



**DEPARTMENT OF ENVIRONMENTAL  
AFFAIRS AND TOURISM**

**DANIDA**



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**NATIONAL WASTE MANAGEMENT STRATEGY  
IMPLEMENTATION SOUTH AFRICA**

**PROJECTIONS FOR HEALTH CARE RISK  
WASTE TREATMENT**

**NWMSI – HCRW Steering Committee**

**26 September 2006**

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WASTE TREATMENT**

**NWMSI – HCRW Project Team**

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## Table of contents

<b>Executive Summary</b>	<b>1</b>
<b>1. Introduction to the projections of Health Care Risk Waste treatment</b>	<b>7</b>
1.1 Terms of reference	7
1.2 Approach to Activity 1.1	9
1.3 Verification of the treatment and disposal data	10
1.4 Definition of Health Care Waste	10
<b>2. Classification of health care waste treatment facilities</b>	<b>13</b>
<b>3. Treatment throughputs</b>	<b>14</b>
3.1 Treatment capacities for authorized treatment plants	15
3.2 Treatment capacity with soon to be installed treatment plants	16
3.3 Treatment capacity for unauthorized plants	16
3.4 Institutional and other capacities	17
<b>4. Disposal of solid residues from waste treatment</b>	<b>20</b>
<b>5. Discussion</b>	<b>21</b>
5.1 Quantities of HCRW from generators not included in the survey	21
5.2 Summary of waste flow through SA. Use of the treatment facilities data base as a tool	21
5.3 Use of the projection data as a tool	21
<b>6. Acknowledgements</b>	<b>23</b>
<b>7. ANNEXURES</b>	<b>24</b>
7.1 ANNEXURE 1: Citations	24
7.2 ANNEXURE 2: List of Abbreviations	25
7.3 ANNEXURE 3: Definition of terms used	26
7.4 ANNEXURE 4: Treatment data tables	29
7.5 ANNEXURE 5: Treatment facility survey questionnaire	30

## Table of figures

Figure 1: Sources and final destinations and mass flows (tonnes per annum) of HCRW survey in SA January 2001 ..... 6

## List of tables

Table 1: Summary of survey data for generated and treated HCRW quantities (tonnes per annum)

Table 2: Provincial and national commercial treatment capacity, and throughput for all HCRW (tonnes per annum)

Table 3: SANS 10248 HCW categories, SANS 0228 hazard classification, with hazard rating for landfill disposal, and sources of HCW in a hospital

Table 4: Treatment technologies in use for categories of HCRW stream at a hospital using the SANS 10248 classification system

Table 5: Surveyed quantities of HCRW treated by service providers, public hospitals and non-public hospitals at January 2006

Table 6: Treatment throughput of HCRW by facility ownership

The following tables are attached

Table 7: Authorization reported by commercial service providers

Table 8: Summary of authorized and unauthorized treatment capacity: Commercial service providers, public and private hospitals

Table 9: Current and proposed commercial treatment capacity January 2006 (tonnes per annum)

Table 10: Provincial and national averages of treatment capacities for public hospitals at January 2006

Table 11: Projection of EC DoH treatment facility quantities

Table 12: EC DPW treatment facilities

Table 13: Projection of Mpumalanga DoH treatment facility quantities

Table 14: Projection of NC DoH treatment facility quantities

Table 15: Projection of WC DoH treatment facility quantities

Table 16: Projection of Mediclinic treatment facility quantities

Table 17: Treatment capacity and estimated quantities of each category of HCRW January 2006

Table 18: Disposal sites used for treated solid HCRW January 2006

Table 19: Expenditure on HCRW as a percentage of the total health budget

## Executive Summary

This survey makes a number of findings on the treatment and disposal of Health Care Risk Waste (HCRW) masses originating at hospitals and clinics in South Africa<sup>1</sup>.

1. Projections for authorized treatment and disposal capacity exceed projections for generation by 36 % at national level for January 2006, and will increase with new large centralized facilities that are being planned in three provinces. A treatment facility has been taken to be authorized if it has received authorization in terms of at least one of the three permitting regulations, ie, air pollution regulations for incinerators, the provincial EIA, and the storage exemption from Sect 20 of the Environmental Conservation Act amendment Act 53 of 2003. Projections for generation at hospitals and clinics and for treatment and disposal at authorized and unauthorized facilities are approximately 28 000 tonnes per annum.
2. Capacity to collect, transport, treat and dispose of HCRW has been provided to DoH by way of provincial contracts by authorized service providers in 7 of the 9 provinces. This includes the most remote hospitals and clinics in the Northern Cape Province which has the lowest population density. The costs for this capacity depend upon many factors including the arrangements for transport between remote clinics and hospitals, collection frequency, container type, monitoring systems, storage time, and tender requirements. For this reason tender costs can be expected to vary considerably. If the transport cost between all remote clinics and contractor collection points are excluded, the percentage of the Health Budget allocated to HCWM is expected to be between 0.2% and 0.3%. Transport costs for rural areas are being addressed in another project.

An indication of the waste management cost per patient bed day in a hospital can be obtained from the three provinces where provincial tender costs and the total masses of HCRW are available. These indicate that a nominal R 6/patient bed day can be used for District Hospitals and Provincial Tertiary Hospitals. At a national average generation rate of 0.65 kg/patient bed day for District Hospitals the patient bed day cost for HCRW is approximately R 4. For Provincial Tertiary Hospitals which generate a measured 1.53 kg/patient bed day this yields approximately R 9 per day. Costs at remote District Hospitals and Clinics will be higher.

3. Some clinics have been found to be using open pit burning in spite of the province having an appointed service provider to collect, treat and dispose of all the HCRW. This is attributed to insufficient capacity at provincial level to administer contracts, ie, to prepare and award tenders and supervise service providers.

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<sup>1</sup> Unless otherwise indicated the data and discussions in this report refer Health Care General Waste (HCGW) measured in mass, ie, non hazardous waste generated in a health care facility or Health Care Waste (HCW) which is the sum of HCRW and HCGW, measured at kg or tonnes.

4. Almost all of the estimated 184 small treatment facilities at public hospitals are not authorized. These operate at small hospitals with an average daily throughput of 84 kg per day and handle approximately 11% of the national HCRW mass. All the 12 commercial service treatment facilities are authorized and typically operate in large urban areas and on average treat 7 178 kg per day, which is approximately 88% of the HCRW.
5. Technical, safety, and regulatory performance data on the treatment facilities at small public hospitals was not readily available. It is considered that this is in part due to gaps in capacity and awareness on how to register, inspect, budget, control, and report in environmental and safety performance. Where reports were not received, some of the facilities may be operating unsafely or have poorly functioning equipment. This has been illustrated by the survey of treatment facilities carried out for the Eastern Cape DoH that is included in this report. A reporting system for these smaller facilities is required.
6. Two databases were developed during the project; one for public hospitals and the smaller on site treatment facilities, and one for larger commercial treatment facilities typically located near to major cities and authorized landfill disposal sites. It has been recommended that National Department of Health add several environmental health reporting fields to the National Department of Health Information System so as to improve accuracy and savings in HCRW cost management (total national budget annually of HCRW is estimated to be greater than R 100m) and identify unsafe conditions and equipment. Due to the dynamic nature of contracting, the profile of HCRW treatment plants will change, and to improve environmental monitoring, it is recommended that commercial treatment facilities status be monitored by the provinces and reported nationally.

A summary of terminology used in the report is contained in ANNEXURE 2: List of Abbreviations, and in Annexure 3: Definitions of terms used.

**Table 1: Summary of survey data for generated and treated HCRW quantities (tonnes per annum)**

Province	Generated HCRW t/a					Treated HCRW t/a				
	Public		Non-public		Other	Commercial Service Provider reported	Public Hospital estimate	Non-public Hospital estimated	Total	
	Hospitals	Clinics	Hospitals	Clinics						Total
<b>EC</b>	2 238	302	849	21		3 410	960	2 238		3 198
<b>FS</b>	1 027	100	490	5		1 621	756			756 (see note 2)
<b>G</b>	3 216	179	4 022	119		7 535	9 812			9 812
<b>KZN</b>	4 218	187	988	43		5 435	6 960			6 960
<b>Lim</b>	1 631	215	85	2		1 933			61	61 (see note 2)
<b>Mpu</b>	818	222	314	19		1 373		817.63	130	948
<b>NC</b>	914	339	371	22		1 646				
<b>NW</b>	174	94	254	6		528	3 637			3 637 (see note 2)
<b>WC</b>	1 796	276	1 173	70	200	3 515	2 239	111.79		2 351
<b>Mining</b>			1 314	3		1 317				
<b>SA</b>	16 031	1 912	8 547	237		28 314	24 364	3 168	191	27 723

Note:

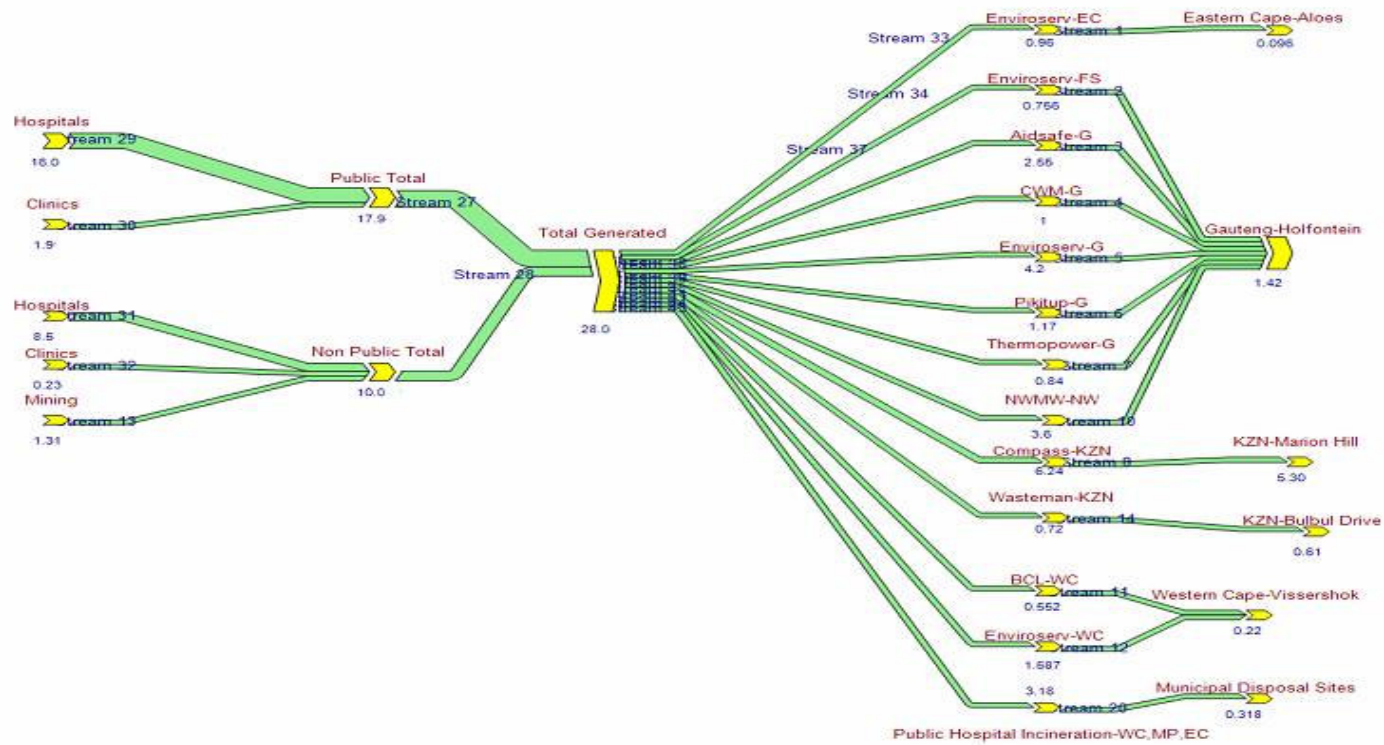
1. Public and private hospital capacities for treatment of HCRW are based only on the projected generation quantities for the hospital and do not include the quantities of waste that may be generated by clinics. As Mpu and WC reported using collection systems between clinics and hospitals, this would increase the amount of public hospital treated waste by more than 200 tpa. Waste at many EC clinics may not be treated, ie, up to 302 tpa.
2. Where a the projection for provincial treatment quantities is significantly greater or less than the projected waste generation, then the waste is either imported or exported from other provinces.

**Table 2: Provincial and national commercial treatment capacity, and throughput for all HCRW (tonnes per annum)**

	Service provider	1	2	3	4	5	6	7	8	9	Sum
		Aidsafe	BCL	CWM	Compass	Enviroserv	NWMW	Pikitup	Thermopower	Wasteman	
<b>EC</b>	capacity					1 557					1 557
	throughput					960					960
	excess					597					597
<b>FS</b>	capacity					2 401					2 401
	throughput					756					756
	excess					1 645					1 645
<b>G</b>	capacity	3 544		3 772		4 801		1 680	840		14 637
	throughput	2 556		1 000		4 246		1 170	840		9 812
	excess	988		2 772		555		510			4 825
<b>KZN</b>	capacity				10 520					1 091	11 611
	throughput				6 240					720	6 960
	excess				4 280					371	4 651
<b>Lim</b>	capacity										
<b>Mpu</b>	capacity										
<b>NC</b>	capacity										
<b>NW</b>	capacity						3 637				3 637
	throughput						3 637				3 637
	excess										
<b>WC</b>	capacity		736			2 401					3 137
	throughput		552			1 687					2 239
	excess		184			714					898
<b>SA</b>	<b>capacity</b>	<b>3 544</b>	<b>736</b>	<b>3 772</b>	<b>10 520</b>	<b>11 159</b>	<b>3 637</b>	<b>1 680</b>	<b>840</b>	<b>1 091</b>	<b>36 979</b>
	<b>throughput</b>	<b>2 556</b>	<b>552</b>	<b>1 000</b>	<b>6 240</b>	<b>7 649</b>	<b>3 637</b>	<b>1 170</b>	<b>840</b>	<b>720</b>	<b>24 364</b>
	<b>excess</b>	<b>988</b>	<b>184</b>	<b>2 772</b>	<b>4 280</b>	<b>3 510</b>		<b>510</b>		<b>371</b>	<b>12 615</b>



Figure 1: Sources and final destinations and mass flows (tonnes per annum) of HCRW survey in SA January 2001



## 1. Introduction to the projections of Health Care Risk Waste treatment

Waste management plans at national and provincial level require quantitative data on quantities, compositions and locations of the HCRW treatment facilities.

Health Care Risk Waste (HCRW) quantities generated at health care facilities (public and non-public hospitals, clinics have been estimated at 836 hospitals and 2501 clinics) have been assessed to be 28 thousand tonnes per annum (Rogers, Molefe et al. 2006 ). HCRW is also generated outside of hospitals and clinics where health professionals work (including dental, medical, nursing, pharmacy, occupational therapy, physiotherapy, radiography and psychology) but this was not included in the projection. Hospitals generate an estimated 92% by mass of the HCRW from hospitals and clinics. Radioactive waste was excluded from the survey because systems are already in place<sup>2</sup>. Smaller sources of waste were to be addressed as parts of the pilot projects at one Metropolitan Municipality as well as at two district hospitals and the surrounding rural clinics at one District Municipality.

The most urgent uses for the projection data have been identified as follows:

- Identifying whether additional treatment and disposal capacity is required,
- Capacity for treatment and disposal nationally

Note: This survey is based on the treatment standards set in the current regulatory framework. If new treatment standards are adopted, it is likely that new plants will be required to meet the standards and old plants will be given a period of grace in which to upgrade the performance. Any changes to capacity will therefore not be immediate.

### 1.1 Terms of reference

The terms of reference are extracted from the project document<sup>3</sup> and subsequent modifications that arose during the implementation of the project are as follows:

#### Output 1.1: Projections for HCRW treatment

##### Activity 1.1.1: Database on HCRW treatment facilities

Treatment/disposal facilities of HCRW in all provinces are to be identified and categorized in accordance with the potential for HCRW treatment/disposal capacity (based on design and utilization efficiencies). Secondary information includes a database on resources available for HCW management within health care facilities as well as service providers.

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<sup>2</sup> See the Non-nuclear radioactive waste regulations of the Department of Health (WSCP91-1 Revised February 2001) and the National Nuclear Regulator Act, 1999 (Act 47 of 1999).

<sup>3</sup> DEAT/DANIDA National Waste Management Strategy Implementation, South Africa, Inception Phase, Project Document Final Document 20040615 104.Sydafrika.1.MFS57-1

<i>Verifiable indicator:</i>	<i>Database is established and populated with information on all identified HCRW treatment facilities</i>
<i>Means of verification:</i>	<i>Cross-reference between different sources to ensure that all treatment facilities are identified and registered</i>
<i>Assumptions:</i>	<i>Information on all treatment/disposal facilities available for all provinces.</i>

Amendment: As it was not possible to provide a clear classification of what constituted Major and Minor treatment facilities, the work plan was amended to include treatment facilities at all hospitals and clinics on the provincial Department of Health facilities, all facilities registered with the provincial Departments of Environment, and facilities at the three large private health care groups, as well as others reported as the result of requests to all stakeholders and NGO's who assisted with the survey.

Activity 1.1.2: HCRW treatment/disposal capacities.

HCRW treatment and disposal capacities are to be determined for a representative sample of each HCRW generation category.

<i>Verifiable indicator:</i>	<i>Reliable treatment/disposal rates for each HCW treatment category.</i>
<i>Means of verification:</i>	<i>Compare treatment/disposal rates with existing Gauteng and World Health Organisation data.</i>
<i>Assumptions:</i>	

Amendment: All available treatment and disposal data was collected in the survey. No sampling of the data was made.

Activity 1.1.3: Projections of HCRW treatment/disposal data.

The overall HCRW treatment/disposal capacities are to be determined by means of projections based on available capacity at treatment/disposal facilities

<i>Verifiable indicator:</i>	<i>Verify treatment disposal capacities projected for each province.</i>
<i>Means of verification:</i>	<i>Compare treatment/disposal capacities between various provinces.</i>
<i>Assumptions:</i>	

## 1.2 Approach to Activity 1.1

A survey questionnaire (see Section 7.5) with a list of all public health care facilities was sent to all 9 provincial departments of Health and departments of Environment with instructions to complete the survey questionnaire where possible, alternatively to provide a list of locations where treatment facilities were located. For the provincial departments of health a list of all public facilities was established and these were to be used if only minimal information was available.

The information required on the survey form included

- Name
- Ownership
- Location
- Permitting status
- Contact persons
- Treatment technology
- Capacity
- Measured throughput
- Design capacity
- Training
- Fuel usage
- Method of disposal of treated waste

Where such information was not available, ie, at the hospitals where, treatment facility documentation was either limited or not available, minimal survey information was requested from an engineer who had personal experience of the equipment, eg, either a consulting engineer or hospital engineer.

The information requested was as follows

- Treatment facility on site or not
- Transport facility available and in use
- Model, name and number of equipment
- Status of the equipment, decommissioned, or in use.
- Any permits obtained

### 1.3 Verification of the treatment and disposal data

#### 1. Verification of existence of treatment facility

Provincial Departments of Health and Environment were requested to confirm the presence and permit status of the treatment facilities.

#### 2. Treatment capacities were verified using

- a. Comparison between throughputs measured, operating hours and equipment specifications,
- b. Reported quantities collected by waste management companies, and measured generation rates for waste generators, lists of generators being served by the facility
- c. An overall mass balance check on the quantities of waste generated and treated.
- d. Checks on all data provided by service providers using self consistency, eg, mass checks on waste flow that can be treated by steam and incineration technologies.

#### 3. Disposal capacities

Disposal sites identified by the waste treatment facility personnel were verified with DWAF and DEAT personnel responsible for permitting of waste sites and disposal of treated health care risk waste and its residues.

### 1.4 Definition of Health Care Waste

The definition of health care waste was taken from the current version of the SABS standard<sup>4</sup>, which “includes all the waste generated in health care facilities, and *health care* research facilities, and *health care test* laboratories. as well as waste originating from health care undertaken in the home, for example dialysis and insulin injections - SANS 10248:2004. “Management of Health Care Waste” (SANS 2004).

While the SANS definition is focussed on health care facilities, some provinces have extended the definition to include all facilities that produce wastes that are potentially infectious to humans, eg, tattoo artists and body piercers. As indicated above, Health Care Waste is classified as either

- Not hazardous<sup>5</sup> and is called Health Care General Waste, or
- Hazardous and is called Health Care Risk Waste.

The categories of Health Care Waste that make up Health Care Risk Waste are defined in SANS 10248. A summary is provided in. The hazard classes are identified in accordance with the international codes of practice that have been adopted by South Africa in SANS 10228<sup>6</sup> are included in Table 3 below. Further details on the items of waste that are included in HCRW and HCGW can be found

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<sup>4</sup> SANS 10248 is currently being revised to incorporate the findings of this project

<sup>5</sup> Health Care General Waste (HCGW) is not included in this survey, as it is considered to be similar to general municipal solid waste once segregated correctly at source.

<sup>6</sup> SANS 10228: Code of Practice for classification of dangerous substances and goods

The health hazards associated with HCRW are summarized in the WHO guide “ Safe management of wastes from health care activities” (Pruess, Giroult et al. 1999) and include<sup>7</sup>:

- Infections:
- Intoxication, ie, poisoning due to chemicals and drugs
- Cancer, ie, from carcinogenic substances
- Radioactive poisoning,
- Burns, and explosions

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<sup>7</sup> The safe management and minimization of Health Care Waste. A training course May 2004, Western Cape Department of Environmental Affairs and Development Planning.

**Table 3: SANS 10248 HCW categories, SANS 0228 hazard classification, with hazard rating for landfill disposal, and sources of HCW in a hospital**

Waste category	SANS 0228 Classification codes	Hazard rating for landfill disposal <sup>8 9</sup>	Typical source(s) in health care facilities
A: Human or animal Anatomical	6.2-infectious	1	Operating theatres, laboratories
B: Infectious non-anatomic	6.2-infectious	1	Operating theatres, general wards, clinics, consulting rooms, pathology research and laboratory testing
C: Sharps	6.2-infectious	1	Operating theatres, general wards, immunization at clinics
D: Chemical/pharmaceutical <sup>10</sup> <ul style="list-style-type: none"> <li>• Chemical</li> <li>• Pharmaceutical excluding catatonic</li> <li>• Cytotoxic pharmaceutical</li> </ul>	Some or all of 1- explosive 2 -hazardous gases 3&4 - flammable liquids & solids 5- oxidizing materials 8- corrosive materials 6.1 toxic substances	Some or all of 1, 2, 3, 4	- Laboratories - Pharmaceutical stores, wards, returned drugs - Laboratories, oncology, wards
E: Radioactive	7 - radioactive	1	Oncology, X-ray, laboratories
F: General waste	No code	Not hazardous under normal handling	Kitchens, waiting rooms, workshops etc.

<sup>8</sup> SANS 10248 hazard ratings for materials are 1: significant amounts of extremely hazardous components, 2:highly hazardous components, 3: moderately hazardous components, 4: low hazards components in large quantities, more information on the hazard rating for landfill disposal can be found in the

<sup>9</sup> DWAF (1998). Minimum requirements for handling, classification and disposal of hazardous waste. DWAF.

Depending upon the way in which the HCRW is stored, handled, treated and disposed, other hazardous waste streams may be generated at a health care facility, eg, gaseous emissions from treatment of waste in an incinerator, and liquid effluents that are destined for disinfection by an activated sludge municipal sewage treatment works.

HCRW components are segregated into categories identified in Table 3, in order to meet the needs for safe transport, treatment and final disposal, eg, for a landfill site<sup>11</sup>.

A typical composition of HCRW has been obtained during the Gauteng project<sup>12</sup> and is provided in **Table 4** using the SANS 10248 classification system.

**Table 4: Treatment technologies in use for categories of HCRW stream at a hospital using the SANS 10248 classification system**

Categories of HCW found in HCRW containers	HCRW sub-category	SA - values (% mass)	Treatment technology in use
Infectious	Anatomic (pathological)	1.6%	Incineration
	Non-anatomic	66.2%	Wet steam or incineration
	Sharps	5.6%	Wet steam or incineration
Chemical		3.9%	Incineration
Radioactive			Incineration (note 2)
HCGW		22.7%	Wet steam or incineration
All HCRW as % of total HCW stream		15%	

Note 1: SA Data obtained from the Gauteng DoH HCRW study prior to training on segregation techniques<sup>12</sup>

Note 2: Only low level activity infectious <sup>14</sup>C from TB testing waste can be treated by incineration <sup>2</sup> high level radioactive waste is typically not processed and is placed in intermediate and long term storage areas under the control of the National Nuclear Regulator (NNR)

## 2. Classification of health care waste treatment facilities

Facility registration is required by the National Environmental Management Act (NEMA) and subsidiary regulations, eg, National Air Quality Management Act and the scheduled process 39 of the former Air Pollution Prevention Act for medical waste incinerators. The reporting requirements in the regulations were used as the basis for a survey questionnaire to all the operators of treatment facilities. The survey fields include:

<sup>11</sup> Health Care Risk Waste is not disposed into a sewer without permission of the sewage treatment authorities, due to the risk of contamination of the water supplies and development of drug resistant pathogens in the sewage system. Only the solid waste stream is quantified.

<sup>12</sup> HCW generation and characterisation study for health and treatment facilities, prepared by DMSAcc, August 2003 for Gauteng DACE.



HCRW facility site name, ownership, address, facility permits and licences (eg, air pollution, treatment and storage, EIA record of decision, and radioactive waste dispersal) treatment technology, capacity, actual throughput, and operational status (eg, operational, waiting repairs or decommissioned).

Only those facilities that were reported to be in operational status, ie, treating HCRW waste over the period October 2005 to January 2006 were included in the survey. The two treatment technologies are incineration to destroy pathogens and the waste, and steam treatment (a description of these terms is included in definition of terms used in Annexure 3.) to destroy pathogens and shredding to make the waste unrecognizable prior to disposal on a landfill site permitted for the waste. Treatment facilities that are not in operational condition or that have been decommissioned (eg, the two former Evertrade facilities in Cape Town and Johannesburg) were not included in the survey. If a health care facility did not have a confirmed means of either onsite treatment or transport to an identified treatment facility, it was recorded as having its own treatment operation, eg, incinerator or open pit burning, and was recorded as an unauthorized treatment facility. The survey distinguishes between authorized and unauthorized facilities, ie, facilities that have been approved and inspected for safe operations under one or more of the applicable regulations, ie, air pollution regulations, the provincial EIA, or the storage exemption from Sect 20 of the Environmental Conservation Act amendment Act 53 of 2003. In addition there are the HCRW regulations for waste treatment and municipal by-laws in some provinces.

A survey form was completed for each of the commercial service provider facilities that were operational or that are being built as part of a tender requirement. On site treatment facilities were surveyed using available data, eg, consultant reports, and interviews with the owners. Information from Hospital located facilities was typically limited to type of treatment technology, model and name of equipment, and use of any available collection and treatment services. Hospitals operate much smaller equipment with correspondingly lower average throughputs, ie, 20 to 100 kg/day, than commercial treatment suppliers, ie, with throughputs of 3 000 to 12 000 kg/day. Only one hospital (newly built and with 40 kg/day) was reported to have a Provincial RoD. All commercial treatment facilities were registered with the provincial authorities and reported their authorization with one or more of the national regulations. As HCRW mass was not measured for on-site treatment at hospitals, the quantity treated was equated to hospital and serviced clinics combined generation quantity.

### **3. Treatment throughputs**

The summary of the treatment throughputs is provided in Table 6. Twelve commercial facilities treat 88% of the HCRW generated in SA. This is achieved by larger treatment facilities, operating full time with scheduled maintenance plans to minimize downtime, that use standard containers and long range collection systems with transfer stations that meet cost and safety standards specified in provincial level tenders that serve both rural and urban areas. For each of the provinces some HCRW is transported across provincial boundaries.

**Table 5: Surveyed quantities of HCRW treated by service providers, public hospitals and non-public hospitals at January 2006**

Province	HCRW treatment (tpa)			Total
	Commercial Service Provider	Public Hospital	Non-public Hospital	
Eastern Cape	960	2 238		3 198
Free State	756			756
Gauteng	9 812			9 812
KZN	6 960			6 960
Limpopo			45	45
Mpumalanga		818	113	931
North Cape		18		18
North West	3 888			3 888
Western Cape	2 239	112		2 351
<b>SA</b>	<b>24 615</b>	<b>3 185</b>	<b>158</b>	<b>27 959</b>
<b>% of total</b>	<b>88%</b>	<b>11%</b>	<b>1%</b>	<b>100%</b>

Note: treatment quantities include both authorized and unauthorized facilities, eg, as it is reported that a significant fraction of the Eastern Cape facilities are either not working or in poor working condition some of the unauthorized facilities are working unsafely.

### 3.1 Treatment capacities for authorized treatment plants

In order to determine whether additional treatment capacity is required, the current authorized capacity was compared with the generation projection so as determine whether there was an excess or shortfall. For commercial plants, total capacity was calculated by using the authorized limits for the plant, and the achievable operating hours and measured hourly throughputs for HCRW. Industry's performance, equipment ratings and model numbers were used to cross check these reported capacities and were adjusted if necessary after discussions with each facility manager. The industry norms used for weekly capacity calculation are for the newer incinerators (which can operate over extended periods without having to stop for de-ashing) are 24 hours per day and 5.5 days per week. For steam and shredding treatment the norm is 24 hours per day and 6 days per week). The industry norm on number of weeks per annum is calculated from 4.33 weeks per month, and 12 months per annum. This gives the following norms:

Incinerator throughput = hourly treatment rate (kg/hr) \* 6859 hrs/annum

Steam treatment throughput = hourly treatment rate (kg/hr) \* 7482 hrs/annum

For on-site hospital treatments where no measured data was provided, it is assumed that the facility is working at full capacity, ie, that there was no excess capacity. Authorized capacities were found to be 37 561 tpa for commercial service providers and 64 tpa for hospitals, this compares with the projected quantities of 28 000 tpa which gives an excess capacity of 10 000 tpa which is an exceedence by 36%. These capacities at January 2006 are shown in Table 8

**Table 6: Treatment throughput of HCRW by facility ownership**

	HCRW treatment service providers	Public Hospitals	Non-public hospitals	Total
Throughput per annum (tpa)	24 615	3 185	158	27 959
No of treatment facilities	12	146	4	162
Average daily throughput (kg/d)	7 178	84	203	7 465
% of total waste treated	88%	11%	1%	100%
Authorized capacity (Jan 2006) (tpa)	37 561	11	53	37 625

### 3.2 Treatment capacity with soon to be installed treatment plants

The waste treatment service providers have reported that additional capacity can also be expected from plants commissioned after the end of the survey period in January 2006. This included the re-commissioning of the former Evertrade plant in Cape Town which was restarting operations under new ownership, expansion of the North West incinerator, and the building of new plants in Limpopo, Free State and Eastern Cape. This does not include the former Evertrade plant in Johannesburg. The proposals for new plants and recommissioned plants account for a possible additional capacity is approximately 10 000 tonnes per annum. (See Table 9).

### 3.3 Treatment capacity for unauthorized plants

Department of Health in each province advised on the status of each on site treatment facility in the public health sector. Eastern Cape, Western Cape, and Mpumalanga are operating treatment facilities routinely at hospitals. Only one of these hospitals is authorized, (Tonga at Mpumalanga)

In the private sector only Mediclinic reported operating four treatment facilities in Limpopo and Mpumalanga, of which the facility at Polokwane is authorized.

Only incineration is used for treatment (although a small pilot chemical treatment facility has been evaluated at one Johannesburg hospital). Disposal of ash is typically to the municipal disposal waste sites, which are not authorized by DWAF/DEAT.

None of the non-public clinics have reported to have treatment facilities on site.

Some of the hospital treatment facilities receive waste that is transported from neighbouring hospitals and clinics. If the hospital or authority could not identify either transport or treatment facilities at a hospital or clinic, then the database records that facilities has no incineration and the waste is destroyed by open burning or dumped with municipal waste.

The treatment at public hospitals is summarized for provincial level in Table 10, and a summary of the other capacities is as follows:

- Transport capacity has not been reported to be in accordance with the regulations of the Department of Transport, so it is expected that capacity will not meet the DoT safety standards. This accounts therefore for all the clinics in Mpumalanga, most clinics more than 100 km from Cape Town in Western Cape, and most clinics in Eastern Cape. First time provincial contracts were in use in Limpopo and North West Provinces and reports indicate that not all clinics were being serviced, eg, due to administrative delays in implementing the contract for all facilities, so it expected that those transport facilities will not meet the transport standards.
- Storage capacity was too low at some clinics for infrequent collections, in particular for anatomic waste (placentae). As a result these unserved clinics used on site burning and or home burial.
- Disposal facilities for unserved hospitals and clinics are distant from the remote rural facilities due to unavailability of appropriately permitted waste disposal sites, eg, in NW, Limpopo, Mpumalanga, Eastern Cape, and Western Cape. As a result it is not possible to make cost savings on transport for small on steam treatment. Incinerator ash was disposed locally, eg, mixed with boiler ash and disposed with municipal waste, and placentae were buried or disposed of in placenta pits (it is not possible to burn them successfully outside of an incinerator (see discussion in ANNEXURE 3: Definition of terms used in section 7.3).

### 3.4 Institutional and other capacities

Secondary information on capacities have been obtained, ie, other capacities required to successfully run a waste management system. These include: technical support from suppliers, administrative and technical skills and financial resources.

- Maintenance capacity of treatment facilities is available throughout SA from equipment suppliers who can manufacture and rebuild treatment plants.

As unscheduled maintenance can result in loss of capacity and financial losses, the large commercial service providers typically use daily, weekly and annual maintenance programmes to maximize throughput and minimize breakdowns.

In the case of Public treatment facilities, the condition of treatment plant was in most cases either unknown, or in poor working condition. The Eastern Cape provided the most comprehensive data; see the report for Eastern Cape incinerators in Table 12

- Administrative and technical skills in setting up waste management contracting and operating systems in the Provincial Departments may be the cause for the following problems: inappropriate specifications for containers, inability to issue orders for collection from hospitals and clinics even though contracts for removal have been approved, difficult to administer contracts, over reliance on a single supplier for a key technology, and out of order incinerators at hospitals.
- Financial capacity: When one tender is put out for a province, all facilities are included in the tenders. This results in opportunities for savings due to economies of scale and can increase affordability, in particular for the small quantities of waste at remote rural health care facilities. Seven of the nine provinces in SA including Limpopo, the poorest province have allocated budgets for the HCRW management that uses authorized treatment and disposal facilities. Final total tender costs and masses collected per annum were not obtained from provinces, so it has not been possible to report on per kilogram costs from provincial records. An indication of the invoiced costs has been provided by the service providers to the Kwa-Zulu Natal and Western Cape Departments of Health for hospitals and clinics, but not including transport from all clinics, as transport is arranged outside of this tender. These provide an average per kg cost for the reporting period of R 5.11/kg. Preliminary estimates for Gauteng Department of Health are closer to R 6/kg. These include charges for containers, collection, treatment and disposal with authorized facilities. For the purpose of assessing costs a nominal value of R 6/kg could be used. For example, at average HCRW generation rates for District Hospitals of 0.65 kg/patient bed day this yields approximately R 4/patient bed day, and for Provincial Tertiary Hospitals at 1.53 kg/patient bed day approximately R 9 per patient bed day. Costings for remote rural areas are being made as part of another component of this project, but these costs are expected to be higher because of the transport cost. Therefore a national budget based on collection at remote rural areas would increase these costs. For an estimated 16 000 tonnes per annum of HCRW generated in the Department of Health system, this would yield at R 6/kg average an annual cost in excess of R 106 m.

An indication of affordability is the total provincial DoH HCRW tender cost as a percentage of the provincial Health Budget. Estimates were possible for Kwa-Zulu Natal and Gauteng that are using mass based tenders. These are shown

in Table 19 to be in the range between 0.2% and 0.3% of the total health care budget. These compare with a Bulgarian Department of Health estimate of 0.1% to 0.3% of the total Health budget for pre-EU standard treatment facilities and 1% to 2% for EU treatment standards (Spasov 2003). Some further investigation of quantities, costs, and standards will assist the province

Conclusions on institutional capacity limitations:

- There is a lack of capacity in the provincial departments of health to provide data which is needed to carry out HCRW management. Although the cost is not a large percentage of the total health budget, it is none-the-less large when considered at nationally (ie, greater than R 100 m p.a.). Without reliable measurements and data it will be difficult to make rational and cost effective decisions on technology selections and tender standards. For this reason the measurements of quantity and cost, merits more capacity than is currently provided. A good starting point will be to get trained professionals managing costs and safety using data bases and information obtained from this study.
- HCRW management systems in rural areas are more expensive to operate within the current tender system and the limited information collected here indicates it is because of transport cost rather than treatment cost in a large centralized treatment facility. The issues of lower cost transport, longer storage and less frequent collection are being investigated and these may provide more cost effective solutions than those currently considered as part of the tender process.
- The lack of data on the cost and safety performance of the small treatment plants in less accessible areas indicates a lack of inspection and reporting capacity in the Departments of Health and Environment. This lack of information could be hiding occupational, public health, air pollution, and disposal site hazards. A training of the inspectors on the safety and health, and minimum safety requirements for operation of these on site facilities will be required so that they can report within the Health and Environment frameworks. The possibility of inspection within the Occupational Health and Safety Act has not been evaluated during this study, and should be assessed as it is both a regulatory requirement, and provides independent expert ass
- The incidence of open burning, placenta pit disposal or burial of waste in provinces which have contracted commercial service providers can be considered to be symptomatic of the capacity problems in operational management, tender specifications, and inspection. The capacity to manage appointed contractors has been linked to the open pit burning. The absence of working solutions for transport and storage is being addressed in another part of this study.

#### **4. Disposal of solid residues from waste treatment**

Permits are required from DEAT (the function was transferred effective from 3 January 2006) in order for waste disposal sites to be authorized to receive the residues of treated HCRW<sup>13</sup>. If the treated waste is not disposed into a hazardous waste site, DEAT policy is to ensure that the treated HCRW is de-listed, ie, classified as being no longer hazardous, and is destroyed so that it is not recognizable as HCRW, before it is disposed in a site approved for this purpose (Brendenhann, 2006-1). This would typically be a GMB+ or a GLB+ site, subject to demonstrated compliance with existing permit conditions for existing waste streams, and possibly additional permit conditions for the treated waste (Bredenhann, 2006). As some provinces may not yet have either a H:H, H:h, GMB+ or a GLB+ disposal site already available for receiving HCRW (le Roux, 2005), the location of a treatment plant is important to ensure cost effective disposal, particularly in the case of steam treatment where mass reduction may be of the order of 15% but volume reduction is relatively low, (compared to incineration which can reduce waste masses by 90% and volumes by more). In the case of small scale steam treatment plants located adjacent to the source of the waste at a District Hospital, this can result in a significant barrier to establishing economically viable treatment facilities, as has been found in pilot project report the North West pilot project Activity of the NWMIS project

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<sup>13</sup> Incinerator ash from medical waste is toxic unless proven otherwise. Refer to the DWAF minimum requirements for how to test for toxicity. <http://www.dwaf.gov.za/Documents/<20060926>>

## **5. Discussion**

### **5.1 Quantities of HCRW from generators not included in the survey**

One question which was asked during the development of the survey was “Is there a relatively large amount of HCRW that is being generated outside of the hospitals and clinics, eg, doctors, blood banks, and laboratories, that will result in any capacity evaluation giving the wrong information to policy makers and planners?”. Unfortunately very limited records of masses of waste from treatment facilities, individuals or groups of these generators were available. The response from the commercial service providers is that the HCRW from such generators is included in the total mass of HCRW reported. As the sum of the projections equals the sum of the treatment quantities, the quantity of treated HCRW from these sources is within the uncertainty of the projection of hospitals and clinics and is expected to account for any additional amounts less than 3-5% of mass of the projection<sup>14</sup>.

### **5.2 Summary of waste flow through SA. Use of the treatment facilities data base as a tool**

A cradle to grave view of the HCRW can be used to get a picture of the relative contributions to the HCRW flow at each of the stages in the life cycle of the waste. This can give an understanding of where the generated waste is treated and disposed. A summary of the flow of waste around South Africa is shown in Figure 1. Of interest from this waste flow is the centralization of treatment and disposal facilities which are authorized in the large metropolitan areas and the relatively small amount of waste that is treated and disposed of at unauthorized facilities in the remote rural areas.

### **5.3 Use of the projection data as a tool**

Two data bases have been setup and can be used as follows:

- The database extracted from the NDoH IS can be used by the NDoH and the provinces to
  - Provide location and capacity and status of treatment, and transport of HCRW at each public facility.

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<sup>14</sup> A very rough estimate of the amount of waste generated outside of hospitals and clinics was made using the numbers of doctors, dentists and physiotherapists identified in the Gauteng study (7 442) and assuming that the rest of SA has half this number per capita ( 15 000) and that these each has 5000 consultations per year with 8g/consultation, produces 600 tonnes per annum, or approximately 2% of the total HCRW projected for the hospitals and clinics.



- Comply with the waste requirements of the new Health Act.

**Recommendations:** the NDoH reporting system should be expanded to include operational status and waste collection service at each public health facility. This will best be executed at Provincial DoH where tenders are managed and where Environmental Health Inspectors report the status of safety, and coordinated at National Department of Health..

In the case of the private sector, an arrangement for treatment inspection and reporting may be feasible either through the occupational health and safety regulations, or new waste regulations.

- The treatment facility database can be used by the DEAT and the provincial Environmental departments to
  - Provide location, capacity and status of treatment and disposal facilities that receive HCRW from the health care facilities
  - Identify where waste can be treated and disposed in each province.
  - Establish an inspection and reporting system for the provincial inspectorates that meets the requirements of the new waste regulations.
- A mass balance between the generated amounts and reported treated amounts can be checked by comparing the outputs of the two databases. This could be part of an ongoing cooperation on HCRW management between DEAT and NDoH at national level and the responsible departments at provincial level.

## **6. Acknowledgements**

National Department of Health: District Health and Development Chief Directorate for support in establishing the hospital and clinic public data set

Provincial Health and Environment Departments for verifying HCF data sets, providing quantities of HCRW, and identifying permitted treatment facilities in their provinces

Pharmaceutical Publishers and Printers (Pty) Ltd, for providing public and non-public hospital and clinic data sets for 2004.

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Health Care Service Providers: Medi-Clinic, Netcare, Health Life, and Anglo Gold Hospital Services for providing and verifying private sector occupancies and generation rates

## 7. ANNEXURES

### 7.1 ANNEXURE 1: Citations

- Ayliffe, G. A. J., E. J. L. Lowbury, et al. (1992). "Control of hospital infection: A practical handbook." (3rd Edition).
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## 7.2 ANNEXURE 2: List of Abbreviations

CHC	Community Health Centre
DACEL	Department of Agriculture Conservation Environment and Land
DANIDA	Danish International Development Agency
DEAT	Department of Environmental Affairs and Tourism
DoL	Department of Labour
DoT	Department of Transport (national)
DPTR&W	Department of Public Transport, Roads and Works (Gauteng)
DPW	Department of Public Works (Eastern Cape)
DWAF	Department of Water Affairs and Forestry
EC	Eastern Cape
EIA	Environmental Impact Assessment
ETD	Electro-thermal deactivation
EU	European Union
FS	Free State Province
G	Gauteng Province
GDoH	Gauteng Department of Health
GP	General Medicine Practitioner
HASA	Hospital Association of South Africa
HCF	Health care facility
HCGW	Health care general waste
HCRW	Health Care Risk Waste
HCW	Health care waste
HC WIS	Health care waste information system
HCWM	Health care waste management
HCRW	Health Care Risk Waste
KZN	Kwa-Zulu Natal Province
Lim.	Limpopo Province
MOU	Midwife and Obstetrics Unit
Mpu	Mpumalanga Province
NC	Northern Cape Province
NDoH	National Department of Health
NEMA	National Environmental Management Act
NDoH IS	National Department of Health Information System
NNR	National Nuclear Regulator
NW	North West Province
NWMS	National Waste Management Strategy
NWMIS	National waste management implementation strategy
OH&S Act	Occupational Health and Safety Act
PHC	Primary Health Care
RoD	Record of Decision
SA	South Africa / South African
TAC	Technical Advisory Committee
tpa	tonnes per annum
WC	Western Cape Province
WIS	Waste Information System
WHO	World Health Organisation

### 7.3 ANNEXURE 3: Definition of terms used

#### Sterilization:

- Sterilization means treatment which achieves the complete killing or removal of all types of micro-organisms. All items to be sterilized should be physically cleaned before they are subject to a standard sterilizing process (Ayliffe, Lowbury et al. 1992).
- Sterilization: a process that kills and/or removes all classes of microorganisms and spores (WHO 2004)

#### Disinfection

- treatment that reduces the numbers of vegetative micro-organisms, and viruses, but not necessarily bacterial spores or viruses to safe or relatively safe levels (Ayliffe, Lowbury et al. 1992).
- a physical or chemical method of killing microorganisms but not necessarily spores (WHO 2004)

HCRW treatment facilities are used to destroy, and or, to reduce one or more of the hazards (infection, toxicity, chemical, radioactive) to safe levels. Technologies most in use in South Africa during this survey are thermal treatments ie, steam treatment technologies, ie, autoclave, and incineration.

#### Incineration

Health care risk waste incineration is the controlled burning of health care risk waste so that no combustible material remains, and the infectious and toxic hazards of the health care risk waste are either eliminated or reduced to acceptable levels, so that the gaseous products can be released safely into the atmosphere.

Incineration is useful for disposing of animal and human anatomical waste and laboratory waste without prior decontamination, and is considered by the WHO to be an alternative to autoclaving only if the incinerator is under laboratory control (WHO 2004) (see page 92). High temperature and two stage incineration is required to ensure destruction of microorganisms and the ash from infectious wastes alone is considered by the WHO (WHO 2004) as normally to be general waste that can be disposed via municipal land fill.

#### Wet Steam treatment

Destruction of micro-organisms using steam is achieved by heating the waste for extended periods, so that the infectious hazards are reduced to levels safe for the disposal of the waste on a landfill site. For laboratory wastes on site autoclaving is recommended prior to off site incineration; land fill of autoclaved laboratory waste is not normally recommended (WHO 2004). WHO prefers the use of wet sterilization to

“steam autoclaves” when referring to waste treatment using steam in a health care environment (Pruess, Giroult et al. 1999). The benefits of this approach have been seen during this survey when hospital personnel mistakenly attributed a steam sterilizer (termed an autoclave) made for preparing reusable medical instruments, to be a waste treatment plant. Waste treated in a “steam autoclave” cannot be reused for medical applications. See discussion below by WHO normal procedures for use of steam treatment for infectious waste from laboratories (WHO 2004).

HCRW disposal facilities are used to release the treated waste to nature. This includes sewage works, incinerator (DEAT 2004) and shredder (DoL 2001) ventilation to the ambient air, and landfill sites (Bredenhann, Fourie et al. 2005). Authorization is required for these releases and these are based on the demonstration of treatment efficiency and individual and community safety to the responsible authority.

Criteria in assessing risk of infection include (Best, Graham et al. 2004)

- Pathogenicity
- Infectious dose (air borne viruses can have the lowest dose, ie, < 10 organisms compared to bacteria 40 000 organisms for cholera (Blodgett 2006))
- Mode of transmission
- Host range
- Availability of effective preventative measures
- Availability of effective treatment

Hazard levels set for bioorganisms are classified (WHO 2003)

- Risk Group 1 (no or very low individual and community risk): A microorganism that is unlikely to cause human or animal disease
- Risk group 2 (moderate individual risk, low community risk): A pathogen that can cause human or animal disease but is unlikely to be a serious hazard to laboratory workers, the community, livestock or the environment. Laboratory exposures may cause serious infection, but effective treatment and preventative measures are available and risk of infection is limited.
- Risk group 3 (high individual risk, low community risk): A pathogen that usually causes serious human or animal disease but does not ordinarily spread from one infected individual to another. Effective treatment and preventative measures are available.
- Risk group 4 (high individual risk and community risk): A pathogen that usually causes serious human or animal disease and that can be readily transmitted from one individual to another, directly or indirectly. Effective treatment and preventative measures are not usually available

Transport safety is explained in the SA Transport regulations for the container, vehicle, driver and manifest controls of responsibility for safety. A WHO guideline document provides the UN codes and specifications for shipping infectious organisms by air, transport, sea and post (WHO 2005) Example of infectious organisms causing the most risk to humans and animals are provided in Annexure 2 (WHO 2005).

#### Nuclear Waste management

The National Nuclear Regulator (NNR) is the national authority responsible for exercising regulatory control over the safety of nuclear installations, radioactive waste, irradiated nuclear fuel, and the mining and processing of radioactive ores and minerals. The primary function of the NNR is to protect workers and members of the public from the harmful effects (i.e. nuclear damage) arising from exposure to ionising radiation.  
[www.nnr.co.za](http://www.nnr.co.za)

#### 7.4 ANNEXURE 4: Treatment data tables

The following tables are attached

**Table 7: Authorization reported by commercial service providers**

**Table 8: Summary of authorized and unauthorized treatment capacity: Commercial service providers, public and private hospitals**

**Table 9: Current and proposed commercial treatment capacity January 2006 (tonnes per annum)**

**Table 10: Provincial and national averages of treatment capacities for public hospitals at January 2006**

**Table 11: Projection of EC DoH treatment facility quantities**

**Table 12: EC DPW treatment facilities**

**Table 13: Projection of Mpumalanga DoH treatment facility quantities**

**Table 14: Projection of NC DoH treatment facility quantities**

**Table 15: Projection of WC DoH treatment facility quantities**

**Table 16: Projection of Mediclinic treatment facility quantities**

**Table 17: Treatment capacity and estimated quantities of each category of HCRW January 2006**

**Table 18: Disposal sites used for treated solid HCRW January 2006**

**Table 19: Expenditure on HCRW as a percentage of the total health budget**



Table 7: Authorization reported by commercial service providers

	1	2	3	4	5	6	7	8	9	10	11	12	Sum
	Enviro-serv-EC	Enviro-serv-FS	Aidsafe	CWM	Enviro-serv-G	Pikitup	Thermo-power	Compass	Wasteman	NWMW	BCL	Enviro-serv-WC	
Steam/shred								1	1				2
Incinerator	1	1	1	1	1	1	1			1	1	1	10
Multi chamber	1	1	1	1	1	1	1			1	1	1	10
Manufacturer	Macroburn	Johnson Thermal	Howden	Seungwoon	Johnson Thermal	Johnson Thermal	Thermo-power	Bondtech	Erdwich	Macroburn	Lucifer	Johnson Thermal	
Scrubber			1	1				1		1	no response		4
Air Pollution Permit for emissions	1	1	1	Requested as a condition of the RoD	1	1	1			1	1	1	9
Provincial EIA regulations RoD for waste treatment site	1	1	1	1	1	1	1	1	1	1	1	1	11
Provincial regulations, eg, G DACEL				1		1							
Metro regulations, eg, by laws											1		
DWAF for storage area	1	1	1	Requested as a condition of the RoD	1		1	1	1	1		1	9
Facility authorized	1	1	1	1	1	1	1	1	1	1	1	1	12
Treated Waste (tpa)	960	756	2 556	1 000	4 246	1 170	840	6 240	720	3 637	552	1 687	24 364

**Table 8 Summary of authorized treatment capacity: Commercial service providers and public and private hospitals**

Treatment of HCRW Jan 2006		tpa	% of waste generated	No of facilities
<b>Authorized Treatment</b>				
	commercial service providers	<b>24 364</b>	<b>87.9%</b>	<b>12</b>
	hospitals			
	public	<b>11</b>	<b>0.0%</b>	<b>1</b>
	private	61	<b>0.2%</b>	1
	total hospitals	72	<b>0.3%</b>	
	<b>Total</b>	<b>24 436</b>	<b>88.1%</b>	<b>14</b>
<b>Unauthorized treatment</b>				
	commercial service providers	0	<b>0.0%</b>	0
	hospitals			
	public	3156.81	<b>11.4%</b>	145
	private	130	<b>0.5%</b>	3
	<b>Total</b>	<b>3 287</b>	<b>11.9%</b>	<b>148</b>
Total treatment		27 723	<b>100.0%</b>	162
Total authorized treatment capacity		37 051	<b>133.6%</b>	14
Excess authorized treatment capacity Jan 2006		12 615	<b>45.5%</b>	10
Additional treatment capacity proposed post Jan 2006		13 401	<b>48.3%</b>	4
Excess treatment capacity after Jan 2006		26 016	<b>93.8%</b>	14

Notes

- 1 Treatment quantities of waste at authorized hospital treatment plants are estimated from the projected generation rate of the hospital, ie, they do not account for additional waste that is transported from other facilities.
- 2 Approved expenditure is based on advise from a commercial service provider indicating that it will construct a new facility, and/or advise from a provincial Dept that a new facility is required.

ref

1 Tonga hospital permitted <20060621 Careen Swart>

2 Polokwane permitted <200606 K Poggenpohl>

Table 9. Current and proposed commercial treatment capacity January 2006 (tonnes per annum)

	Service provider	1	2	3	4	5	6	7	8	9	10	11	Sum	kg/hr
		Aidsafe	BCL	CWM	Compass	Enviroserv	Evertrade	NWMW	Pikitup	Thermopower	Tsunami	Wasteman		
EC	capacity				6 000	1 557							7 557	
	throughput					960							960	
	excess					80							6 597	
FS	capacity				3 000	2 401							5 401	
	throughput					756							756	
	excess					80							4 645	
G	capacity	3 544		3 772		4 801			1 680	840			14 637	
	throughput	3 637		1 000		4 246			1 170	840			10 893	
	excess	988		2 772		80			510				3 744	
K	capacity				10 520							1 091	11 611	
	throughput				6 240							720	6 960	
	excess				4 280								4 651	
L	capacity										3 429		3 429	
	throughput													
	excess												3 429	
M	capacity													
	throughput													
	excess													
NC	capacity													
	throughput													
	excess													
NW	capacity							3 637					3 637	
	throughput							3 637					3 637	
	excess													
WC	capacity		736			2 401	972						4 108	
	throughput		552			1 687	972						3 211	
	excess		184			80							898	
SA	capacity	3 544	736	3 772	19 520	11 159	972	3 637	1 680	840	3 429	1 091	50 380	
	throughput	3 637	552	1 000	6 240	7 649	972	3 637	1 170	840		720	26 417	
	excess	988	184	2 772	4 280	320			510				23 963	

Notes:

1. Italics for proposed capacity
2. Proposed capacity is that for which permit applications, plant purchase, and contracts have already been awarded, and the supplied worksheets have been checked for consistency with proposed plant performance specifications

**Table 10. Provincial and national average of treatment capacities for public hospitals**

Province	Data available	Total HCRW tpa	No hospitals	Avg capacity	
				tpa	kg/day
<b>EC</b>	capacity				
	throughput	2238.15	91	24.6	94.6
	excess				
<b>FS</b>	capacity				
	throughput				
	excess				
<b>G</b>	capacity				
	throughput				
	excess				
<b>K</b>	capacity				
	throughput				
	excess				
<b>L</b>	capacity				
	throughput				
	excess				
<b>M</b>	capacity				
	throughput	817.63	31	26.4	101.4
	excess				
<b>NC</b>	capacity				
	throughput		1		
	excess				
<b>NW</b>	capacity				
	throughput				
	excess				
<b>WC</b>	capacity				
	throughput	111.79	23	4.9	18.7
	excess				
<b>SA</b>	<b>capacity</b>				
	<b>throughput</b>	<b>3167.57</b>	<b>146</b>	<b>21.7</b>	<b>83.4</b>
	<b>excess</b>				

Table 11 Projection of EC DoH treatment facilities and quantities

OU3Short	OUtype	OU5Short-1	Province Aided Health Facility	Public Health Facility	Semi-Private Health Facility	OU5Short-2	Actual beds (raw)	Usable beds - Total (raw)	Inpatient days/year - Total (raw)	Predicted waste generation rate	Kg Predicted waste generated Annium (Processed)	Kg measuredwaste generated Annium (Processed)	Incinerator on site model	Treatment (capacity (pa)	O(operational)/D(decommissioned)/N(not in use or no data)	Collection service available (C,D,N)	CI	
																	N	no incinerator
A Nzo DM	District Hospital	Mary Teresa Hosp		1	Mary Teresa Hosp		177	134	29 799	0.651	19 388				O	Ca		Commercial collection in use
A Nzo DM	District Hospital	Mt Ayliff Hosp		1	Mt Ayliff Hosp		118	167	47 120	0.651	30 658				O	Ca		Commercial collection avail not in use
A Nzo DM	District Hospital	Rietvlei Hosp		1	Rietvlei Hosp		297	172	47 454	0.651	30 875				O	Ca		Commercial collection in use
A Nzo DM	District Hospital	St Margaret's Hosp		1	St Margaret's Hosp		80	80	16 450	0.651	10 703				O	Ca		Commercial collection in use
A Nzo DM	Specialised Hospital	Umzimkulu Hosp		1	Umzimkulu Hosp		320	320	116 800	0.167	19 463				O	Ca		Commercial collection in use
Amathole DM	District Hospital	Adelaide Hosp	1		Adelaide Hosp		93	70	14 861	0.651	9 669				O	Ca		DoH collection service in use
Amathole DM	District Hospital	Bedford Hosp		1	Bedford Hosp		55	48	4 493	0.651	2 923				N	Ca		None, no data
Amathole DM	District Hospital	Bisho Hosp		1	Bisho Hosp		205	262	25 455	0.651	16 562				N	Ca		None, no data
Amathole DM	District Hospital	Butterworth Hosp		1	Butterworth Hosp		403	260	70 815	0.651	46 075				N	Ca		None, no data
Amathole DM	District Hospital	Cathcart Hosp		1	Cathcart Hosp		64	64	11 331	0.651	7 372				N	Ca		None, no data
Amathole DM	District Hospital	Fort Beaufort Hosp		1	Fort Beaufort Hosp		105	94	15 399	0.651	10 019				N	Ca		None, no data
Amathole DM	District Hospital	Grey Hosp		1	Grey Hosp		85	85	22 925	0.651	14 916				N	Ca		None, no data
Amathole DM	District Hospital	Komga Hosp	1		Komga Hosp		8	17	726	0.651	472				N	Ca		None, no data
Amathole DM	District Hospital	Madwaleni Hosp		1	Madwaleni Hosp		220	347	40 096	0.651	26 088				N	Ca		None, no data
Amathole DM	District Hospital	Nompumelelo Hosp		1	Nompumelelo Hosp		194	219	32 099	0.651	20 885				N	Ca		None, no data
Amathole DM	District Hospital	SS Gida Hosp		1	SS Gida Hosp		221	214	30 563	0.651	19 885				N	Ca		None, no data
Amathole DM	District Hospital	Stutterheim Hosp	1		Stutterheim Hosp		78	78	20 654	0.651	13 438				N	Ca		None, no data
Amathole DM	District Hospital	Tafalofefe Hosp		1	Tafalofefe Hosp		284	264	30 526	0.651	19 861				N	Ca		None, no data
Amathole DM	District Hospital	Victoria Hosp		1	Victoria Hosp		251	140	25 768	0.651	16 768				N	Ca		None, no data
Amathole DM	Regional Hospital	C Makiwane Hosp		1	C Makiwane Hosp		1002	847	179 192	1.050	188 176				N	Ca		None, no data
Amathole DM	Regional Hospital	Frere Hosp		1	Frere Hosp		795	690	220 916	1.050	231 992				N	Ca		None, no data
Amathole DM	Specialised Hospital	Fort Grey TB Hosp		1	Fort Grey TB Hosp		239	242	88 330	0.167	14 719				N	Ca		None, no data
Amathole DM	Specialised Hospital	Newhaven Hosp	1		Newhaven Hosp		43	43	15 695	0.167	2 615				N	Ca		None, no data
Amathole DM	Specialised Hospital	Nkqubela Hosp	1		Nkqubela Hosp		740	740	270 100	0.167	45 009				N	Ca		None, no data
Amathole DM	Specialised Hospital	Tower Hosp		1	Tower Hosp		600	400	146 000	0.167	24 329				N	Ca		None, no data
Amathole DM	Specialised Hospital	Winterberg TB Hosp		1	Winterberg TB Hosp		118	141	51 465	0.167	8 576				N	Ca		None, no data
C Hani DM	District Hospital	All Saints Hosp		1	All Saints Hosp		335	330	47 108	0.651	30 650				O	Ca		Commercial collection in use
C Hani DM	District Hospital	Cala Hosp		1	Cala Hosp		188	86	12 354	0.651	8 038				N	Ca		Commercial collection in use
C Hani DM	District Hospital	Cofimvaba Hosp		1	Cofimvaba Hosp		140	140	27 813	0.651	18 096				O	Ca		Commercial collection in use
C Hani DM	District Hospital	Cradock Hosp		1	Cradock Hosp		83	83	16 414	0.651	10 679				O	Ca		Commercial collection in use
C Hani DM	District Hospital	Dordrecht Hosp	1		Dordrecht Hosp		58	58	8 681	0.651	5 648				N	Ca		Commercial collection in use
C Hani DM	District Hospital	Elliot Hosp		1	Elliot Hosp		52	52	9 616	0.651	6 256				N	Ca		Commercial collection in use
C Hani DM	District Hospital	Glen Grey Hosp		1	Glen Grey Hosp		224	218	34 701	0.651	22 578				N	Ca		Commercial collection in use
C Hani DM	District Hospital	Hewu Hosp	1		Hewu Hosp		250	250	38 884	0.651	25 299				O	Ca		Commercial collection in use
C Hani DM	District Hospital	Indwe Hosp	1		Indwe Hosp		28	24	8 725	0.651	5 677				N	Ca		Commercial collection in use
C Hani DM	District Hospital	M Venter Hosp	1		M Venter Hosp		20	30	6 020	0.651	3 917				N	Ca		Commercial collection in use
C Hani DM	District Hospital	Mjanyana Hosp		1	Mjanyana Hosp		100	235	17 574	0.651	11 434				O	Ca		Commercial collection in use
C Hani DM	District Hospital	Molteno Hosp	1		Molteno Hosp		30	30	11 518	0.651	7 494				N	Ca		Commercial collection in use
C Hani DM	District Hospital	Sterkstroom Hosp	1		Sterkstroom Hosp		14	8	1 945	0.651	1 265				N	Ca		Commercial collection in use
C Hani DM	District Hospital	W Stahl Hosp		1	W Stahl Hosp		42	42	8 926	0.651	5 808				O	Ca		Commercial collection in use
C Hani DM	Regional Hospital	Frontier Hosp		1	Frontier Hosp		230	129	48 340	1.050	50 764				O	Ca		Commercial collection in use
C Hani DM	Specialised Hospital	Komani Hosp		1	Komani Hosp		968	968	353 320	0.167	58 876				N	Ca		Commercial collection in use
Cacadu DM	District Hospital	Aberdeen Hosp	1		Aberdeen Hosp		10	28	5 820	0.651	3 787				N	Ca		Commercial collection in use
Cacadu DM	District Hospital	Andries Vosloo Hosp		1	Andries Vosloo Hosp		86	86	22 216	0.651	14 454				N	Ca		Commercial collection in use
Cacadu DM	District Hospital	BJ Vorster Hosp	1		BJ Vorster Hosp		20	45	3 292	0.651	2 142				N	Ca		Commercial collection in use
Cacadu DM	District Hospital	Humansdorp Hosp		1	Humansdorp Hosp		60	60	4 974	0.651	3 236				N	Ca		Commercial collection in use
Cacadu DM	District Hospital	Midland Hosp		1	Midland Hosp		80	80	23 667	0.651	15 399				N	Ca		Commercial collection in use
Cacadu DM	District Hospital	P Alfred Hosp		1	P Alfred Hosp		24	36	10 432	0.651	6 787				N	Ca		Commercial collection in use
Cacadu DM	District Hospital	Sawas Hosp	1		Sawas Hosp		28	10	3 474	0.651	2 260				N	Ca		Commercial collection in use
Cacadu DM	District Hospital	Settlers Hosp		1	Settlers Hosp		219	219	42 804	0.651	27 850				N	Ca		Commercial collection in use
Cacadu DM	District Hospital	Sundays Valley Hosp	1		Sundays Valley Hosp		30	30	2 431	0.651	1 582				N	Ca		Commercial collection in use
Cacadu DM	District Hospital	Willowmore Hosp	1		Willowmore Hosp		34	40	7 295	0.651	4 746				N	Ca		Commercial collection in use
Cacadu DM	Specialised Hospital	Fort England Hosp		1	Fort England Hosp		519	283	103 295	0.167	17 213				N	Ca		Commercial collection in use
Cacadu DM	Specialised Hospital	M Parkes TB Hosp		1	M Parkes TB Hosp		80	80	29 200	0.167	4 866				N	Ca		Commercial collection in use
Cacadu DM	Specialised Hospital	M Parrish TB Hosp		1	M Parrish TB Hosp		180	107	39 055	0.167	6 508				N	Ca		Commercial collection in use
Cacadu DM	Specialised Hospital	PZ Meyer Hosp		1	PZ Meyer Hosp		57	57	20 805	0.167	3 467				N	Ca		Commercial collection in use

Cacadu DM	Specialised Hospital	Temba TB Hosp		1		Temba TB Hosp	60	100	36 500	0.167	6 082	-	-	N	Ca
N Mandela Metro	District Hospital	Uitenhage Hosp		1		Uitenhage Hosp	237	253	59 876	0.651	38 957	-	-	N	Ci
N Mandela Metro	Regional Hospital	Dora Ngqinza Hosp		1		Dora Ngqinza Hosp	254	503	127 733	1.050	134 137	-	-	N	Ci
N Mandela Metro	Regional Hospital	Livingstone Hosp		1		Livingstone Hosp	769	452	140 196	1.050	147 225	-	-	N	Ci
N Mandela Metro	Regional Hospital	PE Prov Hosp		1		PE Prov Hosp	373	218	49 505	1.050	51 987	-	-	N	Ci
N Mandela Metro	Specialised Hospital	E Donkin Hosp		1		E Donkin Hosp	163	163	59 495	0.167	9 914	-	-	N	Ci
N Mandela Metro	Specialised Hospital	Empilweni TB Hosp		1		Empilweni TB Hosp	333	333	121 545	0.167	20 254	-	-	N	Ca
N Mandela Metro	Specialised Hospital	J Pearson TB Hosp		1		J Pearson TB Hosp	350	350	127 750	0.167	21 288	-	-	N	Ci
N Mandela Metro	Specialised Hospital	Orsmond TB Hosp		1		Orsmond TB Hosp	210	210	76 650	0.167	12 773	-	-	N	Ci
O Tambo DM	District Hospital	Bambisana Hosp		1		Bambisana Hosp	138	138	19 330	0.651	12 577	Shaka Zululand	-	N	Ca
O Tambo DM	District Hospital	Canzibe Hosp		1		Canzibe Hosp	140	140	16 845	0.651	10 960	Macroburn	-	N	Ca
O Tambo DM	District Hospital	Greenville Hosp		1		Greenville Hosp	183	119	32 763	0.651	21 317	Shaka Zululand	-	N	Ca
O Tambo DM	District Hospital	Holy Cross Hosp		1		Holy Cross Hosp	260	300	32 027	0.651	20 838	Macroburn	-	N	Ca
O Tambo DM	District Hospital	Isilimela Hosp		1		Isilimela Hosp	143	143	1 396	0.651	908	Shaka Zululand	-	N	Ca
O Tambo DM	District Hospital	N Knight Hosp		1		N Knight Hosp	203	170	26 809	0.651	17 443	Shaka Zululand	-	N	Ca
O Tambo DM	District Hospital	Sipetu Hosp		1		Sipetu Hosp	147	160	38 074	0.651	24 772	Shaka Zululand	-	N	Ca
O Tambo DM	District Hospital	St Barnabas Hosp		1		St Barnabas Hosp	225	320	26 231	0.651	17 067	Macroburn	-	N	Ci
O Tambo DM	District Hospital	St Lucy's Hosp		1		St Lucy's Hosp	314	110	28 140	0.651	18 309	I	-	N	Ca
O Tambo DM	District Hospital	St Patrick's Hospital		1		St Patrick's Hosp	245	245	53 708	0.651	34 944	Macroburn	-	N	Ca
O Tambo DM	District Hospital	Zitulele Hosp		1		Zitulele Hosp	144	144	2 106	0.651	1 370	I	-	N	Ca
O Tambo DM	Regional Hospital	Mandela Acad Hosp		1		Mandela Acad Hosp		21	106 256	1.050	111 583	-	-	N	Ca
O Tambo DM	Regional Hospital	St Elizabeth's Hosp		1		St Elizabeth's Hosp	280	151	67 550	1.050	70 937	Shaka Zululand	-	N	Ca
O Tambo DM	Regional Hospital	Umtata Gen Hosp		1		Umtata Gen Hosp	637	254	71 111	1.050	74 676	Macroburn	-	N	Ca
O Tambo DM	Specialised Hospital	Bedford Orth Hosp		1		Bedford Orth Hosp	171	163	59 495	0.167	9 914	SA Incin Co	-	N	Ca
O Tambo DM	Specialised Hospital	Umtata Chest Hosp (Sir Henry Elliot)		1		Umtata Chest Hosp	189	189	68 985	0.167	11 495	Macroburn	-	N	Ca
Ukhahlamba DM	District Hospital	Aliwal North Hosp		1		Aliwal North Hosp	50	40	16 727	0.651	10 883	Shaka Zululand	-	N	Ca
Ukhahlamba DM	District Hospital	Barkly E Hosp (Cloete Joubert)		1		Barkly E Hosp	44	44	6 699	0.651	4 359	-	-	N	Ca
Ukhahlamba DM	District Hospital	Burgersdorp Hosp		1		Burgersdorp Hosp	25	25	7 297	0.651	4 748	I	-	N	Ca
Ukhahlamba DM	District Hospital	Empilisweni Hosp		1		Empilisweni Hosp	131	140	28 255	0.651	18 384	-	-	N	Ca
Ukhahlamba DM	District Hospital	L Grey Hosp	1			L Grey Hosp	48	30	13 077	0.651	8 508	-	-	N	Ca
Ukhahlamba DM	District Hospital	Maclear Hosp	1			Maclear Hosp	47	38	16 120	0.651	10 488	-	-	N	Ca
Ukhahlamba DM	District Hospital	Steynsburg Hosp		1		Steynsburg Hosp	30	12	5 016	0.651	3 264	I	-	N	Ca
Ukhahlamba DM	District Hospital	T Bequest Hosp		1		T Bequest Hosp	141	146	39 062	0.651	25 415	I	-	N	Ci
Ukhahlamba DM	District Hospital	Umlamli Hosp		1		Umlamli Hosp	73	74	16 829	0.651	10 949	Shaka Zululand	-	N	Ca
Ukhahlamba DM	Specialised Hospital	St Francis Hosp	1			St Francis Hosp	64	20	7 300	0.167	1 216	-	-	N	Ca

Table 12 EC-DPW treatment facilities

DEPARTMENT OF PUBLIC WORKS

EASTERN CAPE PROVINCE

INFORMATION ON MEDICAL INCINERATORS AT STATE HOSPITALS

LATEST UPDATE 23 JANUARY 2006

EQUIPMENT NUMBER	MAKE	MODEL	SIZE	HOSPITAL	REGION	CONDITION	FUEL	COMMENTS	ESTIMATE REPLACEMENT COST	EXPLANATION
				Mary Teresa	ALFRED NZO DISTRICT MUNICIPALITY	Fair / not legal	Coal	Exclude	R -	New hospital has been commissioned by DPW
SB0142	SHAKA - Zululand Steam	N/A	N/A	Mt Ayliff	ALFRED NZO DISTRICT MUNICIPALITY	New 3CR12 - Duel burner	Diesel	OK	R -	
SB0148	SHAKA - Zululand Steam	N/A	N/A	Rietvlei	ALFRED NZO DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK		
SB0169	SHAKA - Zululand Steam	N/A	N/A	St Margeret	ALFRED NZO DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK		
SB0186	MACRO BURN	N/A	N/A	Umzimkulu	ALFRED NZO DISTRICT MUNICIPALITY	Fair / not legal	Coal	Replace - 50 LA	R 230 000.00	Possible transfer to KZN
SB0781	SA INCINERATOR CO	N/A	N/A	Bedford	AMATOLE DISTRICT MUNICIPALITY	Fair	Diesel	Replace - 100 LA	R 280 000.00	Stack is not lagged - does not meet standard
SB0252	MACRO BURN	N/A	N/A	Bhisho	AMATOLE DISTRICT MUNICIPALITY	Poor	Diesel	Replace - 300 LA	R 600 000.00	Stack is disintegrating - unit has one burner
SB0262	SA INCINERATOR CO	N/A	N/A	Butterworth	AMATOLE DISTRICT MUNICIPALITY	OK	Diesel	Replace - 100 LA	R 280 000.00	Stack not lagged - only one burner
SB0266	Lucifer	N/A	B380	Cathcart	AMATOLE DISTRICT MUNICIPALITY	Bad/ Not legal	Diesel	Replace - 50 LA	R 230 000.00	Currently being replaced
SB0298	MACRO BURN	450LA	N/A	Cecilia Makiwane	AMATOLE DISTRICT MUNICIPALITY	Fair/ not used / one burner	Diesel	Replace with 300 LA	R 430 000.00	Hospital utilise waste removal organisation
SB0299	MACRO BURN	450LA	N/A	Cecilia Makiwane	AMATOLE DISTRICT MUNICIPALITY	Fair/ not used / one burner	Diesel	Replace with 300 LA	R 430 000.00	Hospital utilise waste removal organisation
SB0317	MACRO BURN	N/A	N/A	Fort Beaufort	AMATOLE DISTRICT MUNICIPALITY	Poor	Diesel	Replace - 100 LA	R 280 000.00	Stack not lagged - unit badly corroded
SB0358	MACRO BURN	330b	320kg/batch	Frere	AMATOLE DISTRICT MUNICIPALITY	Good	HFO	N/A		Hospital utilise waste removal organisation
SB0367	MACRO BURN	Macro Burn	N/A	Grey	AMATOLE DISTRICT MUNICIPALITY	Poor	Diesel	Replace - 100 LA	R 280 000.00	Hospital utilise waste removal organisation
SB0040	MACRO BURN	N/A	N/A	Madwaleni	AMATOLE DISTRICT MUNICIPALITY	Bad	Diesel	Replace - 100 LA	R 280 000.00	Stack has collapsed - unit badly rusted
SB0375	Mitchell	N/A	N/A	Nompumelelo	AMATOLE DISTRICT MUNICIPALITY	Fair/only one burner	Diesel	Replace - 100 LA	R 280 000.00	Stack is not lagged - does not meet standard
SB0378	SA INCINERATOR CO	100 LA	N/A	Nqamakwe Clinic	AMATOLE DISTRICT MUNICIPALITY	Fair	Diesel	Replace - 50 LA	R 230 000.00	Stack is not lagged - does not meet standard
SB0383	MACRO BURN	N/A	N/A	S.S. Gida	AMATOLE DISTRICT MUNICIPALITY	Fair	Gas	Replace - 50 LA	R 230 000.00	Stack is not lagged - does not meet standard
SB0384	SA INCINERATOR CO	150LA	N/A	S.S. Gida	AMATOLE DISTRICT MUNICIPALITY	Fair	Diesel	Replace - 50 LA	R 230 000.00	Stack is not lagged - does not meet standard
SB0392	N/A	N/A	N/A	Thafolofefe	AMATOLE DISTRICT MUNICIPALITY	Fair/only one burner	Diesel	Replace - 100 LA	R 280 000.00	Stack is not lagged - does not meet standard
		N/A	N/A	Tower	AMATOLE DISTRICT MUNICIPALITY		Coal	Order issued for new 100 LA	R -	
SB0427	MACRO BURN	N/A	N/A	Victoria	AMATOLE DISTRICT MUNICIPALITY	New - small stack rusting	Diesel	Replace - 50 LA	R 230 000.00	Stack is not lagged - does not meet standard
						Fair / Never used but stack and incinerator corroded				
SB0429	Mitchell	N/A	N/A	Willowvale CHC	AMATOLE DISTRICT MUNICIPALITY		Diesel	Replace - 50 LA	R 230 000.00	Stack is not lagged - does not meet standard
SB0005	SHAKA - Zululand Steam	N/A	N/A	All Saints	CHRIS HANI DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK		
SB0432	Mitchell	N/A	N/A	Cala CHC	CHRIS HANI DISTRICT MUNICIPALITY	Good/clean	Diesel	OK		
SB0828	SHAKA - Zululand Steam	N/A	N/A	Cofimvaba	CHRIS HANI DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK	R -	
SB0459	SHAKA - Zululand Steam	N/A	Unknown	Cradock	CHRIS HANI DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK	R -	
SB0468	MACRO BURN	N/A	N/A	Elliot	CHRIS HANI DISTRICT MUNICIPALITY	Fair/ only has one burner	Diesel	Replace - 100 LA	R 280 000.00	Stack is not lagged - does not meet standard
SB0482	Mitchell	250LA	77168	Frontier	CHRIS HANI DISTRICT MUNICIPALITY	Poor	Diesel	Replace - 100 LA	R 280 000.00	Stack is not lagged - does not meet standard
SB0497	MACRO BURN	N/A	N/A	Hewu	CHRIS HANI DISTRICT MUNICIPALITY	Stack badly corroded	GAS	Exclude at D Barnard's instruction		Exclude at D Barnard's instruction
SB0049	SHAKA - Zululand Steam	N/A	N/A	Mjanyana	CHRIS HANI DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK	R -	
SB0530	Mitchell	N/A	N/A	Ngwenyama	CHRIS HANI DISTRICT MUNICIPALITY	Unknown	Diesel	Exclude at D Barnard's instruction		Clinic has burnt down
SB0535	MACRO BURN	N/A	N/A	Wilhelm Stahl	CHRIS HANI DISTRICT MUNICIPALITY	Burner and wiring in bad condition	Diesel	Replace - 100 LA	R 280 000.00	
SB0118	SHAKA - Zululand Steam	N/A	N/A	Bambisana	O R TAMBO DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK		
						New two diesel burner			R 80 000	Stack is not lagged - does not meet standard
SB0025	MACRO BURN	N/A	N/A	Canzibe	O R TAMBO DISTRICT MUNICIPALITY	Fair / not legal	Coal	Replace - 50 LA	R 230 000.00	
SB0125	SHAKA - Zululand Steam	N/A	N/A	Greenville	O R TAMBO DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK		
SB0128	MACRO BURN	N/A	N/A	Holy Cross	O R TAMBO DISTRICT MUNICIPALITY	Fair / not legal	Coal	Investigate		Due to Hospital upgrade MFA instructed by DPW omit
SB0031	SHAKA - Zululand Steam	N/A	N/A	Isilimela	O R TAMBO DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK		
SB0056	SHAKA - Zululand Steam	N/A	N/A	Knessie Knight	O R TAMBO DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK		
						damaged by fire , both burners need to be replaced			R -	Stack is not lagged - does not meet standard - This hospital to be upgraded
SB0077	MACRO BURN	N/A	N/A	Mthatha Chest	O R TAMBO DISTRICT MUNICIPALITY		Diesel	Currently used by Mthatha Com		
SB0095	MACRO BURN	N/A	N/A	Mthatha General	O R TAMBO DISTRICT MUNICIPALITY	Poor	Diesel	Replace - 300 LA	R 450 000.00	Unit damaged beyond repair
SB0096	MACRO BURN	N/A	N/A	Mthatha General	O R TAMBO DISTRICT MUNICIPALITY	Poor	Diesel	Replace - 300 LA	R 450 000.00	Unit damaged beyond repair
SB0191	RJW	N/A	N/A	Port St Johns	O R TAMBO DISTRICT MUNICIPALITY	Good 3cr12 / Not Legal	Coal	Replace - 100 LA	R 280 000.00	
						Replaced - New 3CR12 - Duel burner			R -	
SB0111	MACRO BURN	N/A	N/A	St Barnabus	O R TAMBO DISTRICT MUNICIPALITY	Fair / not legal	Coal	Replace - 100 LA	R 280 000.00	
SB0161	SHAKA - Zululand Steam	N/A	N/A	St Elizabeth	O R TAMBO DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK		
SB0067	RJW	N/A	N/A	St Lucys	O R TAMBO DISTRICT MUNICIPALITY	Good 3cr12 / not legal	Coal	Replace - 100 LA	R 280 000.00	
SB0173	MACRO BURN	N/A	N/A	St Patricks	O R TAMBO DISTRICT MUNICIPALITY	Badly corroded/ Not legal	Coal	Replace - 100 LA	R 280 000.00	
SB0101	RJW	N/A	N/A	Zithulele	O R TAMBO DISTRICT MUNICIPALITY	3cr12 / Not Legal / Stack broken	Coal	Replace - 100 LA	R 280 000.00	
SB0632	SHAKA - Zululand Steam	N/A	N/A	Aiwal North	UKWAHLAMBA DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK		

SB0770	N/A	N/A	N/A	Burgersdorp	UKWAHLAMBA DISTRICT MUNICIPALITY	Fair	Diesel	Replace - 100 LA	R	280 000.00	Stack is not lagged - does not meet standard - one burner
SB0648	MACRO BURN	N/A	N/A	Cloete Joubert	UKWAHLAMBA DISTRICT MUNICIPALITY	Poor	Diesel	Order issued for new 100 LA	R	-	
SB0654	Mitchell	N/A	N/A	Empilweni	UKWAHLAMBA DISTRICT MUNICIPALITY	Fair/Clean	Diesel	Replace - 100 LA	R	280 000.00	Stack is not lagged - does not meet standard
SB0666	N/A	N/A	N/A	Steynsburg	UKWAHLAMBA DISTRICT MUNICIPALITY	Poor	Diesel	Order issued for new 100 LA	R	-	
SB0178	RJW	N/A	N/A	Taylor Bequest	UKWAHLAMBA DISTRICT MUNICIPALITY	Good 3cr12 / Not Legal	Coal	Replace - 100 LA	R	280 000.00	
na	SHAKA - Zululand Steam			Umlamli	UKWAHLAMBA DISTRICT MUNICIPALITY	Replaced - New 3CR12 - Duel burner	Diesel	OK			
SB0558	MACRO BURN	Unknown	Unknown	Dora Nginza	Nelson Mandela Metro	Fair/ Not operational	Diesel	no comment	n.a.		no comment
SB0559	MACRO BURN	Unknown	Unknown	Dora Nginza	Nelson Mandela Metro	Fair/ Not operational	Diesel	no comment	n.a.		no comment
SB0574	MACRO BURN	Unknown	Unknown	Empilweni	Nelson Mandela Metro	Good/Fair	Diesel	no comment	n.a.		no comment
SB0623	MACRO BURN	Unknown	Unknown	Uitenhage	Nelson Mandela Metro	Fair	Diesel	no comment	n.a.		no comment
SB0687	MACRO BURN	N/A	N/A	Andries Vosloo	Western Cacadu	Good/clean	Diesel	no comment	n.a.		no comment
SB0695	SA INCINERATOR CO	N/A	N/A	Fort England	Western Cacadu	Good/Fair	Diesel	no comment	n.a.		no comment
SB0702	MACRO BURN	23C	V94005	Humansdorp	Western Cacadu	Good/clean	Diesel	no comment	n.a.		no comment
SB0708	MACRO BURN	N/A	N/A	Kowie	Western Cacadu	Fair	Diesel	no comment	n.a.		no comment
SB0715	MACRO BURN	N/A	N/A	Midland	Western Cacadu	Good/Clean	Diesel	no comment	n.a.		no comment
SB0242	MACRO BURN	N/A	N/A	Settlers	Western Cacadu	Good	Diesel	no comment	n.a.		no comment



Table 13 Projection of Mpumalanga treatment capacity

OUSShort	OType	OUSShort-1	Province Aided Health Facility	Public Health Facility	Semi-Private Health Facility	OUSShort-2	Actual beds (raw)	Usable beds - Total (raw)	Inpatient days/an - Total (raw)	Predicted waste generation rate	Kg Predicted waste generated Annum (Processed)	Kg measured waste generated Annum (Processed)	Incinerator on site model	Treatment (capacity (pa)	O(operational)/D(decommissioned)/N(not in use or no data)	Collection service available (C.D.N)
Ehlanzeni DM	District Hospital	Barberton Hosp		1		Barberton Hosp	184	184	20795	0.65	13530	-	-	-	N	D,Ca
Ehlanzeni DM	District Hospital	Lydenburg Hosp		1		Lydenburg Hosp	100	100	17364	0.65	11298	-	Zululand Steam DC	-	O	D,Ca
Ehlanzeni DM	District Hospital	Matibidi Hosp		1		Matibidi Hosp	48	40	4889	0.65	3181	-	Sola	-	N	D,Ca
Ehlanzeni DM	District Hospital	Sabie Hosp		1		Sabie Hosp	99	99	23041	0.65	14991	-	Zululand Steam DC	-	O	D,Ca
Ehlanzeni DM	District Hospital	Shongwe Hosp		1		Shongwe Hosp	316	350	12146	0.65	7903	-	-	-	N	D,Ca
Ehlanzeni DM	District Hospital	Tonga Hosp		1		Tonga Hosp	82	130	16540	0.65	10761	-	SA Incinerator Comp	-	O	D,Ca
Ehlanzeni DM	Regional Hospital	Rob Ferreira Hosp		1		Rob Ferreira Hosp	301	239	81662	1.05	85756	-	-	-	N	D,Ca
Ehlanzeni DM	Regional Hospital	Themba Hosp		1		Themba Hosp	556	591	128697	1.05	135150	-	Mitchell	-	O	D,Ca
Ehlanzeni DM	Specialised Hospital	Barberton SANTA		1		Barberton SANTA	170	228	83220	0.17	13868	-	Mitchell Monk 30LA	-	O	D,Ca
Ehlanzeni DM	Specialised Hospital	Bongani Hosp		1		Bongani Hosp	56	45	16425	0.17	2737	-	Zululand Steam	-	O	D,Ca
G Sibande DM	District Hospital	Amajuba Mem Hosp		1		Amajuba Mem Hosp	105			0.65	0	-	-	-	N	D,Ca
G Sibande DM	District Hospital	Carolina Hosp		1		Carolina Hosp	80	66	11949	0.65	7774	-	-	-	N	D,Ca
G Sibande DM	District Hospital	Embuleni Hosp		1		Embuleni Hosp	220	237	79403	0.65	51662	-	-	-	N	D,Ca
G Sibande DM	District Hospital	Ermelo Hosp		1		Ermelo Hosp	150	192	53462	0.65	34784	-	-	-	N	D,Ca
G Sibande DM	District Hospital	Evander Hosp		1		Evander Hosp	60	74	18204	0.65	11844	-	-	-	N	D,Ca
G Sibande DM	District Hospital	Piet Retief Hosp		1		Piet Retief Hosp	227	229	48715	0.65	31696	-	-	-	N	D,Ca
G Sibande DM	District Hospital	Standerton Hosp		1		Standerton Hosp	210	189	41824	0.65	27212	-	-	-	N	D,Ca
G Sibande DM	Regional Hospital	Bethal Hosp		1		Bethal Hosp	148	177	25005	1.05	26259	-	-	-	N	D,Ca
G Sibande DM	Specialised Hospital	Sesifuba SANTA Hosp		1		Sesifuba SANTA Hosp	60	58	21170	0.17	3528	-	-	-	N	D,Ca
G Sibande DM	Specialised Hospital	WF Te Water SANTA		1		WF Te Water SANTA	123	150	54750	0.17	9123	-	-	-	N	D,Ca
Nkangala DM	District Hospital	B Samuels Hosp		1		B Samuels Hosp	35	40	5978	0.65	3889	-	-	-	N	D,Ca
Nkangala DM	District Hospital	Belfast hosp		1		Belfast hosp	12	12	2509	0.65	1632	-	-	-	N	D,Ca
Nkangala DM	District Hospital	Impungwe Hosp		1		Impungwe Hosp	55	55	20075	0.65	13061	-	Mitchell DC	-	O	D,Ca
Nkangala DM	District Hospital	KwaMhlanga Hosp		1		KwaMhlanga Hosp	40	153	15442	0.65	10047	-	Bentone	-	O	D,Ca
Nkangala DM	District Hospital	Mmamethhake Hosp		1		Mmamethhake Hosp	55	55	11186	0.65	7278	-	SA Incinerator Comp	-	O	D,Ca
Nkangala DM	District Hospital	W'Boven hosp		1		W'Boven hosp	9	9	2168	0.65	1411	-	-	-	N	D,Ca
Nkangala DM	Provincial Tertiary Hosp	Witbank Hosp		1		Witbank Hosp	361	296	71792	1.53	109722	-	Mitchell100LA	-	O	D,Ca
Nkangala DM	Regional Hospital	Middelburg Hosp		1		Middelburg Hosp	222	202	52166	1.05	54781	-	-	-	N	D,Ca
Nkangala DM	Specialised Hospital	HJE Schultz SANTA		1		HJE Schultz SANTA	200	200	73000	0.17	12164	-	-	-	N	D,Ca
Sekhukhune DM	District Hospital	Groblersdal Hosp		1		Groblersdal Hosp	25	40	5349	0.65	3480	-	-	-	N	D,Ca
Sekhukhune DM	Regional Hospital	Philadelphia Hosp		1		Philadelphia Hosp	538	362	92473	1.05	97109	-	-	-	N	D,Ca

no data  
Incinerator N

O  
D  
N

Ca  
D  
N

Commercial collection avail not in use  
DoH collection service in use  
None, no data

RoD Authorization

**Table 14 Projection of Northern Cape DoH treatment capacity**

Kgalagadi DM	OU3Short	District Hospital	OU5Short-1	Actual beds (raw)	64	Usable beds - Total (raw)	64	Inpatient days/an - Total (raw)	24 830	Predicted waste generation rate	0.65	Kg Predicted waste generated Annum (Processed)	16 155	Kg measuredwaste generated Annum (Processed)	-	Incinerator on site model	-	Treatment (capacity tpa)	16.5	O(operational)/D(decommissioned)/N(not in use or no data)	O	Collection service available (C,D,N)	C
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N no incinera  
 O no data  
 D no data  
 N Incinerator N  
 Ci Commercial collection in use  
 Ca Commercial collection avail not in use  
 D DoH collection service in use  
 N None, no data

Table 15 Projection of WC DoH treatment capacity

OUSshort	OUSshort	Otype	OUSshort1	Province Aided Health Facility	Public Health Facility	Semi-Private Health Facility	OUSshort2	Actual beds (raw)	Usable beds - Total (raw)	CAS total headcount/annum (raw)	Delivery in facility/ann (raw)	Inpatient days/ann - Total (raw)	Predicted waste generation rate	Kg Predicted waste generated/Annum (Processed)	Kg measured waste generated/Annum (Processed)	Incinerator on site model	Treatment (capacity (pa)	Operational/D(decommissioned)/(not in use or no data)	Ci
Western Cape	Boland DM	District Hospital	Montagu Hosp		1		Montagu Hosp	49	49	9472	461	9912	0.65	6 449.1		I	-	O	N
Western Cape	Central Karoo DM	District Hospital	B West Hosp		1		B West Hosp	54	57	3739	704	16870	0.65	10 976.2		I	-	O	Ca
Western Cape	Central Karoo DM	District Hospital	Murraysburg Hosp		1		Murraysburg Hosp	33	17	1178	134	2277	0.65	1 481.5		I	-	O	Ca
Western Cape	Central Karoo DM	District Hospital	P Albert Hosp		1		P Albert Hosp	35	29	0	143	7902	0.65	5 141.3		-	-	N	Ca
Western Cape	Eden DM	District Hospital	Ladismith Hosp		1		Ladismith Hosp	35	35	3065	243	8830	0.65	5 745.1		I	-	O	Ca
Western Cape	Eden DM	District Hospital	Uniondale Hosp		1		Uniondale Hosp	32	32	1268	196	4257	0.65	2 769.7		I	-	O	Ca
Western Cape	Overberg DM	District Hospital	Caledon Hosp		1		Caledon Hosp	65	65	7073	627	12641	0.65	8 224.6		I	-	O	Ca
Western Cape	Overberg DM	District Hospital	Otto Du Plessis Hosp		1		Otto Du Plessis Hosp	46	40	7640	357	7461	0.65	4 854.4		I	-	O	Ca
Western Cape	Overberg DM	District Hospital	Swellendam Hosp		1		Swellendam Hosp	57	51	4878	408	9492	0.65	6 175.8		I	-	O	Ca
Western Cape	West Coast DM	District Hospital	Citrusdal Hosp		1		Citrusdal Hosp	34	34	1189	234	7279	0.65	4 736.0		I	-	O	Ca
Western Cape	West Coast DM	District Hospital	Clanwilliam Hosp		1		Clanwilliam Hosp	52	48	3446	361	11433	0.65	7 438.7		I	-	O	Ca
Western Cape	West Coast DM	District Hospital	LAPA Munnik Hosp		1		Pikitsburg	15	15	3369	269	4147	0.65	2 698.2		I	-	O	Ca
Western Cape	West Coast DM	District Hospital	Radie Kotze Hosp		1		Radie Kotze Hosp	33	33	3224	336	6553	0.65	4 263.6		I	-	O	Ca
Western Cape	West Coast DM	Specialised Hospital	Malmesbury ID Hosp		1		Malmesbury ID Hosp	99	47			17155	0.17	2 858.7		-	-	N	Ca

Sum 111 788.7

I - no data  
Incinerator N  
O  
D  
N  
Ci Commercial collection in use  
Ca Commercial collection avail not in use  
D DoH collection service in use  
N None, no data

**Table 16 Projection of Mediclinic treatment capacity**

Province	Hospital	beds	occupancy	rate	patient bed days	Projected quantities of waste kg/an	no incinerator	N	N	O	Ci	Treated on site tpa	daily treatment rate kg/day
							no data	-	-	D	D		
							Incinerator	I		N	N	Commercial collection avail not in use	
												Own collection service in use	
												None, no data	
EC													
FS									-		Ci	0	
G									N	N	Ci		
KZN									N	N	Ci		
Limpopo	Polokwane	183	0.62	1.09	41 413	45 140	SA Inc Co	160 kg/hr	N	N	Ca	61	234
	Tzaneen	64	0.62	1.09	14 483	15 787	N		N	N	D		
	total treated											61	
Mpu	Barberton	30	0.62	1.09	6 789	7 400	N			N	D		
	Ermelo	40	0.62	1.09	9 052	9 867	N			N	D		
	Nelspruit	213	0.62	1.09	48 202	52 540	SA Inc Co	96 kg/hr	N	N	Ca	70	268
	Highveld	202	0.62	1.09	45 713	49 827	SA Inc Co	50 kg/hr	N	N	Ca	50	192
	Secunda	44	0.62	1.09	9 957	10 853	SA Inc Co	25 kg/hr			Ca	11	42
	total treated											130	
NW									-	N	Ci		
NC									-		Ci		
WC									N		Ci		
National total tonnes/an											191		
National average kg/day												184	
No of treatment facilities confirmed							4						
Quantity of waste confirmed treated							158 360						

**Table 17 Treatment capacity and estimated quantities of each category of HCRW at January 2006**

waste stream category	Treatment capacity			estimated load (note 1)
	incineration	steam	total	
infectious anatomic	24 528		24 528	982
infectious sharps	24 528	11 611	36 139	1 146
non-sharps infectious (ward waste)	24 528	11 611	36 139	23 240
chemical and pharmaceutical	32 684		32 684	2 946
low level radioactive	9 495		9 495	na

Note 1: composition of waste estimated using average composition found during Gauteng survey

**Table 18 Disposal sites used for treated solid waste**

<b>Province</b>	<b>Name of authorized landfill site in use</b>	<b>Unauthorized landfill sites</b>	<b>Type of waste</b>
<b>EC</b>	Eastern Cape-Aloes	Municipal Disposal Sites	Incinerator ash
<b>FS</b>	-	-	Incinerator ash
<b>G</b>	Gauteng-Hofontein	-	Incinerator ash
<b>K</b>	KZN-Bulbul Drive	-	Autoclave waste
	KZN-Marion Hill □□	-	Autoclave waste
<b>L</b>	-	Municipal Disposal Sites	no treatment in the province reported
<b>M</b>	-	Municipal Disposal Sites	Incinerator ash
<b>NC</b>	-	-	no treatment in the province reported
<b>NW</b>	-	-	no treatment in the province reported
<b>WC</b>	Western Cape-Vissershok	Municipal Disposal Sites	Incinerator ash

**Table 19: Expenditure on HCRW as a percentage of the total health budget**

<b>Province</b>	<b>Gauteng</b>	<b>KZN</b>
provincial area (km2)	14027	169951
provincial population 2001(m)	8.64	9.38
<b>Tender data</b>		
whole or part of province served	whole	whole
DoH hospitals	29	75
DoH clinics	333	514
container or mass based invoicing system	mass	mass
HCRW invoiced tpa	n.a.	4 206
HCRW expenditure 1 year Rm	24.2	22.9
Provincial DoH budget R b pa.	8.5	8.6
% HCRW actual/total Health Budget	0.29%	0.27%
<b>Source of information</b>	1	2

1 DoH Gauteng: P Britz; and National Department of finance  
<http://www.treasury.gov.za/<20060210 19:01>>

2 Compass Waste Services: D Anderson; and DoH KZN 2003/4 Annual Report at <http://www.kznhealth.gov.za/report/situation.pdf <20060210 19:00>>

7.5 **ANNEXURE 5: Treatment facility survey questionnaire**



**Instructions: How to complete the survey:  
List of FAQ's and contact details**

No.	FAQ	Answer
1	Why is the survey being carried out	Data is needed on how much waste is being treated, where and how so that the impact of recommendations on policy for treatment can be evaluated, eg, centralized treatment versus on site treatment and cost and safety implications
2	If the information is not readily available must all the fields be completed?	<p>No. Provide all reasonably available data. If not available indicate "na", this is a compilation of existing data, not a survey for new information</p> <p>It is preferred to complete the data that you have now, and send in data subsequently if it is still subject to for example a provincial survey</p> <p>The intention is to send this questionnaire to the personnel who have access to the information already. If you do not have access to the information please advise asap.</p> <p>A priority has been allocated to the data collection and this is indicated as A, B and C priority. A is the most important and should be completed if at all possible. B is information that would provide much value to the analysis of data, whereas C is information that is not essential but would facilitate the data processing significantly.</p> <p>Highest priority is for the identification and location of the treatment site, type and model of equipment, if it is working, and an estimation of what and how much can be, and is being treated annually</p> <p>All data should if possible be completed and forwarded within 2 weeks. Data received after the end of date may not be included in the survey report.</p>
3	How does one complete the survey	Fill in the information either on a hardcopy and fax to 012 841 2135 Attn D Rogers or complete in a soft copy and email to <a href="mailto:drogers@csir.co.za">drogers@csir.co.za</a>
4	Is this survey to be used for all treatment facilities	<p>Specified major facilities are being surveyed using Parts A, B, and C of this questionnaire. There are an estimated 50 of these in the country. This questionnaire is intended for coordinated and completion by provincial departments responsible for reporting on these, eg, WC DEA&amp;DP, and WC Provincial Dept of Health</p> <p>Unspecified minor facilities are to be identified for each province on a hospital facilities list. This questionnaire if being coordinated by the general survey is to be completed by the organizations responsible for the maintenance, and purchase of the large treatment facilities, eg, Provincial Health Engineering services or Provincial Works</p>
5	If I have queries to whom do I direct them	For technical, NDoH, DEAT, administrative queries, please forward queries to the below contact points
6	Complete facilities questionnaire for all commercial and large public sector treatment facilities	<a href="#">Go to Facility Identification page</a>
7	Complete public hospitals questionnaire	<a href="#">Go to Part B Incineration Equipment</a>
8	Complete public clinics questionnaire	<a href="#">Go to Part C: Non-incineration equipment</a>
9	Forward response	<a href="#">Send to contact person below</a>

**Contacts**

Query	Who	Phone	Fax	Cell	Email
Technical	Dr Dave Rogers	(012)8413540	(012)8412135	0845543121	drogers@csir.co.za
NDoH Health	Qaphile Gcwensa	(012) 312-3141/3138/D&D0070	(012) 312-3181	0825784509	ntsleq@health.gov.za
DEAT	Sharon Molefe	(012) 310-3949	(012) 320-0024	0828811454	smolefe@deat.gov.za
DEAT	Kobus Otto	(012) 310-3933	(012) 322-0558	0823769673	jbotto@global.co.za
DEAT	Kobus Otto	(012) 310-3933	(012) 322-0558	0823769673	jbotto@global.co.za

## Part A: Treatment facility Identification

Notes: For all specified (large) facilities and commercial treatment facilities

Do not complete field if data is not available or unknown

[For help or answer of FAQ's go to the instructions page](#)

Province	Questionnaire number	NCDoH	1
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Information sought		Response		
No.	Data category	Descriptor	Data entry	Priority
1	Facility name	Full Name, ie, Hospital or waste treatment site name		A
2	Facility ownership	Name of legal entity, eg, Provincial DoH, KZN		A
3	Location	District Municipality/Metro		A
		Town/suburb		A
		GIS coordinates latitude		C
		GIS coordinates longitude		C
4	Any facility permits	Provincial EIA regulations RoD for waste treatment site		A
		Air Pollution Permit for emissions		A
		DWAF for storage area		B
		Other, eg, Radioactive waste incineration		A
5	District Municipalities served by facility	Attach list if more than one District Municipality		
6	Contact person to verify information	name		A
		position		A
		organization		A
		telephone		A
		cell		C
		email		B
		Date of information		A

[for incineration facilities click here or go to worksheet Part B](#)

[for non-incineration facilities click here or go to worksheet Part C](#)

## Part B: Incineration treatment equipment survey

Note [For help see the instructions page](#)

Province	NCDoh	Name of facility		0	
Questionnaire number	1	District Municipality		0	
Information sought		Response			Priority
No.	Data field query	No.	Descriptor	Data entry	
1	Status of treatment equipment (v/n)	1	operational		A
		2	awaiting repairs		A
		3	decommissioned (if decommissioned stop questionnaire here)		A
2	Incineration facility description	1	manufacturer		A
		2	model type and number		A
		3	design capacity - kg/hr		A
3	Actual operating hours per month	1	average hours/day		A
		2	average days/week		A
4	Any measurements of quantity treated (typical per month)	1	kg/month		A
		2	litres/month		A
		3	no data		A
5	Type of incinerator	1	single chamber		C
		2	multiple chamber		C
6	Flue gas cleaning system (ves)	1	none		C
		2	type		C
7	Operator qualifications		educational level		C
8	Any operator training in past two years	1	yes		C
		2	no		C
9	Loading system manual procedure	1	yes/no		C
		2	yes/no		C
	Loading system automatic, eg, ram feed	3	yes/no		C
		4	yes/no		C
10	Type of fuel used	1	coal (or other solid fuel)		C
		2	gas		C
		3	diesel		C
11	Disposal of residue		Is ash mixed with boiler ash and disposed at a landfill? (yes/no)		C
<b>Thankyou for your cooperation</b>					

**Part C: Non-incineration treatment equipment survey (e.g. Steam Sterilisation, Vacuum Sterilisation, Microwave, ETD, Dry Heat Disinfection, Chemical Disinfection etc.)**

Note [For help see the instructions page](#)

Province		NCDoH	Name of facility		0
Questionnaire number		1	Location of facility		0
<b>Information sought</b>			<b>Response</b>		
No.	Data field	No	Descriptor	Data entry	Priority
1	Status of treatment plant	1	operational		A
		2	awaiting repairs		A
		3	decommissioned (if decommissioned do not complete rest of survey)		A
2	Treatment facility description	1	manufacturer		A
		2	model type and number		A
		3	design capacity - kg/hr		A
		4	design capacity - litres/hr		A
3	Any recorded quantity treated typical data per month	1	Mass - kg		A
		2	volume - litres		A
		3	no data		A
4	Name of treatment technology	1	steam disinfection		B
		2	autoclave		B
		3	microwave		B
		4	electro-thermal deactivation		B
		5	chemical disinfection		B
		6	other (specify name)		B
5	Monitoring procedures to demonstrate treatment efficiency compliance permit		short description		B
6	Treatment capacity-cyclic operation	1	kg/cycle		B
		2	litres/cycle		B
	Treatment capacity-continuous operation	3	kg/hour		B
		4	litres/hour		B
7	Typical operating rates - (averaged over one month)	1	cycles/day		B
		2	hours/day		B
		3	days/week		B
8	Size reduction (indicate option)	1	shred		C
		2	mill/grind		C
		3	before/after treatment		
		3	none		C
9	Operator qualifications		eg, educational level, eg, grade 6		C
10	Any operator training by supplier in past two years	1	yes		C
		2	no		C
11	Disposal of residue		Has de-listing of treated waste been arranged for landfill disposal? (yes/no)		C
<b>Thankyou for your cooperation</b>					