

# Addressing the Health Care Waste Problem in Gauteng

A Policy for Environmentally Sustainable Health Care Waste  
Management in Gauteng Province

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## 0. Executive Summary

The special risk that Health Care Risk Waste (HCRW) poses to society, together with the present poor level of Health Care Waste (HCW) management in Gauteng, has resulted in the need for general improvement of HCRW standards.

In meeting its constitutional responsibility to ensure that every South African lives in an environment that is not harmful to his/her health or well-being, the Department of Agriculture, Conservation and Environment (DACEL) together with the Gauteng Department of Health (DOH), embarked on a comprehensive programme to improve the quality of the environment through the prevention of pollution, the promotion of conservation and the securing of ecologically sustainable development. The formulation of this Policy therefore forms part of the process of facilitating the implementation of sustainable HCW management in Gauteng, in accordance with the following vision:

*To ensure that integrated, environmentally sustainable and occupationally safe HCW management be established in Gauteng; within the frames and principles of the National Waste Management Strategy (NWMS), and covering the full HCW stream.*

The Policy sets the frame for the more detailed HCW management strategy and action plans. It also provides guidance for both HCW generators and HCW service providers when planning investments, preparing for increased performance standards and future market conditions, as well as when developing suitable treatment facilities and equipment for service delivery to the HCRW generators. The Policy appreciates the principles of the NWMS that requires:

- Improved delivery of basic waste management services.
- A shift in emphasis away from end-of-pipe treatment to pollution prevention and waste minimisation.
- Reduced risk to human health and environment from improved waste management practices.
- More effective integration of waste management across all environmental media (land, water and air), through the adoption of a more effective integrated approach to legislation.

HCW is a combination of Health Care General Waste (HCGW) - similar to domestic waste, and HCRW that is considered to be the hazardous component of health care waste. HCRW is further made up of a number of components such as infectious waste (including sharps), chemical waste (including pharmaceutical waste) and radioactive waste. The generators of HCW are generally grouped into two categories that represent major generators like hospitals and clinics, as well as minor generators like health practitioners, dentists and pharmacies. The 600 major generators are responsible for some 90% of HCRW generated in Gauteng, with the 9 700 minor generators being responsible for the remaining 10%.

Incineration is the only treatment process presently used in Gauteng, and of the 70 incinerators, only 54 are operational. It is unlikely however, that any of these are meeting the

present Department of Environment and Tourism (DEAT) emission guidelines. Hence, the introduction of improved treatment technologies including various non-burn technologies as well as environmentally acceptable incinerators is encouraged with the phasing out or up grading of unacceptable treatment facilities.

The health care waste management problems identified during the Status Quo Study, as well as in subsequent investigations, were grouped into 12 problem categories. All these having a potential impact on the environment or the occupational health and safety of humans. The problems were then transformed into needs. These were listed as several groups, each with its own distinct impact on either the environment or on humans.

The first group of needs relates to the environment, with the main emphasis on the environmentally sound treatment and disposal of HCRW. Secondly occupational health and safety considerations that affected patients and visitors, health care professionals, waste management workers and the public, were considered. The problems identified were then transformed into needs.

The third group focussed on organisational needs. These included aspects such as the development and implementation of uniform registration, record-keeping, and reporting systems for parties involved in HCW management. The equipment and technical needs related to various aspects starting from generation and continuing through collection, transport and treatment, to final disposal.

Because any HCW management system must be sustainable, the other group of needs focussed on financial and legislative needs. These deal primarily with the lack of appropriate legislation, as well as the ineffective enforcement thereof. To some extent, the legislative needs lead to the need for information and awareness. These needs consider the inadequate training and awareness of HCW management in the healthcare industry. Finally, public health needs were been identified.

Based on the needs analysis, the overall policy statement for health care waste management was formulated. As the overall policy statements consist of relatively broad requirements, a set of Interim Minimum Requirements for HCW Management has been developed.

By recognising the financial and logistical impact that the minimum requirements for HCW management will have on the industry, the Provincial Government proposes a phased implementation of the policy. This will be developed in a HCW Management Strategy and Action Plan with specific targets for implementation. In the period until the Strategy is implemented, the Interim Minimum Requirements for HCW Management shall form the basis for monitoring, for the issuing of permits and for the planning of HCW management activities.

# 1. Policy Formulation Process.

## 1.1 Background to the Gauteng HCW Management Policy

Gauteng embarked on the development of this policy because Health Care Waste (HCW) poses a special risk to society, including health care professionals, patients and visitors, workers at transport companies and treatment plants, as well as people being exposed to spills and unsuitable disposal practises. In addition, illegal dumping of health care risk waste poses a risk to adults and children, for instance when scavenging on waste disposal sites.

The main concern for infection centres around the spread of hepatitis and Human Immune Deficiency Virus (HIV), but other diseases are also of concern.

Although most health care facilities have established some form of HCW management system, investigations have revealed that there is generally a shortage of both human and financial resources, a lack of awareness and limited training in the various roles and functions required for responsible HCW management, all contributing towards a need for improved standards of HCW management. Poor standards of HCW segregation further increases the costs of HCRW treatment and disposal, as HCGW is, in many instances, treated and disposed of as HCRW. This costs much more than the disposal of general waste. The financial implications of this are often not known by the health care workers and health care facility managers.

Other problems arise from the collection of HCRW. At present this is predominantly undertaken by means of a non-returnable cardboard box system. This results in the unnecessary destruction of cardboard, and also creates a health and safety risk for health care service providers.

Approximately 70 HCRW treatment facilities exist in Gauteng. These are incinerators that are mostly still operational. The incinerators have small treatment capacities - as little as 9 kg/hour, increasing to a maximum of 350 kg/hour. Based on the results of a Status Quo Study undertaken in 2001, it is clear that these small capacity units are not able to meet the current DEAT air emission guidelines which, when compared to international standards, (cf. Box 5.10) are lenient. . The large number of pollution sources created by this aggravates the problem. Hence, it is believed that non-compliance with the existing guidelines is a general problem for almost all of Gauteng's incinerators. The problem is further aggravated by a lack of suitable minimum air emission standards, as there are no legally binding emission limits set at present. This results in the DEAT guidelines being used in Gauteng.

It is not feasible to upgrade the vast majority of the existing incinerators in Gauteng so that they include flue gas cleaning. This is because of the design of the incinerators. It is assumed that the operation of most of the incinerators would be discontinued if the DEAT emission guidelines were to be enforced.

Non-burn technologies are being introduced as an alternative to the existing incinerators. The use of alternative technologies may have been a result of public pressure to address concerns around

air emissions. There is, however, still a lack of national and/or provincial standards and guidelines to manage, control and monitor both burn- and non-burn HCRW treatment technologies. This shortcoming makes the setting of conditions during permitting, as well as verification and auditing during operation, difficult.

Finally, the absence of any requirements for an integrated reporting system on the transport as well as the treatment and disposal of HCRW, makes it difficult to strategically plan for the future of HCRW management facility requirements, but also prevents any form of HCRW tracking to control the illegal disposal of, or inappropriate treatment of HCRW.

Environmental management and pollution control are constitutionally, functional areas of concurrent national and provincial competence. Provincial planning is exclusively a function of the provincial legislative. Cleansing, refuse removal and solid waste disposal are described as a local government competence, while the role of provincial government is to monitor and support local government. In broad terms it can therefore be stated that constitutionally, HCW implementation is the function of local government, while planning for sustainable HCW management is the role of the province. The role of national government with regard to HCW management is to ensure that a sustainable management system is in place, in line with the Constitutional requirement.

In order to meet the Constitutional right of every South African to live in an environment that is not harmful to his/her health or well being, DACEL together the Gauteng DOH have embarked on a comprehensive programme to improve the quality of the environment through the prevention of pollution, the promotion of conservation and the securing of sustainable ecological development. The Environmental Impact Assessment (EIA) regulations, promulgated under the Environmental Conservation Act (Act 73 of 1998), are used to ensure the environmental compliance of new developments that include Health Care Waste management facilities.

Although other related legislation is not to be ignored, the primary legislation and strategies driving the Policy are:

- The South African Constitution<sup>1</sup>;
- The National Environmental Management Act<sup>2</sup>;

together with:

- The National Waste Management Strategy;
- The White Paper on Integrated Pollution and Waste Management

## **1.2 The Vision of the Gauteng HCW Policy**

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<sup>1</sup> Act 108 of 1996.

<sup>2</sup> Act 107 of 1998.

**The Vision of this Policy is to ensure that:**

Integrated, environmentally sustainable and occupationally safe health care waste management is established in Gauteng and that this is done within the frames and principles of the National Waste Management Strategy, covering the full health care waste stream.

The Vision of the Policy represents the final goal, or the ideal situation, for health care waste management in Gauteng Province. It is therefore considered ambitious in the short term. The action plans to be developed will however, provide a time frame for implementation that is reasonable and progressive within the context of available resources.

The Policy sets the framework for the more detailed HCW management Strategy and Action Plan. It also provides guidance for both HCW Generators and HCW Service Providers when planning investments, preparing for increased performance standards and future market conditions; as well as when developing suitable treatment facilities and equipment for service delivery to the HCRW generators.

### **1.3 Context in which the Policy will Function**

The Gauteng HCW Management Policy appreciates the National Waste Management Strategy (NWMS) that was adopted by DEAT in 2000. The NWMS has started a process that is intended to transform the current approach to waste management in South Africa. In particular the NWMS aims to:

- Improve the delivery of basic waste management services to a large section of the population who currently receive inadequate services. This requires that all health care facilities be supplied with appropriate waste collection and transportation systems, as well as access to proper treatment facilities. This in turn requires the strengthening of legislation to allow for effective enforcement, proper planning, the supply of appropriate equipment as well as training and information.
- Shift emphasis away from end-of-pipe treatment to pollution prevention and waste minimisation. This means an improved emphasis on the recycling of packaging, as well as HCRW minimisation through improved segregation and green procurement. It should however, be kept in mind that the enforcement of high standards for hygiene and cleanliness is a priority, and in certain cases this will prohibit any recycling and waste minimisation other than effective segregation
- Reduce the risk to human health and environment through improved waste management. This is one of the primary objectives of sound HCW management, as HCRW poses a special risk to both humans and the environment.
- More effectively integrate waste management across all environmental media (land, water and air), through the adoption of a more effective integrated approach to legislation and institutional structures. This is important for HCW management as, for instance, the thermal treatment of HCRW should not result in excessive air pollution, whilst trying to

reduce the impact on water and soil. On the institutional front there is a need for a stronger demand-driven influence by the health care sector with regards to the type and quality of services being provided by the service industry. There seem to be a lack of suitable environmental standards for controlling the performance and emission from both incinerators and the emerging non-burn treatment technologies.

The process for developing this Policy is based on the “problems” observed within the health care sector, identified among others through the Status Quo Study. The problems were then transformed into “needs”, to fulfil the overall vision of the policy, which in turn were guided by the “principles” formulated in the National Waste Management Strategy and the White Paper on Integrated Pollution and Waste Management.

Based on the HCW Management Policy, a more detailed HCW Management Strategy and Action Plan will be developed for Gauteng. This will provide the “how” and “when”. By implementing the Policy, Strategy and Action Plans, the sustainability of the results will be assured.

Apart from the HCW Management Policy, Strategy and Action Plans for Gauteng Province, detailed HCW Management Guidelines for a broad spectrum of HCW Management activities will serve as the practical tools for implementing the Strategy. The guidelines will broadly include waste segregation and containerisation, waste collection and transport as well as waste treatment and disposal. In addition to this, a feasibility study, to evaluate various options for service delivery, will be undertaken.

A further component is the development of a HCW Information System (HCWIS). This will be developed with the intention of recording the information required for effective waste management planning and the implementation of sustainable systems, whilst being able to keep track of HCRW movement.

Finally, selected pilot projects will be implemented to develop, test and demonstrate some new concepts introduced to improve the existing HCW management systems.

The Policy is formulated as part of a DANCED-supported project on Sustainable Health Care Waste Management in Gauteng. It should, where applicable, be used at a national level as a blue print for other South African provinces.

The Policy is formulated by Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (DACEL) in co-operation and in full consultation with all key stakeholders. These include:

- Gauteng Department of Health (GDoH)
- Gauteng Department of Transport and Public Works (GDTPW)
- National Department of Health (NDoH)
- Department of Environment and Tourism (DEAT)
- Department of Water Affairs and Forestry (DWAF)
- Danish Cooperation for Environment and Development (DANCED)



- Infection Control Association of Southern Africa (ICASA)
- South African Non- Governmental Organisation Council (SANGOCO)
- National Education and Health Workers Union (NEHAWU)
- South African National Civics Organisation (SANCO)
- South African Society of Occupational Medicines (SASOM)
- South African Bureau of Standards (SABS)
- Gauteng Association of Local Authorities (GALA).

## **2. What is Health Care Waste and where is it generated?**

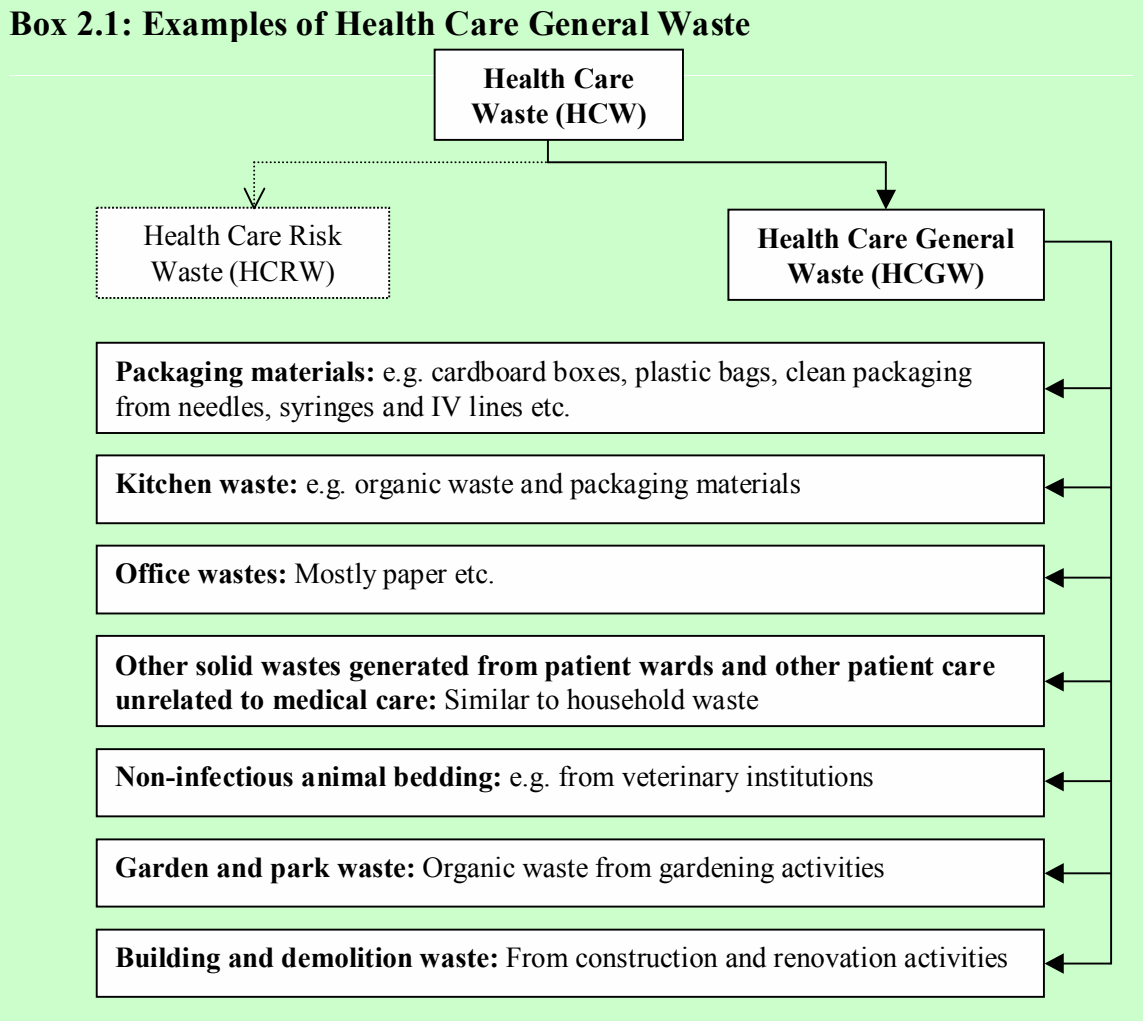
The HCW Policy covers all types of waste from health care facilities, excluding animal carcasses and radioactive waste<sup>3</sup>. (Radioactive waste is addressed by the National Nuclear Regulator Act, 1999 (Act 47 of 1999)) The policy covers HCW through its complete life cycle from generation, through treatment, to disposal. It covers HCW generated not only from major sources like hospitals and clinics, but also from minor sources of HCRW like laboratories, general practitioners and dentists etc.

The Health Care Waste (HCW) stream is divided into Health Care General Waste (HCGW) and Health Care Risk Waste (HCRW).

### **2.1 Health Care General Waste**

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<sup>3</sup> The problems created by radioactive HCRW are to be confronted through co-operative governance with other agencies such as the National Nuclear Regulator

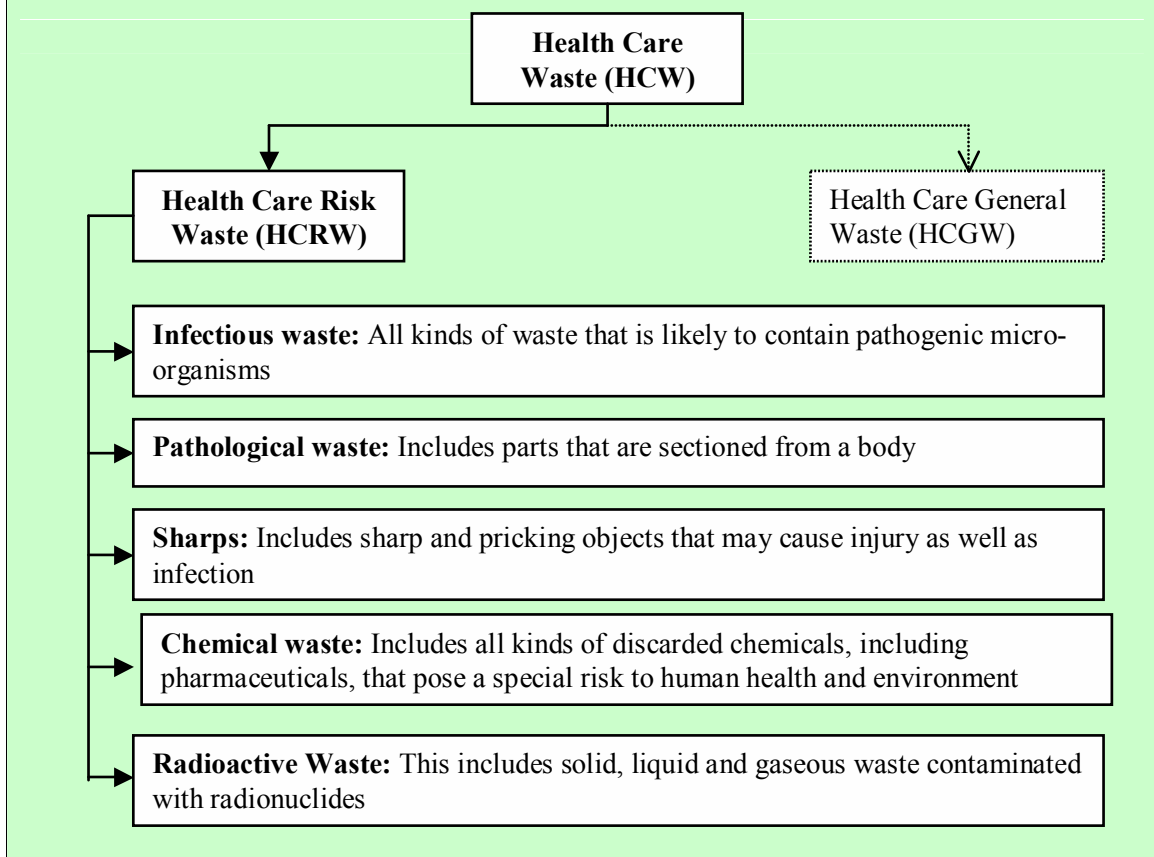


Health Care General Waste (HCGW) is the non-hazardous component of HCW from health care facilities. It includes many of the same substances as domestic waste. HCGW is generated during the administrative and housekeeping functions of health care facilities - among others - and may include a number of recyclable materials.

## 2.2 Definition of Health Care Risk Waste

Health Care Risk Waste (HCRW) is considered to be the hazardous component of Health Care Waste (HCW) generated in both large and small health care facilities. HCRW has the potential to create a number of environmental, health and safety risks, depending on the particular type of HCRW, the way it is handled, as well as the way in which exposure takes place.

## Box 2.2: Examples of Health Care Risk Waste



In **Box 2.2** the five different categories of health care risk waste are defined and examples given of the most commonly found components.

Three of the components of HCRW may be infectious (infectious waste, pathological waste and sharps), but since pathological waste and sharps have additional features, they constitute a separate component.

### 2.3 Health Care Risk Waste generators

The sources/generators of HCRW include a range of different institutions within the health care sector, and the type of HCRW generated corresponds to the service provided. The sources can be divided into two distinct groups: major and minor generating sources, based on their contribution towards the overall HCRW stream.

### Box 2.3 Definition of Major and Minor HCRW Generators:

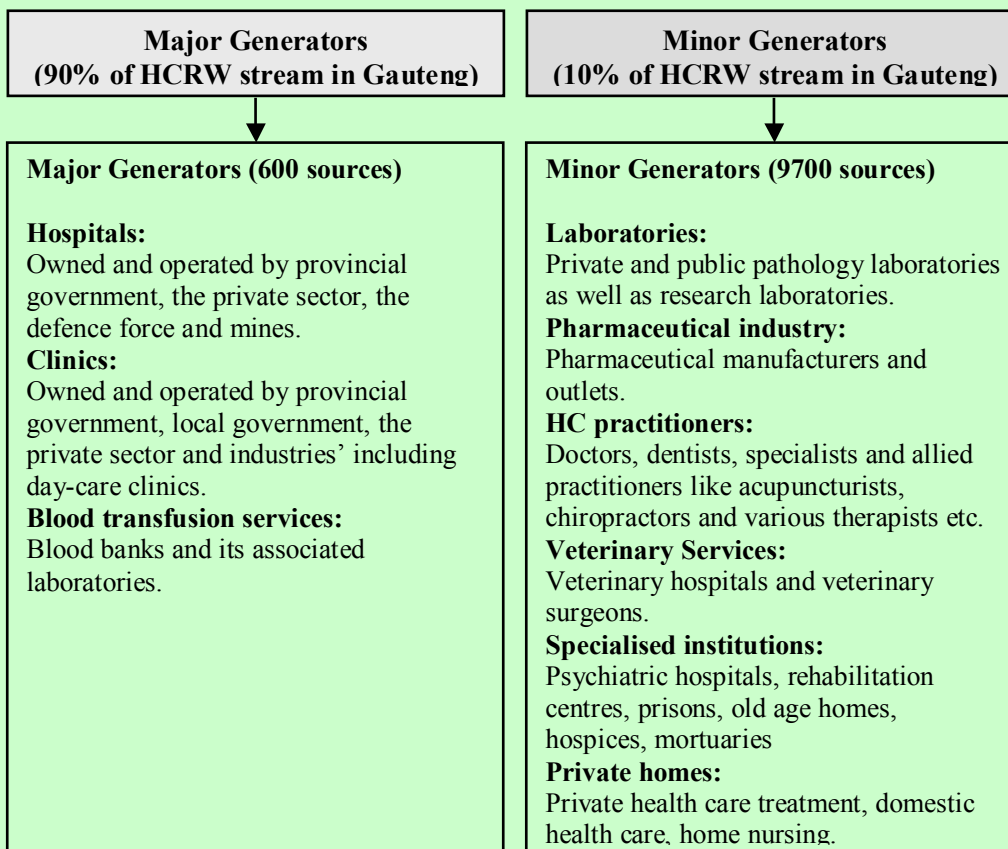
*For the purpose of this policy, the following definitions will be applied:*

**Major generators:** Health Care Facilities or similar, generating more than 10 kg of HCRW per day (cf. Box 2.2 for examples)

**Minor generators:** Health Care Facilities or similar generating up to 10 kg HCRW per day (cf. Box 2.2 for examples)

The Policy focuses on the major HCRW sources as, in Gauteng, some 600 existing major sources of HCRW were found to contribute about 90% of the HCRW stream whilst the 9 700 minor sources of HCRW identified were found to contribute about 10% of the HCRW stream. The HCRW sources were identified as follows:

### Box 2.4: The HCRW Generators



With the duty of care principle being entrenched in the NWMS, health care facilities have the primary responsibility of ensuring that the waste generated at the respective facility, is treated and disposed of in an environmentally sound manner, whilst meeting the relevant occupational health and safety requirements.

## 3. Need for Change

### 3.1 What are the problems?

The following list of typical problems identified, is organised according to the flow of the HCW from its origin at the health care facility to its final disposal. These problems were identified during the Status Quo Study, subsequent site visits and discussions with various stakeholders:

#### **Box 3.1: The typical HCRW management problems identified in Gauteng.**

The following categories of problems were identified for HCRW management in Gauteng:

- **Awareness and Training:**
  - Limited HCW awareness and HCW Management training
- **Segregation:**
  - Poor segregation of HCW
  - Poor health care-facility infrastructure design
- **Internal HCW management Equipment:**
  - Poor HCW management equipment design
  - Inappropriate handling of HCRW containers
- **Tendering and Contracting:**
  - Inappropriate pricing system for service delivery
- **Safety and Health:**
  - Appropriate Personal Protective Equipment (PPE) not used
  - Inadequate response to needle stick injuries (e.g. inoculation and retroviral treatment not provided effectively or not available) This sounds as if inoculation and retroviral treatments do not work properly when they are given – i.e. that there is a problem with the medicines.)
- **Storage:**
  - Inappropriate internal and external storage procedures
  - Inappropriate / insufficient external HCRW storage facilities
- **Transportation:**
  - Poor / inappropriate off-site transport equipment
  - Poor handling during collection and transport
- **Record-keeping and Reporting:**
  - Inappropriate / no HCRW recording system
  - No reporting procedures in place
- **Treatment Facilities:**
  - Inappropriate storage procedures at treatment facilities
  - Poor siting of HCRW incinerators considering the present operational standards
  - Poor HCRW treatment facility design
  - Ineffective operation of HCRW treatment facilities;
- **Disposal of Residues:**
  - Unsafe and environmentally inappropriate disposal of HCRW incinerator ash
- **Enforcement, Permitting and Monitoring:**
  - Inadequate enforcement of guidelines and standards
- **Inadequate capacity of public agencies**
  - Lack of resources
  - Insufficient guidelines

## **3.2 What are the Needs?**

### **3.2.1 Environmental Needs:**

Inappropriate handling, storage, transport, treatment and disposal of HCRW pose a risk of pollution to the soil, water or air. At the same time they also create a health risk to both humans and animals. The HCRW Policy will therefore provide for the movement of waste to be monitored from beginning to end, with an effective tracking system to ensure that all components of the HCW management system meet the required environmental standards. Clear identification of containers will make it possible to assess the HCRW generation rates for the respective activities performed in health care facilities.

To ensure environmentally sound HCRW management, that the HCRW processes from generation to final disposal, should be environmentally sound. For example, it is believed that there is generally a lack of compliance with the DEAT air emission guidelines, as most incinerators probably exceed the maximum permissible emission limits on substances like acidic gases and heavy metals. The lack of legislated emission standards is not sustainable, and therefore calls for immediate action. There is a need to stop the disposal of untreated HCRW at landfills due to mis-handling as well as stopping the mis-placement of certain types of anatomical waste.



### **Box 3.2: Environmental needs identified for HCRW Management:**

The following environmental needs were identified for HCRW management in Gauteng:

- The proper design of HCRW containers to prevent spillage
- The development and enforcement of a uniform labelling and colour coding system to effectively mark, record and track waste
- The prevention/limitation of HCRW spillage inside and outside health care facilities during handling, storage, transport and treatment; and to immediately remove spillage that may have occurred
- The provision of sufficient appropriate storage facilities at health care and treatment facilities to prevent HCRW from being exposed to the elements during storage
- To ensure that, as a point of departure, all incinerators are brought in compliance with the DEAT emission guidelines or are discontinued
- To ensure that acceptable ambient air quality contributions are achieved by limiting emissions and securing the adequate dispersion of flue gasses
- To introduce control systems and /or the provision of sufficient training to prevent the overloading of incinerators
- To ensure correct disposal of incinerator ash
- To ensure all facilities in operation are permitted and in compliance with the required standards
- To allow for the upgrading or closure of non-compliant facilities, thus reducing the number of point sources of pollution
- To secure sufficient compliant treatment capacity at affordable rates
- To set appropriate norms and standards for non-burn technologies
- To ensure a uniform reporting system is introduced and maintained
- To ensure a uniform monitoring of operational parameters to control pollution
- To encourage the use of alternative treatment technologies where appropriate.

### **3.2.2 Occupational Health and Safety Needs:**

The occupational health and safety needs relate to the different parties that may be affected either directly or indirectly. The parties directly affected by HCRW are the health care professionals as well as HCRW service providers both inside and outside health care facilities. Other persons that may be affected by HCRW are patients and visitors to health care facilities, as well as members of the public that may be contact with HCRW after it has been removed from the health care facility premises.

The Occupation Health and Safety Act and Regulations (Act 85 of 1993) covers a wide spectrum of responsibilities and aspects that are to be attended to by both the employer and the employees.

### **Box 3.3: Occupational health and safety needs identified for HCRW Management:**

The following occupational health and safety needs were identified for HCRW management in Gauteng:

- To ensure that the design and use of HCRW containers will prevent injuries and infection of workers, patients and visitors
- To ensure that re-usable containers are effectively sterilised and handled before use
- To provide suitable HCW storage areas with effective security and access control that will prevent containers from being placed inside wards or where it they are accessible to both patients and visitors while protecting containers against the elements
- To prevent the prolonged HCRW storage resulting in the release of odours and possible pathogens
- To prevent injuries by minimising the manual handling of HCRW containers
- To ensure access to safe and sheltered HCRW storage facilities for internal transport of HCRW
- To ensure effective access control at incinerators to prevent unauthorised entry
- To ensure that appropriate Personnel Protective Equipment (PPE) is supplied to protect workers
- To ensure that inoculation is provided to all workers that may be exposed to HCRW and that details on the treatment programme are recorded
- To ensure that retroviral treatment is effectively applied to all persons that may have been infected by HCRW and that details are recorded.

### **3.2.3 Organisational Needs**

One of the possible reasons for the low environmental standards of treatment facilities is the relatively large number of small, on-site incinerators that are based on technology that is often more than 30 years old, together with the inadequate training provided to the operators of these incinerators. The Status Quo Feasibility Study found the regional approach to be cost effective, whilst at the same time reducing the number of point sources of pollution. It revealed that such regionalisation of the HCRW treatment facilities would be beneficial.

Together with regionalisation, the principle of proximity should be enforced to minimise the distance between the point of HCRW generation and the treatment plant and to control the movement of HCRW across provincial borders.

There is a need to register all parties involved in the HCRW generation and transportation as well as treatment and disposal with the appropriate professional bodies or regulating authorities. Ongoing reporting by the parties involved is also required.

Finally, clarification of the roles and functions of the three tiers of regulating authorities is important - not only for the authorities, but also for the HCRW management industry.

### **Box 3.4: Organisational needs identified for HCRW Management:**

The following organisational needs were identified for HCRW management in Gauteng:

The need to:

- Develop and implement an effective registration and reporting system. This needs to be done together with the implementation of a corresponding and validated system in the affected local and provincial authority
- Have sufficient regulatory authority capacity, with trained staff to receive, audit, control and manage the registrations and reporting submitted by the HCW management industry in terms of the HCWIS
- For authorities to have sufficient staff and capacity for the effective enforcement of legislation and permit conditions
- Ensure that all HCRW generators, transporters and treatment facilities record the HCRW handled according to the agreed categories by mass and to ensure that they submit reports and data to the respective professional bodies or regulating authorities as and when required
- Have a management system that will allow for linking permits, permit conditions and annual reports with the registrations
- Have sufficient legal and fiscal tools, as well as the tendering mechanisms for services to provincial health care facilities, to make sure that regionalisation takes place, and that the principles of proximity are adhered to
- For authorities to control the movement of HCRW to provinces where less stringent treatment standards may apply
- Have sufficient data and monitoring tools in place to plan the HCRW available treatment capacity in the short, medium and long term
- Secure the establishment of sufficient compliant treatment capacity with the optimum utilisation of available resources to enable closure of non-compliant facilities.

#### **3.2.4 Equipment and Technical Needs**

The standard of the HCRW equipment and the HCRW facilities varies significantly within the health care sector. This results in the inefficient handling and treatment of the waste. It also results in unnecessarily high levels of pollution and an increased risk of injury and infection. This situation prevails in health care facilities, with transporters, in treatment facilities and at the disposal sites.

There is therefore the need to upgrade both facilities and equipment to a standard that will not only make the HCW Management more effective, but will also make it safer and healthier.

### **Box 3.5: Equipment and Technical needs identified for HCRW Management:**

In terms of equipment and other infrastructure there is a need:

- To ensure that health care waste management equipment is designed and selected by health care professionals in accordance with their needs;
- To ensure that trolleys of an appropriate design are supplied for the internal transport of HCRW, which will limit the manual handling of HCRW as well as the risk of damage to containers that could result in spillage;
- To ensure safe and effective access for internal transport of HCRW between the generation areas, intermediate storage areas and collection areas;
- To ensure that appropriately designed HCRW storage facilities are provided at health care facilities as well as at HCRW treatment facilities;
- To ensure that safe and suitable HCRW collection vehicle access and loading facilities with sheltered loading areas are provided at the health care facilities, as well as the HCRW treatment facilities;
- To ensure that HCRW collection vehicles are appropriately designed to allow for securing of containers whilst being transported and for optimum use of available capacity in loading bays;
- To ensure that the required human and physical resources are made available at health care facilities as well as at HCRW treatment facilities;
- To ensure that realistic backup is provided for human and physical resources;
- To ensure that HCRW storage and treatment facilities are appropriately located in accordance with the types of waste treatment processes being used.

### **3.2.5 Financial Needs**

A balance is to be struck between the standard of service to be rendered, and the affordability thereof within the South African context. It is therefore important that sound financial planning be undertaken and that cost effective, safe and environmentally sound systems be implemented to ensure sustainability of the strategy in the long term.

The financial needs stem from a variety of areas and can be grouped as a need by health care facilities to have an effective HCRW management system implemented, the HCRW industry for rendering an affordable yet profitable HCRW management service and, finally, the regulatory authorities for controlling the HCRW industry.

### **Box 3.6: Financial needs identified for HCRW Management:**

The following financial needs were identified for HCRW management in Gauteng:

- To ensure that the standards set are meeting the environmental, health and safety requirements whilst being affordable, to give effect to the constitutional right of all citizens to have access to affordable health care;
- To ensure implementation of an appropriate pricing system for service delivery that will facilitate accurate recording of data for use in HCWIS based on mass (thus also preventing overloading of containers);
- To ensure the financially viable supply, commissioning and operation of environmentally sound regional HCRW treatment facilities that will enable the closure of non-compliant, poorly designed facilities;
- To ensure that sufficient funds are made available to public health care facilities to be able to enter into affordable, yet environmentally sound, HCRW management service agreements;
- To ensure that budgets make provision for sufficient funds for regulating authorities to enable them to undertake the required permitting and auditing functions;
- To ensure that there are sufficient financial incentives for health care facilities to optimise the HCW segregation and use of equipment;
- Ensuring the introduction of more cost effective HCRW management systems that are safe and environmentally sound.

### **3.2.6 Legislative Needs**

Promulgation of just environmental legislation, together with effective enforcement thereof, is the cornerstone for the implementation of an environmentally sound HCRW management system.

There is currently a general lack of legislation with regards to thermal as well as non-thermal treatment of HCRW. DEAT for instance only set air emission *guidelines* rather than promulgated standards and very few incinerators in Gauteng meet the recommended *guidelines* in terms of the maximum permissible emission limits regarding substances such as acid gases, dioxins and heavy metals. When comparing the existing DEAT emission *guidelines* with similar international legislation it becomes evident that the SA *guidelines* are relatively lenient (cf. Box 4.13).

This situation is obviously not sustainable and therefore calls for immediate action, especially since Gauteng is a highly industrialised province with considerable background pollution. Regulation of the emission standards for HCRW treatment facilities is not only required from an environmental point of view, but also from a health point of view.

There is thus a need for the setting of standards for the emissions from thermal and non-thermal treatment technologies, for effective monitoring and reporting systems, for permitting of HCRW transporters and treatment facilities, as well as a fiscal penalty system to be used by authorities against under-performing service providers.

### **Box 3.7: Legislative needs identified for HCRW Management:**

The following legislative needs were identified for HCRW management in Gauteng:

- To promulgate requirements for the registration of HCRW generators, transporters and treatment / disposal facilities;
- To introduce a permitting system for HCRW transporters and treatment / disposal facilities and to secure compliance with the permit conditions;
- For authorities to have clear guidance as to the requirements for permitting conditions and monitoring procedures (performance requirements);
- For authorities to be able to require the effective implementation of external auditing and reporting by permit holders, using approved laboratories and approved monitoring systems (parameters/on-line or grab sampling);
- For authorities to be able to control / direct the flow of HCRW to allow for effective use of available treatment facilities, thereby avoiding establishment of unnecessary treatment capacity. This would include provisions for controlling the transport of HCRW across the provincial borders;
- For authorities to control the import and export of HCRW generated inside/outside of Gauteng for treatment / disposal at facilities in other provinces that are not meeting the same standards;
- For authorities to be able to prescribe the use of a particular reporting and record-keeping system by HCRW generators, transporters and treaters/disposers;
- For authorities to be able to demand adjustment and renewed application for permitting in case of non-compliance or development of the “Best Practical Environmental Option” (BPEO).
- For authorities to be able to decline applications for establishing treatment capacity / facilities if the government assesses that there is sufficient compliant capacity in place.

### **3.2.7 Information and Awareness Needs**

It is believed that many of the existing problems, in part, are related to the limited education and awareness that exists with respect to the risks associated with HCRW, the operational procedures for effective use of HCRW equipment, as well as the practical procedures required to avoid or minimise such risks. The consequential costs to rectify the effects of poor HCRW management are also not recognised.

This not only applies to the personnel at health care facilities, but also at HCRW treatment facilities, disposal sites and amongst HCRW transport companies. In addition to this, patients and visitors also lack awareness regarding this problem. Lastly, there is a need for capacity building amongst health and environment officers.

Hence, there is a need to ensure that these sectors all receive the required information and training as part of a sustainable awareness and capacity building process.

### **Box 3.8: Information and awareness needs identified for HCRW Management:**

The following information and awareness needs are identified for HCRW Management in Gauteng:

- To provide sufficient resources and capacity for development of capacity building and training programmes that will address the limited awareness of the types of HCRW and potential impacts thereof;
- To ensure effective co-ordination of training and awareness programmes within both the public and private sector;
- To improve curricula of training institutions to address HCW management;
- To address the lack of awareness on the ability to purchase environmentally friendly products;
- To develop and publish HCW Management Guidelines that will be used by the health care sector;
- To improve the skills and awareness of planning and enforcement officers;
- To improve the skills and awareness of health care professionals to ensure effective segregation and containerisation of HCW;
- To address the lack of training and awareness for treatment facility operators.

### **3.2.8 Public Health Needs**

The pressure put on the HCRW Management industry is to a large extent directly related to the potential impact of HCRW treatment on public health. Such impacts may be in the form of unobstructed access to HCRW or in the form of poor emissions from HCRW treatment processes.

### **Box 3.9: Public Health needs:**

The following Public Health needs were identified for HCRW Management in Gauteng:

- Reduce emissions from existing poorly performing incinerators for HCRW;
- Avoid disposal of untreated HCRW in the general waste stream, thus reducing the exposure to HCRW for the litter pickers, waste recyclers and waste collectors;
- Avoid access to HCRW for patients, visitors and uninformed workers at all health care facilities;
- Ensure that adequate minimum standards and guidelines are in place to avoid spillage and leakage resulting from the use of unsafe containerisation and packaging of HCRW.

### **3.3 Priorities for HCW Management in Gauteng**

This Policy appreciates the principles and criteria set up in the IPWM White Paper that addresses the development of waste management and environmental protection practices in a broad socio-economic context.

For the development of HCW management in Gauteng these needs have been translated into the following priorities although not necessarily according to any level of importance:

### **BOX 3.10: Overall Policy Priorities:**

- To initially address major HCRW generators, generating 90% of the HCRW stream but accounting for only 10% of the sources, thus addressing the bulk of the problem whilst only using limited public resources. Addressing the minor generators will follow this
- To provide regionalised off-site HCRW treatment facilities that are preferred to smaller on-site treatment facilities in order to make effective use of the economies of scale provide a suitable technical and environmental performance level at an affordable cost, having less point sources of pollution and reducing the public sector burden of auditing and enforcing standards
- To establish environmentally sound HCW management systems for the solid or containerised HCRW stream
- To control, where necessary, the microbial and chemical quality of effluents like contaminated urine, faeces, liquids from laboratories and similar substances containing blood products, pathogens etc. discharged to the sewer by health care facilities
- To establish efficient and safe segregation and containerisation of HCRW by providing appropriate equipment, thus resulting in waste minimisation. Particular recycling and waste minimisation initiatives are to be encouraged, including introduction of environmental purchasing, where there is sufficient capacity to develop, introduce and monitor such initiatives
- In the absence of suitable national HCW Management standards and legislation the provincial government health care facilities, accounting for 50% of the HCRW stream, are to take a leading role in setting minimum performance standards to be rendered by the service industry
- To apply the Polluter Pays Principle, thus resulting in the generator of the HCW paying for all costs associated with sound treatment and disposal of the waste, including emissions to the environment
- For the provincial government to recover cost by charging a levy for environmental monitoring of permit holders, in particular in instances where non-compliance requires increased frequency of inspections etc. The fees levied should reflect actual costs
- To outsource HCW Management services to the private service industry or specialised utilities that can provide the necessary capital and technical know-how, in order for health care facilities to focus on primary activity
- For the permit holder to have the burden of evidence in documenting compliance with regulations and permit conditions, including commissioning and reporting of independent tests and analyses required by the public
- For joint governance by national, provincial and local governments and, in particular, between environmental and health authorities for management of HCW. Hence all tiers and departments of government shall apply good and accountable governance in the service of the public respecting co-governance and co-operation between relevant environmental authorities
- To develop and implement the first generation HCWIS. As there is currently no reliable data available and limited public capacity to operate, maintain and verify reporting of data, the first generation HCWIS shall be simple, whilst meeting the basic data requirements of the government in an affordable and cost-effective way. The basic HCWIS shall however be designed to allow for future elaboration or expansion when needed and justifiable
- To develop user and stakeholder driven solutions to the HCW management requires involvement by all relevant stakeholders in the development of the improved HCW management system. Access to information that is not proprietary or associated with commercial confidentiality is also required.



## 4. Health Care Waste Management Policy for Gauteng

### 4.1 Introduction and Policy Options

This chapter presents the Policy and minimum requirements to be adhered to in the Province of Gauteng by the health care sector and, in particular, the HCRW management industry. Most of the issues are interrelated; meaning that implementation of one requirement may depend on the effective implementation of a number of other requirements.

All the requirements are directed towards improving the environmental as well as the occupational health and safety standards, but the instruments to achieve this are of a technical, organisational, financial and legislative nature. Hence, the environmental and the occupational health and safety requirements are only formulated in general terms and refer to the specific proposals for policy instruments.

The figure overleaf briefly introduces the key principal policy options for:

1. Internal Packaging, Collection & Transport;
2. Technology Options;
3. Training & Awareness Options;
4. Co-operation & Driving Forces;
5. Site Options;
6. Finance/ Ownership Options;
7. Affordability Options;
8. Options for Control of Waste Flow;
9. Environment vs. Cost Options.

The figure below contains selected principal strategic options for HCW management as well as demonstrating six principal HCW Management scenarios that could be developed based on the selected principal strategic options. The figure is intended to assist in evaluating the proposed Minimum Requirements and statements presented in this Policy below.

**Figure 4.1: Principal Strategic Options and Selected Possible Scenarios**

SELECTED PRINCIPAL SINGLE OPTIONS					KEY ISSUES	Selected Scenarios Based on Different Policies					
						A. Public Control and Best Technology	B. Market Force Driven Best Technology	C. On-site Acceptable Technology	D. On-site Low Cost	E. No Burn	F. Absolute Minimum Cost
2 stringed collection only (HCRW & similar to MSW)	Separate sorting/collection of heavy metals, chemicals, etc. (3+ stringed system)	Single use inner bags collected via reusable receptacles	Reusable receptacles that are cleaned/disinfected before reuse	Single use bags, boxes etc.	Internal Packaging Collection & Transport	Any safe sorting syst. & separation if unsuitable for selected treatment technology	Any safe sorting syst. & separation if unsuitable for selected treatment technology	Any safe sorting syst. & separation if unsuitable for selected treatment technology	2 stringed collection only (HCRW & similar to MSW)	Any safe sorting syst. & separation if unsuitable for selected treatment technology	2 stringed collection only (HCRW & similar to MSW)
Haz landfilling	Emerging technologies	Microwave treatment	Autoclaving	Incineration		Technology Options	All complying treatment technologies permitted	All complying treatment technologies permitted	All complying treatment technologies permitted	All complying treatment technologies permitted	Sterilisation + haz. Landfill only
		National/Provincial common minimum training methods and curricula	Group of health care facilities develop common training methods	Each health care facility develops own training methods and curricula	Training & Awareness Options	Any Principal Option and Regional requirements for sorting & packaging	Any Principal Option and Regional requirements for sorting & packaging	Any Principal Option	Any Principal Option	Any Principal Option	Any Principal Option
		Treatment and management driven by private sector	Treatment and management driven by public authorities	Treatment and management driven by waste generators	Co-operation & Driving Forces	Treatment and management driven by public authorities	Treatment and management driven by private sector	Treatment and management driven by waste generators	Treatment and management driven by waste generators	Treatment and management driven by public authorities	Treatment and management driven by waste generators
	Off-site regional plants/large capacity	Off-site/limited capacity	On-site with excess capacity, treating waste from other generators	On-site/limited capacity	Site Options	Large/Regional Facilities Only - Phasing out of existing on-site plants	Large/Regional Facilities Only - Phasing out of existing on-site plants	Replacement of existing on-site plants that do not comply with standards	Maintenance and minor improvements of existing on-site incinerators	Phasing out of all existing plants + new on or off site sterilisation plants	Large/Regional Facilities Only - Phasing out of existing on-site plants
		Private Sector	Public Utility/DPW&T	Health Care Facilities/DPW&T	Finance/Ownership Options	Private Sector or Public Utility/DPW&T	Private Sector	Health Care Facilities/Outsource to Private Sector DPW&T	Health Care Facilities/Outsource to Private Sector/DPW&T	Any Principal Option	Private Sector or Public Utility/DPW&T
Market Forces only	Cost differentiation based on affordability	Cost attenuation schemes	Subsidised	Polluter Pays	Affordability Options	Polluter Pays + Cost Attenuation Scheme	Market Forces Only	Market Forces Only	Market Forces Only	Any Principal Option	Any Principal Option
		Market Forces only	Compulsory use of licensed plants in service area	Environmental Performance Criteria only (air, transport, residues, suitability for landfilling)	Options for control of waste flow	Compulsory use of licensed plants in service area	Environmental Performance Criteria only (air, transport, residues, suitability for landfilling)	Environmental Performance Criteria only (air, transport, residues, suitability for landfilling)	Environmental Performance Criteria only (air, transport, residues, suitability for landfilling)	Any Principal Option	Any Principal Option
		Use of Low Cost Environmentally Poor Technologies	Use of Older Environmentally Balances Technologies	Use of Environmentally Best Available Technology	Environment vs. Cost Options	Use of Environmentally Best Available Technology	Use of Environmentally Best Available Technology	Use of Older Environmentally Balances Technologies	Use of Low Cost Environmentally Poor Technologies	Any Principal Option	Use of Low Cost Environmentally Poor Technologies

## 4.2 Overall Policy Statements

The overall policy statements presented in Box 4.2 are aimed at addressing the individual problems and needs presented in the sections above, and taking the Vision and the Principles into account.

## **Box 4.2: Overall Policy Statements for the Management of Health Care Risk Waste in Gauteng**

The Provincial Government of Gauteng will apply the following overall provincial policy for HCW management in Gauteng:

### **Environmental requirements:**

- All health care facilities and waste management service providers shall apply adequate technology and procedures to ensure successively reduced environmental impact and, as a minimum, follow the current rules concerning environmental protection;

### **Occupational health and safety requirements:**

- All health care facilities and waste management service providers shall apply adequate technology and procedures to ensure reduced impact on human health and, as a minimum, follow the current requirements concerning occupational health and safety;

### **Equipment and technical requirements:**

- All health care facilities and waste management service providers shall apply adequate technology and procedures to ensure technically efficient and cost-effective health care waste management systems that are environmentally sustainable and safe for the public and staff;

### **Organisational / Institutional requirements:**

- Efficient co-ordination between the responsible authorities shall ensure appropriate overall planning of the resources within the health care waste management sector. Such planning shall be done in consultation with relevant stakeholders.
- Provincial tender requirements shall require improved performance levels from service providers and facilitate a move towards fewer and larger off-site treatment facilities (regionalisation);

### **Legislative requirements:**

- Existing legislation and guidelines for burn and non-burn treatment technologies shall be enforced and strengthened with the ultimate aim being to reach environmental and safety standards that are comparable with those applied internationally, e.g. EU and USA.
- Reporting and registration requirements shall be introduced to ensure relevant information and registration and permitting of treatment facilities, transporters of HCRW and monitoring of performance and quantities;

### **Financial requirements:**

- Financial mechanisms shall be developed and implemented in order to improve the service level as well as the environmental and safety standards at an affordable cost while ensuring that the *polluter pays principle* is being fully applied.

### **Information and training requirements:**

- Adequate information and training shall be provided to the staff of the health care facilities and of the waste management service providers to ensure that the level of awareness supports improved quality of waste management and reduced impact on the environment and public health.

A detailed Provincial HCW Management Strategy and Action Plan will be developed based on the Policy Statements above and the findings of an ongoing HCW Management Feasibility Study.

In the interim period, until the HCW Management Strategy and Action Plan have been developed, consulted and approved, a set of Interim Gauteng Minimum Requirements for HCW Management has been developed in the following chapter.

## 5. Interim Minimum Requirements for HCW Management in Gauteng

The interim minimum Gauteng requirements for HCW management shall be seen as the provincial minimum requirements that shall be used for planning, permitting and decision making purposes until the Gauteng HCW Management Strategy and Action Plans have been developed, consulted and implemented, among others, via adequate legislation and guidelines.

### 5.1.1 Interim Environmental Minimum Requirements

The environmental problems within health care waste management are mostly associated with the treatment and disposal of the waste and not so much with the handling of the waste inside the health care facilities. However, the purchase of environmentally “green” products, recycling, waste minimisation and the efficiency of sorting, e.g. the sorting of pharmaceuticals and heavy metal containing products, has a direct impact on the amounts and quality of waste and, hence, on the quality of residual products after treatment, as well as emission levels to the atmosphere.

#### 5.1.1.1 Environmental requirements at health care facilities

##### **Box 5.1: Minimum Requirements for green procurement, waste minimisation, recycling and discharges to the sewer**

- Any plastic bag, container or similar item that may, or may not, be incinerated shall be made of PP, alternatively of PE, or any other plastic material that can be demonstrated to produce minimum emissions if incinerated. PVC may not be used for any such items, unless it cannot reasonably be substituted for medical or technical reasons;
- Dyes or colouring agents used for any plastic, paper, cardboard or other materials may not contain heavy metals, chlorinated or other halogenated compounds and shall be of such a nature that minimum pollution is caused when disposed of/incinerated. The burden of proof shall lie with the service provider;
- Disposable receptacles shall be designed with a view to minimising the wastage of materials without compromising on the strength of the containers, thus avoiding excessive disposal of paper, cardboard, plastic, metal etc.
- Materials like glass, paper, cardboard, plastic, metal etc. should be recycled where financially and practically possible, whilst adhering to the high standards of hygiene and risk of infection;
- The Health Care Facility must ensure that discharges to the sewer systems do not contain unacceptable risk of infection by carrying out necessary disinfection of particular types of liquid waste, e.g. from laboratories, blood banks etc.

These requirements shall be observed in the present purchasing procedures by establishing procedures for “green procurement” for provincial departments.

### 5.1.1.2 Environmental Minimum Requirements for Treatment

These requirements particularly address the need to reduce the emission of pollutants from incinerators as well as the impact on soil and water from the disposal of residues after any type of treatment (sterilisation, disinfection, incineration etc). The requirements are further aimed at setting requirements for verification of the efficiency of the emerging non-burn technologies, whereas impact via discharge of effluents is presently regarded to be a problem or lesser priority as regards to HCW management. Reduction of emissions from incinerators will include a number of requirements that will have technical, financial, organisational and legislative implications as well as require training and information.

#### **Box 5.2: Environmental Minimum Requirements for Treatment (non-burn and burn technologies)**

- The Provincial Government shall assess any proposed treatment technology for HCRW on its merits and environmental impact and shall encourage the use of innovative and emerging technologies that can be demonstrated to be suitable;
- The Provincial Government shall ensure that new treatment facilities meet the set environmental requirements via (i) standard- setting in the tenders for HCW disposal from the provincial hospitals and clinics (the provincial health care facilities account for approximately 50% of the HCRW being generated in Gauteng), (ii) regulating the environmental requirements for HCRW transportation, treatment and disposal in Gauteng, and (iii) introduce and enforce a licensing system for HCRW service providers (collection, transportation, treatment and disposal);
- The Provincial Government shall require that existing treatment facilities up-grade to meet the set environmental standards. Existing treatment facilities that cannot be brought to compliance with Gauteng requirements should be decommissioned;
- The Provincial Government shall ensure that HCRW treatment facilities meet the regulated Gauteng minimum requirements for environmental impact;
- Where required, the industry/service providers must allocate additional capital for investment in the required environmental performance level, or discontinue operation. The HCRW generators must equally allocate the necessary financial resources to (i) pay for the services provided by successful tenderers providing the required performance, and (ii) provide the necessary financial/human resources for monitoring and enforcing the required service levels;
- The Provincial Government shall ensure that the organisational and logistical structure of the HCRW treatment industry is planned to operate in the most efficient and environmentally sound manner via, among others, the existing permitting tools, reporting; a HCW Information System and a licensing system for HCRW service providers;
- The Provincial Government shall put legislative measures in place to ensure clear requirements for all operators of HCRW treatment plants;
- The Provincial Government shall enforce the existing provincial legislation, new legislation and policy directed towards HCRW treatment facilities;
- The Provincial Government shall ensure, via the relevant tools, that permit holders provide adequate training of staff responsible for handling the waste at HCRW treatment facilities.

### 5.1.1.3 Environmental Minimum Requirements for Disposal

The environmental problems associated with disposal of the residue from HCRW treatment are primarily related to the risk of groundwater pollution on landfills that are not meeting the environmental requirements, and illegal storage and dumping of untreated HCRW. The following requirements are to be adhered to:

#### **Box 5.3: Environmental Minimum Requirements for Disposal**

- *Introduce quality requirements for residues generated by HCRW treatment facilities*
  - **Incinerator bottom ash/fly ash:** set standards for: (i) maximum allowable percentage of non-combustible matter (ignition loss), and (ii) maximum contents of heavy metals with a view to forcing optimisation of the combustion efficiency and segregation of heavy metal containing components from the waste stream. In the absence of national standards the limits set out in the EU Directive 2000/76/EC of 4 December 2000 will be used for incinerator residues only;
  - **Residues from non-burn technologies:** Set standards for (i) the microbial inactivation achieved to be documented in accordance with the report “Technical Assistance Manual of the State Regulatory Oversight of Medical Waste Treatment Technologies, April 1994” of the State and Territorial Association/USEPA, and (ii) the residues from non-burn technologies must meet the same requirements with respect to the heavy metal content as the incinerator residue.
- *Introduce provisions requiring permit holders to dispose of residues at permitted landfills only.*
  - **Penalties for illegal disposal:** The Provincial Government shall introduce discouraging penalties as well as efficient monitoring via, among others, the HCWIS, to ensure lawful disposal of HCRW residues;
  - **Availability of permitted landfills:** The Provincial Government shall facilitate the availability of sufficient permitted landfill capacity.

### 5.1.2 Interim Occupational Health and Safety Minimum Requirements

Occupational health and safety problems are encountered all the way through the waste stream. The primary problems are those connected to the risk of direct contact of staff with infectious waste that can lead to risk of infection. However, there are also more traditional occupational health problems like heavy lifts, heat exposure and dust. It is to be noted that this Policy does not in any way supersede the requirements of the Occupational Health and Safety Act or any other Acts.

The initiatives to cope with the occupational health and safety problems are divided according to the flow of the waste.

The initiatives should be:

- To set minimum requirements for the waste handling equipment to be used at provincial hospitals via provincial procurement and tendering procedures in accordance with the provincial HCW Management Guidelines;
- Publish HCW Management Guidelines for segregation, collection, transport, treatment and disposal;
- Incorporate OHS requirements in provincial tenders;
- Incorporate OHS requirements in the permitting conditions for permit holders;
- Health investigation and inoculation programme;
- *On the longer term:* Introduce a compulsory Technical Competence Certificate for key personnel operating HCRW transportation and treatment facilities.

#### 5.1.2.1 Interim Occupational Health and Safety Minimum Requirements at Health Care Facilities

All persons who implicitly make contact with HCRW are potentially at risk of infection or other health risks, although staff handling the HCRW, including nurses, physicians, workers and cleaners at the health care facilities, are most exposed to the aforesaid risk.

#### **Box 5.4: Occupational Health and Safety Minimum Requirements for Health Care Facilities**

- Health Care Facilities are to provide the necessary equipment to ensure that the segregation, containerisation and transportation of the waste take place safely (waste collection receptacles such as bins, bags, sharps containers etc. and trolleys)
- Health Care Facilities to provide safe storage facilities for the health care risk waste
- Health Care Facilities and Service Providers to plan to avoid heavy lifts and lifts that bring the personnel in close contact with the waste bags as well as ensure provision of adequate personal protective equipment (PPE)
- Health Care Facilities not to allow recapping of needles
- Health Care Facilities and Service Providers to arrange for inoculation and re-inoculation procedures to be in place including documentation for all staff being at risk of infections, needle stick injuries etc.
- Health Care Facilities and Service Providers to provide for adequate retroviral response to needle stick injuries etc.
- All major generators of HCRW shall develop and make available a Code of Practice for HCW Management, detailing the procedures, use of equipment, division of responsibilities, emergency response procedures, contact persons and other relevant information.

#### 5.1.2.2 Occupational Health and Safety Minimum Requirements for Transportation, Treatment and Disposal

Safe handling of the HCRW during transportation, treatment and disposal is to a large extent dependent on appropriate segregation, containerisation and labelling. There is therefore a clear link and potential sharing of responsibilities between two different institutions in the waste flow. Some of the most prominent requirements are shown in Box 5.5 below.



### **Box 5.5: Occupational Health and Safety Minimum Requirements for Treatment, Transportation and Disposal**

- Health Care Facilities shall ensure that HCRW is correctly and safely containerised to prevent spillage and that the bags/containers are labelled to ensure that the transporters are aware of the contents of the containers they are carrying
- Health Care Facilities shall provide the necessary equipment to ensure that the collection and transportation is occupationally safe and that heavy lifts and lifts that bring the personnel in close contact with the waste bags/cardboard boxes are avoided
- Service Providers and Health Care Facilities shall ensure that the workers are duly informed about the risk of the HCRW and that they have received training on how to handle the waste in a correct way, including emergency response plans
- Service Providers and Health Care Facilities shall ensure that inoculation and retroviral programmes are in place and documented
- Provincial Government shall ensure that the treatment facilities have up-to-date technology to reduce emissions of smoke, dust and heat in the working environment
- Service Providers shall ensure that the operators are duly informed about the risk of the health care risk waste and that they have received training on how to operate the treatment facility.
- Provincial Government shall ensure that occupational safety and health is addressed in the permitting and tendering/procurement process
- Landfilling of untreated HCRW shall be prohibited.

### **5.1.3 Provision of Equipment and Technical Procedures**

This section includes requirements for i) segregation and sorting, ii) internal collection and storage, iii) off-site collection and transportation, and iv) treatment facilities.

#### **5.1.3.1 Segregation and Containerisation Minimum Requirements**

The basic requirements for HCW segregation and containerisation are shown in Box 5.6 below.

### **Box 5.6: Minimum Requirements for Segregation and Containerisation**

- All HCW shall be sorted at source;
- Suitable receptacles shall be available for segregation and containerisation at source;
- All HCGW that does not require special treatment shall be disposed of via the conventional domestic waste disposal system, thus minimising the need for costly treatment and the risk of unacceptable emissions resulting from thermal/chemical/mechanical/disinfection treatment;
- No after-sorting of HCRW at any point of the waste stream shall be accepted. Where HCW is poorly sorted and there is any doubt as to the contents of the receptacles/bags, it shall all be treated and disposed of as HCRW;
- A maximum allowable mass of 15 kg is to be adhered to for all containers that are to be lifted manually;
- Manual handling and lifting as well as the number of transfers shall be minimised by use of trolleys, wheeled bins, or similar mechanisms.

Implementation of these basic principles will require:

- Provision of waste collection receptacles of appropriate design for anatomical waste, infectious waste and sharps etc. to ensure that all waste is effectively containerised when segregated;
- Provision of collection and transportation equipment, e.g., trolleys, of appropriate design for internal transportation of waste;
- Establish a uniform colour coding and labelling system to ensure safe waste containerisation once segregated;

Box 5.6 below sets the provincial colour coding system for waste containers that will be used until such time that an overall national colour coding system has been introduced. The provincial colour coding system is based on the current prevailing colour coding used by the health care facilities and service industry in Gauteng. The currently prevailing colour used for HCRW is red, as is the case in, for example, the USA, whereas the WHO recommends yellow, as currently used in Europe. A flexible approach to the use of colours is suggested to allow for cost efficient use of sharp containers available on the international and national markets.

### **Box 5.6 Minimum Requirements for Colour Coding and Labelling System**

A uniform **colour coding system** should be based on the following principles:

- Until such time that a national colour coding system for HCW is in place the following **colour coding system** shall be used;
  - HCRW: **Red** (i) heavy duty plastic bags of min. 80 micron thickness, or (ii) receptacles with **Red** markings;
  - Sharps (HCRW): Preferably **Red** or with significant **red markings** or, alternatively, **Yellow** tamper proof, puncture proof and spill proof containers with indicator for maximum fill level, preferably with transparent indicator of fill level, that can be closed safely and not re-opened once a full container is sealed. Combinations of red/yellow and transparent containers are possible if deemed necessary for particular applications;
  - HCGW: Any colour other than red or yellow can be used. Preference should be given to **black, grey or transparent**.

A uniform **labelling system** should be based on the following principles:

- All HCRW containers shall be marked with the following symbol printed in **Red**:
  - The international ISO biohazard symbol (cf. WHO Guidelines and SABS codes);
  - Text clearly identifying the contents as HCRW/Infectious Waste/Medical Waste/Clinical Waste (any of the mentioned terms are acceptable, to allow for cost-efficient use of various existing national and international products);
  - The intended contents of plastic bags may be indicated by the use of colour only, thus allowing for savings by avoiding printing of plastic bags;
- All containers shall be labelled in such a way that the following information is clearly visible:
  - Waste category (Preferably the following additional information should be labelled: (i) date, (ii) name of health care facility, and (iii) department identification (if applicable)).

#### 5.1.3.2 Internal Collection and Storage

The basic requirements for internal collection and intermediate storage are shown in Box 5.7 below.

### **Box 5.7: Minimum Requirements for Internal Collection and Storage**

The Provincial Government of Gauteng will apply the following provincial minimum requirements for any existing and proposed future internal collection and storage of HCRW in Gauteng:

- **Collection from point of generation:**
  - At all major generators (cf. Box 2.3), HCRW shall be collected and removed from wards, departments and similar on a daily basis and brought to a safe and lockable central storage facility until off-site transport and treatment or on-site treatment takes place;
  - At all minor generators (cf. Box 2.3), HCRW shall be stored in such a way that staff, patients, workers and visitors cannot get unauthorised access to it;
  - The HCRW shall not be handled by HCRW management staff unless containerised and no segregation shall be undertaken by such staff;
  - The required PPE shall be used when handling HCRW containers.
- **Internal transport between point of generation and storage facility:**
  - Where the number of containers to be transported justifies it, HCRW shall be transported on purpose-made trolleys with sufficient storage space and designed to avoid spillage, breakage etc.
  - HCRW containers shall not be loaded higher than the design level and no unsecured containers that may drop from trolleys shall be loaded onto the trolleys;
  - Trolleys, when loaded, shall not be left unattended.
- **Storage on Site:**
  - All major generators (cf. Box 2.3) of HCRW shall establish a lockable storage facility protected against the elements, rodents and vectors that has sufficient capacity for 8 days of waste generation;
  - Waste storage times and temperatures shall be controlled to avoid odour problems and the breeding of vectors.

#### 5.1.3.3 Off-site Collection and Transportation

The basic requirements for off-site collection and transportation are shown in Box 5.8 below. It is to be noted that the requirements do not replace the Road Traffic Act for hazardous materials or any other Acts and legal requirements.

### **Box 5.8: Minimum Requirements for External Collection and Off-site Transport**

The Provincial Government of Gauteng will apply the following provincial minimum requirements for any existing and proposed future external collection and transport of HCRW in Gauteng:

- **Registration and liability:**
  - All transporters of HCRW are to register with DACEL;
  - Without affecting the duty-of-care principle for the generator, transporters of HCRW will be held liable for ensuring that all HCRW is treated and disposed of in accordance with the requirements of this policy.
- **Collection from onsite storage area:**
  - The HCRW shall not be handled by HCRW management staff unless containerised and no segregation shall be undertaken by such staff;
  - The required PPE shall be used when handling HCRW containers;
  - HCRW storage areas shall be closed and secured on completion of the collection round;
  - No HCRW containers shall be left unattended.
- **Loading of containers:**
  - Manual handling of containers shall be minimised;
  - Loading/transfer of excessive mass (>15 kg) shall not be carried out manually;
  - Access to HCRW vehicles shall be safe and unobstructed;
  - Containers shall be secured when loaded;
  - Where containers are to be stacked, the maximum allowable stacking height for the particular types of containers shall be adhered to.
- **Vehicle design:**
  - HCRW collection vehicles shall be equipped with spill kits;
  - HCRW collection vehicles shall be clearly marked as transporting HCRW.
- **Reporting and record-keeping:**
  - HCRW shall be weighed and recorded;
  - Data on HCRW transported shall be submitted to DACEL in the required format for capturing on the HCWIS;
  - Existing manifest requirements shall be complied with until such time that a more sophisticated HCRW tracking system is introduced

#### 5.1.3.4 Treatment facilities

The requirements shown in Box 5.9 below shall be applied for the establishment and operation of treatment facilities.

Specifically, the following minimum requirements for flue gas emission shown in Box 5.10 below shall be applied for thermal treatment facilities. For comparison the similar emission standards applied in EU and USA are shown.

### **Box 5.9: Minimum Requirements for Thermal Treatment Facilities**

- **Emissions to the atmosphere:**

- In the absence of suitable national South African emission standards, and until such time that new national emission standards have been enacted, the *DEAT Emission Guidelines* shall be complied with by all existing and proposed thermal treatment facilities in Gauteng (cf. Box 4.13);
- The permit holder shall document compliance by use of a combination of independent emission tests and on-line monitoring to be prescribed by DACEL;
- The permit holder must report cases of non-compliance immediately to DACEL with a report containing the reason for non-compliance and the plan for avoiding future non-compliance. Operations must be stopped and back-up treatment measures introduced until such time that compliance can be demonstrated to be achievable;
- A standard frequency of tests shall be carried out. However, in case of three successive past tests demonstrating compliance, the frequency can be reduced to a minimum frequency. On-line monitoring of certain parameters may be prescribed.

- **Disposal of residues:**

- The *DWAF Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste* shall be complied with and residues shall be disposed of or landfilled accordingly. However, as a more operational measure, the Gauteng Provincial Government will require frequent determination of (i) ignition loss and (ii) contents of selected heavy metals. The ignition loss shall not exceed 5 % by weight (cf. Box 4.5);
- The permit holder shall document compliance by use of a combination of independent emission testing to be prescribed by DACEL;
- The permit holder must report cases of non-compliance immediately to DACEL with a report containing the reason for non-compliance and the plan for avoiding future non-compliance. If permitted disposal facilities cannot be used according to the DWAF Minimum Requirements, operations must be stopped and backup treatment measures introduced until such time that compliance can be achieved;
- A standard frequency of tests shall be carried out. However, in the case of three successive past tests demonstrating compliance, the frequency can be reduced to a minimum frequency.

- **Reporting and record-keeping:**

- DACEL will develop, enact and prescribe a record-keeping and reporting structure that shall be applied by all treatment facilities. The *DWAF Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste* shall be complied with and residues shall be disposed of or landfilled accordingly (cf. Box 4.17).

- **Siting of facilities**

- In principle, the impact of any HCRW treatment facility on the environment and public health shall be of such nature that the facility could be placed anywhere. However, siting shall take into account any nuisances to the public, neighbouring areas etc. (cf. the EIA procedures) and preferably such facilities shall be placed on or near already compromised land, industrial areas and similar areas.

### Box 5.10: Minimum Requirements for Thermal Treatment Facilities

In the absence of suitable South African flue gas emission standards Gauteng will enforce the current Emission Guidelines published by DEAT.

It is expected that national government will revise the current lenient requirements of the “1965 Atmospheric Pollution Prevention Act” (Act 45 1965) as it currently does not set any specific limits in the form of maximum allowable concentrations of selected pollutants per standard volume of flue gas.

Schedule 2, Process 39 Atmospheric Pollution Prevention Act 1965 <i>Guidelines (DEAT)</i>		Proposed Monitoring Frequency (Permit conditions can vary)	EU	US
		Standard (minimum) per year	Dec. 2000	Sept. 1997
Type				S/M/L*
Units	mg/Nm <sup>3</sup>		mg/Nm <sup>3</sup>	mg/Nm <sup>3</sup>
PM/dust	180	12 (4)	10	53/26/26
CO	-	Continuous	50	36
TOC	-	-	10	-
Dioxin/furan (nanogram) TEQ	0.2	4(1)	0.1	1.76/0.46/0.46
HCl	30	12 (4)	10	17
HF	-	-	1	-
SO <sub>2</sub>	25	12 (4)	50	112
NO <sub>x</sub>	-	-	200	366
NH <sub>3</sub>	-	-	10	-
Pb, (same for Cr, Be, Ar, As, Sb, Ba, Ag, Co, Cu, Mn, Sn, V, Ni)	0.5	4 (1)	0.05	0.92/0.05/0.05
Cd (same for Tl)	0.05	4 (1)	0.05	0.12/0.03/0.03
Hg	0.05	4 (1)	0.05	0.42
Ref. Cond.	11% O <sub>2</sub> , 273 Kelvin, 101.3 kPa			

Note: \*) S/M/L: Small (<200lb/h)/Medium/Large facilities (>500lb/h). Limits recalculated to same standard conditions

Similar requirements for Non-burn treatment technology are shown in Box 5.11 below.

### **Box 5.11: Minimum Requirements for Non-burn Treatment Facilities**

- **Emissions to the atmosphere:**
  - There shall be suitable measures to avoid emission of any pathogens via exhausts or similar;
  - Filter materials and the maintenance and replacement of filters must be documented.
- **Microbial inactivation:**
  - Gauteng requires microbial inactivation based on the *Technical Assistance Manual: State Regulatory Oversight of Medical Waste Treatment Technologies, April 1994*, issued by the *State and Territorial Association* of the USA. Hence the following is required (in brief):
    - Vegetative bacteria, fungi, lipophilic/hydrophilic viruses, parasites and mycobacteria: ?6 *Log<sub>10</sub> reduction*;
    - B. steartothermophilus spores or B. subtilis spores: ?4 *Log<sub>10</sub> reduction*;
    - Representative biological indicators, as described in the *Technical Assistance Manual of the State Regulatory Oversight of Medical Waste Treatment Technologies*, shall be used.
- **Disposal of residues:**
  - The *DWAF Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste* shall be complied with and residues shall be disposed of or landfilled accordingly;
  - The permit holder shall document compliance and microbial inactivation by use of a combination of independent tests to be approved by DACEL;
  - The permit holder must report cases of non-compliance immediately to DACEL with a report containing the reason for non-compliance and the plan for avoiding future non-compliance. If permitted disposal facilities cannot be used according to the DWAF Minimum Requirements, operations must be stopped and backup treatment measures introduced until such time that compliance can be achieved;
  - A standard frequency of tests shall be carried out. However, in case of three successive past tests demonstrating compliance, the frequency can be reduced to a prescribed minimum frequency (cf. *State Regulatory Oversight of Medical Waste Treatment Technologies, April 1994*).
- **Reporting and record-keeping:**
  - DACEL will develop, enact and prescribe a record-keeping and reporting structure that shall be applied by all treatment facilities. The *DWAF Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste* shall be complied with and residues shall be disposed of or landfilled accordingly (cf. Box 5.13).
- **Siting of facilities**
  - In principle, the impact of any HCRW treatment facility on the environment and public health shall be of such nature that the facility could be placed anywhere. However, siting shall take into account any nuisances to the public, neighbouring areas etc. (cf. the EIA procedures) and preferably such facilities shall be placed on or near already compromised land, industrial areas and similar areas.

#### 5.1.4 Organisational and Institutional Initiatives

To ensure an efficient organisation and suitable institutional approach the following provincial requirements are set:



## **Box 5.12: Organisational and Institutional Minimum Requirements**

### **Coordination:**

- A permanent provincial committee shall be established to coordinate activities within health care waste management by the relevant provincial and local government departments (e.g. DACEL, DoH, DPTR&W and GALA) in particular regarding incorporation of all provincial requirements in procurement and tendering procedures for the health care sector

### **Resources:**

- DACEL, DoH and DPTR&W should be supplied with *adequate managerial and human resources* to develop and implement this Policy and to enforce the existing legislation

### **Distribution and logistics for treatment facilities:**

- The Provincial Government shall encourage a shift towards *fewer, larger and complying treatment facilities* by means of:
  - Provisions set up in the coming provincial tenders for HCW collection and treatment
  - Enact and enforce improved Gauteng environmental requirements, thereby discouraging smaller plants that may be costly to up-grade
  - Establish provisions for charging fees to permit holders and permit applicants based on cost recovery for the provincial government's environmental monitoring and permitting system
  - Establish provisions for requiring permit holders to use and pay for independent laboratories or similar to document compliance with improved environmental standards and microbial inactivation standards and requirements to residual products (self-monitoring and burden of evidence by permit holders)
- The Provincial Government shall in the setting of tenders and in the planning process seek to prevent the forming of private sector monopoly positions for the benefit of cost-efficient HCRW treatment and disposal services to Gauteng

### **Proximity aspects and Availability of Sufficient Treatment Capacity in Gauteng:**

- The Provincial Government shall introduce effective measures to *avoid transport of HCRW in or out of the Province motivated by differences in environmental standards*:
  - Any service provider transporting untreated HCRW to other provinces shall document that the treatment facility, as a minimum, complies with the Gauteng Minimum Requirements for HCW Management.
- Permitted HCRW treatment facilities in Gauteng shall only treat HCRW from other provinces insofar there is excess treatment capacity available compared to the HCRW treatment need in Gauteng.

## 5.1.5 Regulatory Minimum Requirements

The regulatory problems are connected both to the lack of compliance with the existing legislation and to the lack of adequate legislation to meet the environmental requirements.

### **Box 5.13: Minimum Requirements for Regulation and Guidelines**

#### **Compliance with Environmental Regulations:**

- All permitted HCRW treatment facilities shall document compliance in accordance with national legislation and any additionally enacted guidelines or regulations required by the Provincial Government in an Annual Report to be submitted to DACEL. The permit holder will bear all cost of necessary tests etc.
- Existing unlicensed HCRW treatment facilities must apply for permitting as any new facility. However, the siting of existing facilities will, in general, be assumed acceptable, but a dispersion model calculation shall be made for burn-technologies
- Existing unlicensed HCRW treatment facilities that do not comply with existing environmental requirements must submit an EIA application and commit to achieving compliance over a maximum period of 18 months to be set by DACEL. If compliance cannot realistically be achieved within that period the operation must be stopped immediately
- As of 1 January 2004 all HCRW treatment facilities shall be in compliance. Any facility in non-compliance on or after 1 January 2004 shall stop its operation until such time that compliance can be documented.

#### **New regulation**

- The Provincial Government shall establish the following provisions for:
  - Lifting the current DEAT Emission guidelines to an actual minimum requirement for Gauteng (cf. Box 5.10)
  - Establishing microbial inactivation standards for non-burn technologies (cf. Box 5.11)
  - Implementation of a HCWIS where all HCRW Service Providers shall report in a prescribed format
  - Establishing a licensing system for all HCRW service providers (transporters, treatment and disposal facilities)
  - Deterring penalty system including provisions for cost recovery for inspections and handling of permit applications
  - Reporting obligations by transporters and treaters/disposers of HCRW (cf. Box 5.14)

#### **Issue Guidelines**

- Publish and disseminate HCW Management Guidelines for Gauteng to assist health care facilities and service providers to improve standards and performance of services

### **Box 5.14: Minimum Requirements for Reporting and Record-keeping on Performance and Waste Quantities**

- **Reporting on Waste Quantities:**

- All existing and future **Transporters of HCRW** shall submit an *Annual Report* to DACEL using a prescribed format that would include, among others, the following information:
  - Monthly and annual accumulated amounts of HCRW collected in kilograms based on actual weighing of 100% of the waste stream;
  - List of Clients Serviced and the annually accumulated amounts for each expressed in kilograms based on weighing;
  - List of permitted /unpermitted treatment and disposal facilities that have received the collected waste, including amounts expressed in kilograms delivered to each facility;
  - Amounts of waste stored for how long, why and where (if any);
  - The Annual Report shall also include any other information prescribed in the format that could include: (i) types, standard and maintenance of equipment, (ii) accidents and other unexpected operational events, (iii) training and capacity development plans/initiatives, and (iv) use of containers and equipment, etc.
  - The information shall be submitted in a prescribed format electronically (email, diskettes or CD-ROM) and in hard-copy.
- All existing and future **Treatment and Disposal Facilities** for HCRW shall submit an *Annual Report* to DACEL using a prescribed format that would include, among others, the following information:
  - Monthly and annual accumulated amounts of HCRW collected in kilograms based on actual weighing of 100% of the waste stream;
  - List of Clients Serviced and the annually accumulated amounts for each expressed in kilograms based on weighing;
  - List of permitted /unpermitted treatment and disposal facilities that have received any residual products or transfers of waste for other treatment including amounts expressed in kilograms delivered to each facility;
  - Amounts of waste stored for how long, why and where (if any);
  - The Annual Report shall also include any other information prescribed in the format that could include: (i) Estimated environmental impact and emission standards and results of emission tests, (ii) types, standard and maintenance of equipment, (iii) accidents and other unexpected operational events, (iv) training and capacity development plans/initiatives, and (v) use of containers and equipment, etc.
  - The information shall be submitted in a prescribed format electronically (email, diskettes or CD-ROM) and in hard-copy quarterly or as prescribed.
- All existing and future **Major Generators of HCRW** (cf. Box 2.3-4) shall keep a record of the amounts of waste disposed of and the service providers and facilities used for the waste disposal. Recordings shall be based on weighing (e.g. as stated on invoices from service providers). Major Generators (cf. Box 2.3-4) of HCRW shall keep the records for at least five full calendar years and shall submit the information to the authorities if required.

The reporting on waste quantities and the reporting on performance indicators may be separated into two separate reporting structures using different formats.

### 5.1.6 Requirements for Financial Minimum Requirements

Naturally, the availability of public funds is limited and there is an ever-present need for minimizing the costs of providing an acceptable and efficient public service. It is the province's intention to improve the cost-effectiveness and the service level for HCRW disposal in parallel, thus ensuring that the health care facilities receive the required service level at an acceptable price that corresponds to the service rendered.

In general, it is the policy of the Province that the service of collecting and disposing HCRW from provincial health care facilities is best outsourced to specialised service providers having the necessary experience and skills to render an effective service.

For this purpose the actions shown in Box 5.15 below are required.

#### **Box 5.15: Minimum Requirements for Financial Initiatives**

- Allocation of necessary funds for inadequately serviced health care facilities, thus allowing implementation of acceptable HCR management systems that comply with the Gauteng Minimum Requirements for HCRW Management;
- Committing health care facilities, via financial monitoring systems, to introduce effective source segregation that minimises the costs of disposing of HCRW by avoiding disposal of non-infectious waste (HCGW) via the systems provided for HCRW;
- Developing and investigating the various financial and budgetary initiatives that can make the health care waste management at the provincial health care facilities more efficient and environmentally sound.

### 5.1.7 Awareness, Information and Training Minimum Requirements

There is obviously an urgent need for more information and training to ensure improved health care risk waste management. It concerns both information on the risks connected to that particular kind of waste as well as practical training in how to handle the waste.

Required actions within this field are shown in Box 5.16 below.

### **Box 5.16: Minimum Requirements for Information and Training**

- Provision of Provincial HCW Management Guidelines that increase the awareness of health care facilities and service providers as well as provides relevant information to public enforcement officers;
- Development of training plans for Health Care Professionals in the management of HCW;
- Making available training packages and information materials to ensure that all staff involved in health care waste management have access to appropriate training material and information;
- Ensure the level of awareness and skills of existing and emerging companies providing HCRW collection, treatment and disposal services, as well as service providers;
- Provision of training for operators of on-site HCRW treatment facilities operated by the province to improve safety and environmental performance;
- HCRW Management to be introduced in the curriculum of health care professionals at provincial health care educational institutions.

## 6. Future Initiatives and Strategy Development for HCW

This Policy is seen as the first of a series of co-ordinated efforts by the Provincial Government and its Departments to improve the management of HCRW in Gauteng.

The following key initiatives, which will be developed in full consultation with the relevant stakeholders, are part of the coming provincial efforts to achieve environmentally sustainable HCRW management that is occupationally safe and financially sound:

- Approval of the Gauteng HCW Management Policy by the Provincial Cabinet;
- Development of the Gauteng HCW Management Strategy and Action Plans, based on the Policy, possibly including a Policy Review;
- Development and publishing of the Gauteng HCW Management Guidelines;
- Development and introduction of a compulsory HCW Information System;
- Introduction of minimum technical requirements and performance requirements in the coming tenders for provincial HCRW collection and disposal services that comply with the Policy, Strategy and Action Plan being prepared.

The detailed timing and planning of the implementation of this HCW Management Policy for Gauteng via the Strategy and Action Plans is planned to take place during the coming 12 months in full consultation with all relevant stakeholders. It is assumed that the full implementation of the Strategy will be phased over a period of some years to be determined, among others, in consultation with stakeholders and available resources.

## Annexure 1: List of Abbreviations

Cd	Cadmium
CO	Carbon mono oxide
DACEL	Department of Agriculture, Conservation, Environment and Land Affairs
DANCED	Danish Co-operation for Environment and Development
DEAT	Department of Environmental Affairs and Tourism
DoH	Department of Health
DPTR&W	Department of Public Transport, Roads and Works
DTPW	Department of Transport and Public Works
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
ETD	Electro-thermal deactivation
EU	European Union
GALA	Gauteng Association of Local Authorities
GDACEL	Gauteng Department of Agriculture, Conservation, Environment and Land Affairs
GDoH	Gauteng Department of Health
GDPTR&W	Gauteng Department of Public Transport, Roads and Works
HASA	Hospital Association of South Africa
HCF	Health care facility
HCGW	Health care general waste
HCl	Hydrochloric acid
HCRW	Health care risk waste
HCW	Health care waste
HCWIS	Health care waste information system
HCWM	Health care waste management
HF	Hydro fluoride
Hg	Mercury
HIV	Human Immune Deficiency Syndrome
ICASA	Infection control association of Southern Africa
IP&WM	Integrated Pollution & Waste Management
MSW	Municipal solid waste
NDoH	National Department of Health
NGO	Non-Governmental Organisation
NH <sub>3</sub>	Ammonia
NO <sub>x</sub>	Nitric oxides
NWMS	National Waste Management Strategy
OHS	Occupational Health and Safety
Pb	Lead
PE	Polyethylene
PM	Particulate matter
PP	Polypropylene
PPE	Personal protective equipment
PVC	Polyvinyl chloride
RSA	Republic of South Africa
SA	South Africa / South African
SANGOCO	South African Non-Governmental Organisation Council
SMLC	Southern Metropolitan Local Council
SO <sub>2</sub>	Sulphur dioxide
TOC	Total Organic Carbon
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
US	United States
USA	United States of America
WHO	World Health Organisation
ZAR	South African Rand