-section (3) gives the Authority power to clearly indicate the disposal operation permitted and identified for the particular waste. Section 27(1) outlaws export of hazardous waste without proper documentation and authority from the authority. Sub-section (2) describes how to apply for a license for exportation of hazardous waste. Sub-section (3) describes the conditions for issuance of a license while sub-section (4) describes customs verification and control by the Kenya Revenue. Section 28 stipulates the validity of an export permit issued under this part

Section 29 provides for a permit for the export of toxic or hazardous wastes issued under these Regulations shall not be transferable

30. Outlaws transit of toxic/hazardous wastes without a valid permit.

31. (1) an applicant for a permit issued under the Act is required to subscribe to an insurance policy covering the risks likely to arise out of the activity for which the license is required

(2) a generator of toxic or hazardous wastes shall upon written instructions from the Authority, subscribe to an insurance policy to cover the risks caused by the waste

32. The provisions of the Act relating to management of toxic and hazardous chemicals and materials shall apply *mutatis mutandis* to this part.

### **3.4 Policies and other Planning Documents**

Such documents included the Sessional Paper No. 1 of 1999 and Vision 2030.

#### **3.4.1 National Policy on Water Resources Management and Development (Sessional Paper No. 1 of 1999)**

The paper strive to restore order and prosperity in the water sector by ensuring sustainable water schemes while noting that the realization of this goal depends on the application of alternative management options and technologies that are participatory, rather than wholly recipient in nature. Chapter two paragraphs 2.6 addresses water quality issues and aim at protecting the available water resources from pollution. The cardinal source of such pollution according to the paragraph are land use practices which have been carried out in total disregard of the need to conserve the water resources. Another threat to the water resources according to the policy document are other human activities. In this regard, though proudly, the solid waste management could be considered as one of the land uses or human activities that could pose great danger to the available water resources if not well handled. In so viewing, the policy document provides for the consideration of an integrated approach in its actualization process.

#### **3.4.2 Vision 2030**

As a planning document, Vision 2030 is divided into three fundamental pillars: Economic, Social and Political pillars. The social pillar aims at realizing a just and cohesive society enjoying equitable social development in a clean and secure environment. Under the Social Strategy, paragraph 5.4 of the strategy envisions Kenya becoming a nation that has a clean, secure and sustainable environment by 2030. So as to realize this strategy, the document explains that one of the specific strategies will be to improve pollution and waste management through the design and application of economic incentives, and the commissioning of public-private partnerships (PPPs) for improved efficiency in water and sanitation delivery. some of the flagship projects earmarked for this strategy developing tight regulations for the plastic bags in order to limit production and usage of environmentally-detrimental plastic bags, and a solid waste management initiative that is to be characterized by the relocation of the Dandora dump site, and the development of a solid waste in five leading municipalities and in the economic zones planned under Vision 2030.

### **3.5 Existing Economic Instruments for Solid Waste Management**

There exist a number of provisions for relevant economic instruments to address different aspects of solid waste management chain in several legislations. Such provisions advocate for the employment of financial disincentives (fine, levy, surcharges and penalty) for non-compliance with the provisions governing the proper management of solid waste. Economic incentives such as subsidies, tax rebates, and exercise waiver are also captured in some provisions of the legislations relevant to the management of solid waste such as EMCA.

Section 57 of the Environmental Management and Co-ordination Act (EMCA) provides for the development of economic instruments to be used for enhancing the proper utilization of the environment. Section 57(1) of the Act empowers the Minister for Finance to make proposals to government tax and other fiscal incentives, disincentives or fees to induce or promote the proper management of the environment and natural resources or the prevention or abatement of environmental degradation. Such proposals are to be made upon recommendation by the National Environment Council established by section 3 of the EMCA. The tax, fiscal incentives, disincentives or fees to be proposed by the minister are specified in section 57(2) paragraphs (a),(b),(c) and (d) and may include:

- Customs and exercise waiver in respect of imported capital goods which prevent or substantially reduce environmental degradation caused by an undertaking;
- Tax rebates to industries or other establishments that invest in plants, equipment and machinery for pollution control, recycling of wastes, water harvesting and conservation, prevention of floods and for using other energy resources as substitutes for hydrocarbons;
- Tax disincentives to deter bad environmental behavior that leads to depletion of environmental resources or that cause pollution; or
- User fees to ensure that those who use environmental resources pay proper value for the utilization of such resources.

The relevance of this provision to the solid waste management sector is that it provides room to develop such economic tools that could be used to encourage or discourage good or bad solid waste management practices respectively. Section 10(1) of the City Council of Nairobi's Solid Waste Management By-Laws mandates the Council to issue directions on waste collection charges. Such directions are to specify the amount of charge or charges to be imposed for different categories of services or for services in different localities or zones within the area of jurisdiction of the Council; the mode of payment and receipt of the charges; and provisions as to the penalty or penalties for failure to pay the charges. However, the findings of this review indicate that even though there are such legal provisions, very few economic tools have since been developed to encourage good practices in the solid waste management sector such as recycling, re-use and material recovery. Nonetheless, the few that have been developed have not been implemented successfully. The unsuccessful implementation of these economic tools due to many factors such as lack of awareness among the stakeholders about such tools and the fact that most of the stakeholders in the solid waste management sector are not normally involved in the process of coming up with such economic tools. Most of the economic instruments reviewed in a number of literature covered were in the form of disincentives



such as fines, penalties, levy and surcharges. There are very few, if any economic incentives for those involved in best solid waste management practices such as recycling and material recovery as well as segregation of solid waste at source level. The amount that is stipulated in most laws to be paid as penalties or fines by those who violate the provisions of such laws are in most cases general. Quantifying the fine therefore becomes a problem in the event that offences of varying magnitudes are committed.

Despite the fact that most of the economic instrument available for the management of solid waste are in the form of disincentives with legal foundation, there are also voluntary economic instruments in existence. Most of these instruments are employed mostly in the industrial and institutional sectors. A few of such instruments identified during this exercise include: Certifications (such as ISO 1400) and the Company of the Year Award (COYA). The ISO 14000 standards are designed to cover environmental management systems, environmental auditing, environmental performance evaluation, environmental labeling, life-cycle assessment and environmental aspects in production standards. In this regard, it therefore follows that the management of solid waste is thus one of the components targeted by ISO 14000. The ISO 14000 is therefore an economic instrument in the sense that if awarded to a particular market, it makes the company in question to take the advantage of the market. The problem with these economic instruments is that they lack a legal backing.

### **3.6 Enforcement**

The enforcement of the provisions governing the management of solid waste is done mainly by NEMA and the City Council of Nairobi. Section 11(1) mandates the CCN to establish and implement a system of monitoring, inspections and enforcement of waste management activities and is to inform and keep the public informed of steps it is taking to implement and improve waste management within the City Council of Nairobi and the use to which the general cleansing levy is put in each year. Any officer or agent of the Council duly authorized in that behalf, may at all reasonable times, enter any residential dwelling or trade premises within the area of jurisdiction of the Council for the purposes of conducting any inspection, inquiry or the execution of works under the provisions of this By-laws. In addition to such penalties for non-payment as may be stipulated in the directions issued by the Council for non-payment of charges for waste management services, any waste management charge payable under the By-laws shall be a debt due and owing to collector and may be recovered as a civil debt by suit at the instance of the collector or any person authorized by the collector to collect on its behalf. Sub-section (4) states that power or a function conferred on the Council under the By-laws which, pursuant to an agreement between it and a third party, may be exercised or performed by the third party, to have been exercised or performed under the authority of these By-laws. The ground truthing exercise indicated that the enforcement process is currently riddled with a number of problems. These include inadequate financial resources, personnel and overwhelming cases of non-compliance with the set standards. An interview with NEMA officials established that the authority is currently understaffed. The Authority has a total of 10 inspectors. This number is very low and as a result, NEMA finds it difficult to send its inspectors to the field regularly as required by the law.

The CCN on the other hand finds it difficult to enforce its By-Laws since it acts as a regulator and a service provider at the same time. This was evidenced at the Municipal Disposal site at Dandora where the Council trucks do not follow the laid down rules. This leaves the privately owned trucks with no option but to follow suit.

### **3.7 Conclusion**

After the review exercise it emerges that the solid waste management system for the City of Nairobi does not meet the accepted standards. Even though E-waste is currently considered as an emerging environmental issue, there is no special law or regulation in the country that articulates for its management. The solid waste management sector is also a victim of many laws and regulations that are mainly sectoral and in most cases tend to conflict. Implementing these laws and regulations is therefore difficult. Nonetheless, there is very little on recycling, re-use, material recovery covered by the existing laws and policies. Lack of effective and efficient enforcement mechanisms for the relevant provisions for solid waste management also affects the solid waste management system. The solid waste management in the city also suffers from the disjointed manner of service between the CCN, the private firms involved in the provision of transport services. Another factor that also affects the sustainable solid waste management is low public awareness about the provisions in the existing laws as well as the best practices in solid waste management.

### **3.8 Recommendations**

- There is need to establish trial burns to evaluate the emissions from incineration process and to demonstrate that the incinerator meets the recommended standards.
- Introduction of open door policy for commercial incineration so as to provide access to such facilities.
- Establishment of legal frame work for safe disposal of solid waste based on best available techniques.
- Regulatory bodies to ensure that every waste recycler is licensed and fiscal incentives developed to encourage such registered recyclers.
  
- Specific disposal sites for wastes from different sources (industries, health facilities) should be established with the distances from such sources being considered as the cardinal determinant.
  
- There is need to develop a central point for carrying out incineration services so as to reduce the cumulative effect of harmful emission from such sites.
  
- The City Council need to help people involved in the recovery of material from solid waste by helping them acquire land to carry out their activities.
  
- There is need to privatize the solid waste management sector as the current arrangement where the Council plays the role of a regulator and a service provider compromises the enforcement process.

- There is need to raise public awareness on best practices in solid waste management such as recycling, segregation, re-use, recovery as well as inculcating the culture of waste reduction and proper storage among producers and consumers.
- The authority should improve on exercising its powers as provided in sections 87 (1) and 87 (6) of EMCA so as to prevent rampant illegal disposal of solid waste.
- NEMA should prescribe a clear form of treatment for each type of waste. It should also encourage other form of treatment apart from incineration.
- NEMA and the Kenyan government should give incentives (financial support) to encourage the development of landfills for proper disposal of solid waste.
- A well elaborate transfer station should be established in accordance with the set provisions to provide a platform for resource recovery while minimizing the amount of solid waste that find its way into the final disposal site.
- The existing laws relevant to solid waste management need to be harmonized and a single autonomous body established to oversee their enforcement.
- Solid Waste collection within the city should be streamlined and areas where there is no system of collection like in the slums is given needed attention and subsidized so as to make solid waste collection attractive to private firms.
- Transportation of solid waste has been riddled with the problem of non-compliance with the set rules and regulations. There is therefore the need to adequately staff the institutions charged with the responsibility of regulating the set standards so as to increase efficiency.

## APPENDICES

### *Appendix A: Reviewed Acts of Parliament, Regulations and Economic Instruments*

The following are the Acts collected and collated during the exercise.

<i>Policies</i>	<i>Laws/Acts</i>	<i>Regulations/Standards</i>	<i>Economic Instruments</i>		<i>Enforcement</i>
			<i>Legal</i>	<i>Voluntary</i>	
	Environmental Management and Co-ordination Act No. 8 of 1999.	Environmental Management and Co-ordination (Waste Management) Regulations, 2006	Fines  Levies  Penalties	Certifications (e.g. ISO 14000)  The COYA Award	The National Environment Management Authority (NEMA).
	The City Council of Nairobi By-Laws on Solid Waste Management.	Environmental Management and Co-ordination (Water Quality) Regulations, 2006	Surcharges		The City Council of Nairobi (CCN)
	The Public Health Act (Cap 242)				
	The Water Act, 2002.				
	The Agriculture Act (Cap 318)				
	The Local Government Act (Cap 265)				
	The Physical Planning Act (Cap 286)				

	<p>The Traffic Act (Cap 403)</p> <p>The Factories Act (Cap 514)</p> <p>The Wildlife Management and Conservation Act (Cap 376)</p> <p>The Scrap Metal Act (Cap 503)</p> <p>The Trade Licensing Act (Cap 497)</p> <p>The Hotels and Restaurants Act (Cap 494)</p> <p>The Environmental Management and Co-ordination (Waste Regulations), 2006</p> <p>The Companies Act (Cap 486)</p>				
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	<p>The Kenya Bureau of Standards Act (Cap 496)</p> <p>The Education Act (Cap 211)</p> <p>The Books and Newspapers Act (Cap 111)</p> <p>The Land Planning Act (Cap 303)</p> <p>The Registration of Business Names Act (Cap 499)</p> <p>The Land Control Act (Cap 302)</p> <p>The Penal Code (Cap 63)</p> <p>The Radiation Protection (Cap 243)</p> <p>The Procurement and Disposal Act of 2003</p>				
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	<p>The Building Codes</p> <p>The Mining Act (Cap 306)</p> <p>The Privatization Act of 2003</p> <p>The Sessional Paper No. 1 of 1999</p> <p>The Kenya Roads Act of 2007</p> <p>Vision 2030</p>				
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*Appendix B: Questionnaire for Generators*

**INTEGRATED SOLID WASTE MANGEMENT PROJECT  
(ISWMP)**

**AN ASSESSMENT OF THE EXISTING POLICIES AND LEGISLATIVE  
FRAMEWORK FOR THE MANAGEMENT OF SOLID WASTE: THE CASE OF  
NAIROBI CITY, KENYA**

**A QUESTIONNAIRE FOR SOLID WASTE GENERATOR**

**NAME OF ENUMERATOR:**

**SURVEY AREA:** \_\_\_\_\_ **QUESTIONNAIRE NO:** \_\_\_\_\_

Dear Sir/Madam,

We are members of the team currently mandated by the City Council of Nairobi (CCN) and The United Nations Environment Programme (UNEP) to develop an *“Integrated Solid Waste Management Plan for Nairobi City”*. At the moment, we are carrying out an exercise on reviewing the existing policies and legislative framework for the management of solid waste with a major focus on Nairobi City. We would therefore like to request that you kindly assist in filling in the information required in the questionnaire to enable us identify the strengths, weaknesses, opportunities and threats for the current solid waste management system and to be able to make appropriate recommendations

The information obtained from respondents will be treated as confidential and will only be used for the purposes of developing the said integrated plan.

Thank you

**SECTION A: WASTE SEGRAGATION AND REDUCTION**

1. (a) Do you segregate the wastes that come from your premise/house? (If yes, go to question 2)

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
-----	--------------------------	----	--------------------------

(b) What are the reasons for not segregating your solid waste?

.....  
.....

(c) In your opinion, how can the culture of segregating solid waste at source level be mainstreamed in the solid waste management system with Nairobi City?

.....  
.....  
.....



2. (a) Do you experience any challenge(s) in segregating the solid waste that come from your premises/house?

Yes		No	
-----	--	----	--

(b) If yes, what is/are the challenge(s)?

.....  
.....

(c) In your opinion, how can the challenge(s) identified in (b) above be dealt with?

.....  
.....

3. (a) Do you have a mechanism in place to help reduce the amount of solid waste generated by your premise/house at production or consumption level? (If no, go to (b))

Yes		No	
-----	--	----	--

(i) If yes, what is/are the mechanism(s)?

.....

(ii) How effective is/are the mechanism(s)?

.....  
.....

(b) Do you have reasons for not having such a mechanism in place?

.....  
.....

4. As a stakeholder in the solid waste management system sector within Nairobi City, what is your knowledge/understanding of the existing policies, economic instruments, laws, regulations/standards and the enforcement mechanism available for the management of solid waste management within the city?

(a)Policies.....  
.....

(b)Economic Instruments.....  
.....

(c)Laws.....  
.....

(d)Regulations/Standards.....  
.....

(e) Enforcement  
 Mechanism.....  
 .....  
 .....

**SECTION B: PRIMARY STORAGE, COLLECTION AND TRANSPORTATION OF SOLID WASTE**

1. (a) Do you store the solid waste that is generated from within your premises/house?  
 .....  
 ....

(b) Where do you store the solid waste that is generated from within your premises/house?  
 .....  
 ....

(c) What is the duration for which the waste is stored? .....

(d) Is the stored solid waste collected? (If no, go (e))

Yes		No	
-----	--	----	--

- (i) Who collects the waste?.....
- (ii) How often is the waste collected.....
- (iii) How would you rate the services provided by the waste collectors?

Rating	Tick where appropriate
Very Good	
Good	
Bad	
Very Bad	

(e) What are the reason(s) why the stored solid wastes are not collected?

2. Comment on the status of the solid waste storage, collection and transportation system within Nairobi City.

*Appendix C: Interview Schedule*

**INTEGRATED SOLID WASTE MANGEMENT PROJECT  
(ISWMP)**

***AN ASSESSMENT OF THE EXISTING POLICIES AND LEGISLATIVE FRAMEWORK  
FOR THE MANAGEMENT OF SOLID WASTE: THE CASE OF NAIROBI CITY, KENYA***

**AN INTERVIEW SCHEDULE FOR THE REGULATORS**

NAME OF INTERVIEWER.....  
NAME OF REGULATOR.....

1. Section 9(2)(m) of EMCA mandates you to undertake, in co-operation with relevant lead agencies, programmes intended to enhance environmental education and public awareness about the need for sound environmental management as well as for enlisting public support and encouraging the effort made by other in that regard. In light of this provision, and considering the CCN as the relevant lead agency in this case, what measures, if any have you put in place to ensure that;

(a) The generators of solid waste within Nairobi City are educated about the need to segregate and employ environment friendly mechanisms to reduce the volumes of solid wastes that come from their houses or premises?

(b) The best practices in solid waste management such as recycling, re-use, treatment and material recovery are encouraged and supported?

2. Section 4(1) and (2) of the CCN’s Solid Waste Management By-Laws rest the primary duty of regulating and managing the solid waste within Nairobi City as well as developing a solid waste management plan for the duty thereof on the CCN. Experience has shown that the solid waste management sector within your jurisdiction is still riddled with a number of challenges. One of these challenges is non-compliance by stakeholders to the provisions of the laws relevant to the sector. In this regard, what legal measures, if any are being pursued or have been pursued by your organization to ensure that the stakeholders comply with such provisions so as to enhance sustainability in the solid waste management sector within the city?

3. Licensed transporters of solid waste with the City of Nairobi are expected ply designated routes while providing transportation services and the law provides for the inspection of such routes. In respect of this, how often are your inspectors on the transportation routes?

4. How many cases of non-compliance with the legal provisions relevant to the solid waste management do you receive?

Daily		Weekly		Monthly		Yearly		Others	
-------	--	--------	--	---------	--	--------	--	--------	--

5. How many licenses are revoked for non-compliance with the provisions of the laws governing the management of solid waste?

Daily		Weekly		Monthly		Yearly		Others	
-------	--	--------	--	---------	--	--------	--	--------	--

*Appendix D: The Work Plan*

**A WORK SCHEDULE FOR THE ASSESSMENT OF THE EXISTING POLICIES  
AND LEGISLATIVE FRAMEWORK FOR THE MANAGEMENT OF SOLID  
WASTE IN KENYA: THE CASE OF NAIROBI CITY**

NATURE OF WORK	DAY									
	1	2	3	4	5	6	7	8	9	10
<i>Collection of relevant literature</i>										
<i>Reviewing of collected literature</i>										
<i>Conducting of field work</i>										
<i>Compiling report</i>										

DAY	DATE
1	09/11/09
2	10/11/09
3	11/11/09
4	12/11/09
5	13/11/09
6	16/11/09
7	17/11/09
8	18/11/09
9	19/11/09
10	20/11/09