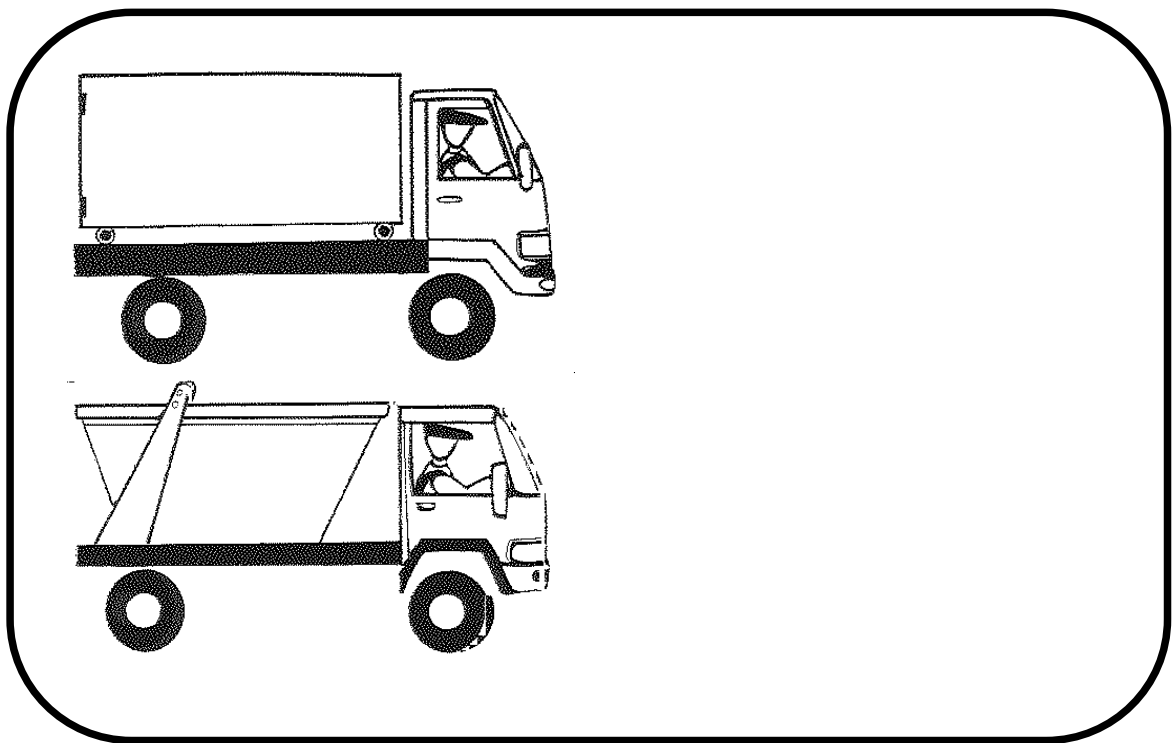


Guidelines on Sustainable Health Care Waste Management in Gauteng

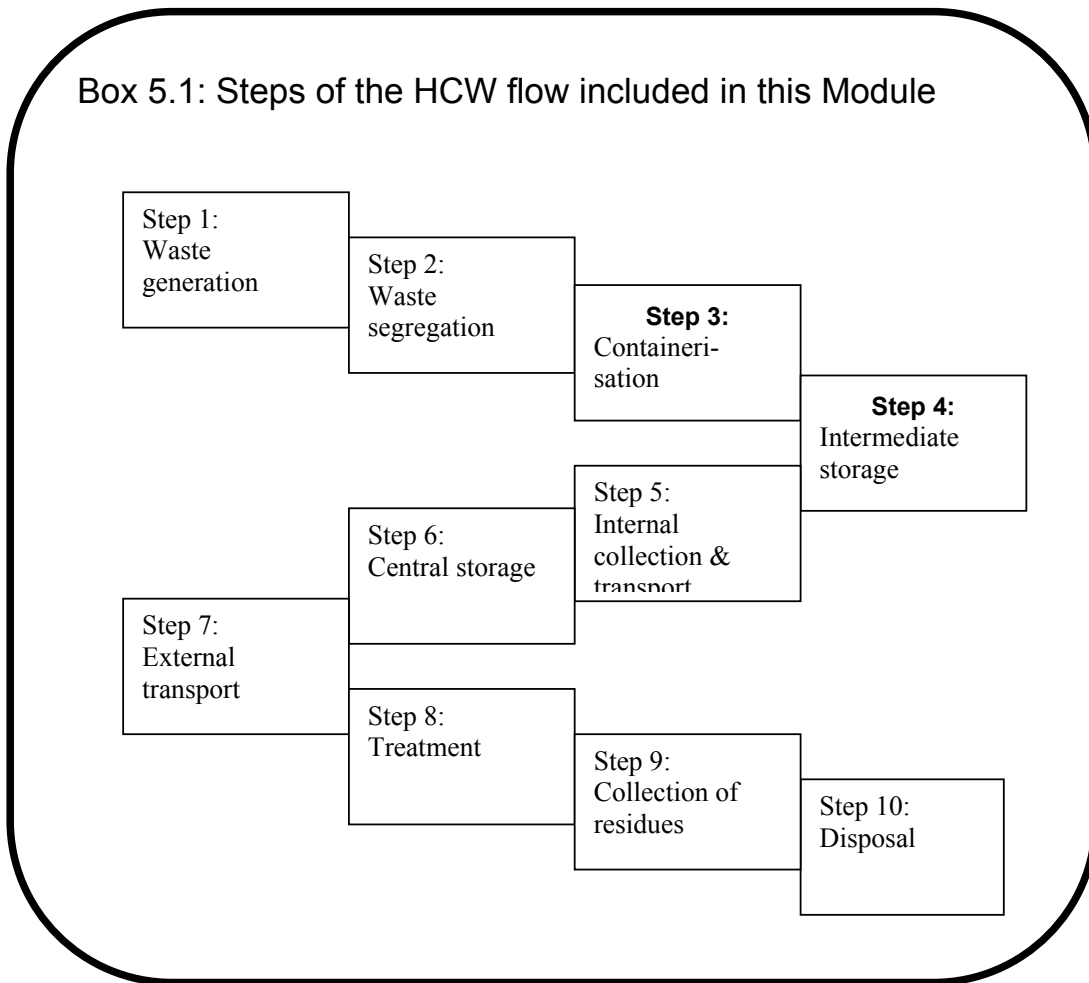
MODULE 5: Transport of Health Care risk Waste and Residues:

- Loading and unloading health care risk waste
- External transport
- Loading and unloading residues
- Examples on transport equipment



5. Module 5: Transport of HCRW and residues

Box 5.1: Steps of the HCW flow included in this Module



5.1 Objectives of Module 5

This module of the Guidelines includes recommendations on the collection of HCRW from central storage areas at health care facilities for transport to offsite treatment facilities (where treatment of HCRW is not done onsite), as well as on the collection of residues from HCRW treatment facilities for disposal at appropriately permitted waste disposal sites.

The objective of Module 5 is therefore to provide detailed guidance on the execution of each of the above activities.

5.2 Target Group

This Module of the Guidelines will focus on the HCRW handlers responsible for collection, loading and transport of HCRW, from the central storage areas to the treatment facilities where it is to be offloaded. It also addresses responsibilities for vehicle drivers transporting HCRW between the generators and the treatment facility, as well as for those transporting residues between the HCRW treatment facility and an appropriately permitted disposal site. As some of the HCW workers and truck drivers may not be familiar with the terminology used in the Guidelines, this Module is also directed at the middle management who is responsible to supervise and overlook the daily activities of the HCW workers and truck drivers.

5.3 Scope of Module 5

After the successful execution of the activities on the internal transport and storage of HCW at central storage areas as described in Module 5, the next step would be to collect and transport HCRW from the central storage areas to the HCRW treatment facility (where offsite treatment facilities are used).

In principle the activity on collection and transport of HCRW includes the following steps:

Collection of HCW from the central storage areas at health care facilities for loading onto dedicated HCRW vehicles;
Transport of HCRW from the health care facilities to the regional HCRW treatment facilities;
Offloading and storage of HCRW at the regional HCRW treatment facility.

Another area of external transport that will be dealt with is the transport of residues from the HCRW treatment facility, to the appropriately permitted waste disposal site. The collection and transport of residues from the HCRW treatment facilities will include:

Collection of containerised residues from on-site or regional HCRW treatment facilities
Transport of residues from the HCRW treatment facility to an appropriately permitted waste disposal site for disposal.

5.4 Reference to Other Modules and Documents

The information in this module is to be read in conjunction with Module 1, which is the module designed to address all the cross cutting issues identified in the process of integrated HCW management.

To get a better understanding of the interfacing that needs to take place in terms of internal HCW transport and storage at health care facilities on the one side, treatment of HCRW in the middle as well as disposal of residues on the other side, readers are referred to Modules 4, 6 and 7 respectively for more information.

This document should also be read in conjunction with the following relevant Acts and SABS Codes on the transport of hazardous materials:

National Road Traffic Act (Act 93 of 1996);
SABS Code 0228: Identification and classification of dangerous goods;
SABS Code 0229: Packaging of dangerous goods for road and rail transportation in South Africa;
SABS Code 0230: Transportation of dangerous goods – Inspection requirements for road vehicles;
SABS Code 0231; Transportation of dangerous goods – Operational requirements for road vehicles;
SABS Code 0232; Transportation of dangerous goods – Emergency information system;
SABS Code 0233: Intermediate bulk containers for dangerous substances;
The United Nations document titled "Recommendations on the transport of dangerous goods - model regulation".

5.5 How to Load HCRW for Transport to Treatment Facility

Where there is no on-site HCRW treatment facility available, all HCRW and HCGW stored in the central storage area are to be collected and transported to a regional treatment/disposal facility, as applicable to the respective HCW categories.

External transport of HCW can therefore be considered to be the movement of HCW by means of suitable designed vehicles from the point of external storage, to the point of treatment/disposal outside the boundaries of the health care facility. External transport of HCRW would be in an uncompacted state as containerised at source, whilst HCGW may be in either an uncompacted or compacted state, depending on the volumes generated as well as the containers and vehicles used.

Only companies authorised through registration with the regulatory authorities will be allowed to transport HCRW. The precautions to be taken when transporting HCRW are presented in Box 5.1.

Box 5.1: Provisions for transport of HCRW from health care facility to treatment facilities.

Registration:

In Gauteng all transporters of HCRW are to register with DACEL;
The registration and reporting procedures should include the physical address of the depot where vehicles will be stored and where it would be available for roadworthiness as well as health and safety inspections;

Responsibilities:

Without affecting the duty-of-care principle for generators of HCRW, transporters of HCRW will be held liable for ensuring that all HCRW entrusted to it will be treated and disposed of in accordance with the requirements of the Gauteng Health Care Waste Management Policy.

Recording:

Mass recordings on HCRW transported is to be submitted to DACEL in the required format for capturing on the HCWIS;
Existing manifest requirements shall be complied with until such time that a more elaborate HCRW tracking system is introduced;
Where the billing system is fully or partially based on the mass of the HCRW removed, such mass recordings shall be undertaken at the point where HCRW is collected. The same applies to the recording of the number of bins, where volume recording is used for the billing.

A number of recommendations related to the transport of HCW are presented in Box 5.2. Also included are some of the requirements for the transport of hazardous materials, which in South Africa include HCRW.

Box 5.2: Recommendations related to the transport of HCW between the central storage areas and the treatment/disposal facility:

Health Care Risk Waste

Loading of HCRW:

No HCRW containers shall be left unattended;
Central HCRW storage areas are to be closed and secured on completion of the HCRW collection;
Waste to be transported off-site should be bundled to suitable volumes and sizes to avoid excessive handling of numerous smaller units;
Where possible, HCRW containers should not be lifted or moved manually in a way that it will bring the personnel in close contact with the waste containers. Movement of HCRW containers should rather be by means of trolleys or other means of wheeled transportation to protect workers against possible injuries or infection from needle pricks, or alternatively from sustaining injuries through heavy and awkward lifts;
Any HCRW containers exceeding the allowable mass limit of 15 kg shall not be lifted manually. To ensure minimum ergonomic strain, lifting tailgates, ramps or other elevating systems should be applied where the type of container selected will result in the allowable lifting mass being exceeded;
Where containers are to be stacked, the maximum allowable stacking height for the particular types of containers are to be adhered to and containers are to be secured when loaded.

HCRW vehicle design:

Transport vehicles should be for the sole purpose of transporting HCRW and should not be used for any other purposes;

All HCRW vehicles are to meet the standards laid down by the National Road Traffic Act (Act 93 of 1996), as well as the bylaws of the respective local authorities in which area of jurisdiction it has to operate;

Access to the HCRW vehicle's loading compartment shall be safe and unobstructed, thus ensuring easy access for the HCRW management staff;

The type and size of the HCRW collection vehicles used would to a large extent depend on the type of containers to be used, the amount of HCRW to be collected per collection round, as well as the need to optimise the payload by for instance the use of double level loading compartments;

Storage compartments for HCRW collection vehicles should not have any holes or openings that could result in leaking of liquids that may have spilt from containers;

The inner surface of the collection vehicle's storage compartment should be rust free by being galvanised, manufactured from stainless steel or covered by zinc or other materials approved by the regulating authorities;

The internal finish of the load compartment should allow for easy cleaning, e.g. angles should be rounded;

There should be a bulkhead between the drivers cabin and load compartment, designed to retain the load, should the vehicle be involved in an accident;

There should be a suitable method for fastening the closed HCRW containers, thus reducing the risk of spills;

Vehicles are to be equipped with emergency equipment required by national or local legislation, including spill kits containing at least all personal protective equipment like masks, gloves and overalls, as well as folded HCRW containers, brooms, scoops and disinfectants, together with fire extinguishers and the staff should be trained in the effective use thereof;

Where transport of HCRW is to be undertaken over long distances like in the case of inter-provincial transport, HCRW collection vehicles are to be refrigerated;

Where the bylaws from neighbouring local authorities differ, the stricter bylaws should be used as the design criteria for the vehicle.

HCRW vehicle identification:

The HCRW transporting vehicle should be marked with the name and address of the waste carrier as well as an emergency telephone number for use in the event of an accident;

HCRW collection vehicles shall be clearly marked as transporting HCRW by inter alia displaying the international hazard sign on the vehicle;

HCRW vehicle maintenance:

Vehicles shall be well maintained, which should include a programme of preventative maintenance;

Cleaning and disinfection of HCRW collection vehicles should be undertaken at intervals, using or similar (according to the suppliers specifications), as a disinfectant;

Emergency procedures to be followed in the event of an accident:

Assuming for the worst case scenario that the truck driver and his/her crew is unable to assist emergency workers in the event of an accident, the following procedures are to be followed:

Identify the contents of the vehicle by means of the hazardous waste signage displayed on the outside of the vehicle;

Verify if there is any risk of a fire on the HCRW transport vehicle, and if so, distinguish the fire by means of the fire extinguisher provided on the truck, or alternatively by means of an external fire extinguisher;

Put on the necessary personal protective equipment (PPE) which should at least consist of sterile gloves, before attending to any injured persons;
Having given the necessary attention to injured persons or having transferred this responsibility to other professionals like paramedics, the emergency kit on the vehicle is to be located;
Provided that the emergency kit can be reached without the risk of being contaminated by HCRW, the PPE (leather gloves, goggles, mask, apron and gumboots) is first of all to be located and put on, after which an assessment of the extent of the spillage is to be made;
If the containers are not damaged, it is simple to be packed back into the loading compartment in as far as possible. Where this cannot be done due to the loading compartment not being accessible, damaged or the weight of the containers being too much for manual lifting, the containers are merely to be stacked as close as possible to the truck;
Where spillage occurred, the broom and scoop provided as part of the spill kit should be used to clear and HCRW for re-containerisation into the initial containers (if undamaged), or alternatively into the folded cardboard boxes with plastic liners that are to be provided as part of the spill kit;
With all the solid HCRW being re-containerised, the contaminated area is to be disinfected with that will also be included in the spill kit;
Throughout all of this, it is to be ensured that no inexperienced person or person not properly equipped to deal with HCRW, be allowed to approach the areas where HCRW spillage has occurred;
Only once the damaged vehicle(s) and any remaining spillage were removed from the scene, can final disinfection be undertaken;
All PPE used during the cleanup operation, is thereafter to be removed and bagged for disposal as HCRW.

For any spillage incidents that did not result from a vehicle accident, the procedures presented above (excluding bullets 1 to 4) will apply.

Occupational Health and Safety:

It is important for the HCRW collection staff are properly trained and equipped not only to execute their duties in terms of environmental standards, and OHS requirements, but also in terms of emergency procedures in the event of accidents, spills, leakage, etc.

All inoculation and anti-retroviral (if required) programmes should be in place and all treatment be documented for staff that may come in contact with HCRW;
The training as well as the inoculation and anti-retroviral programmes should apply to permanent as well as temporary staff employed for HCW management;
It is recommended that illustrative posters, e.g. inside the waste collection compartment, be displayed to remind the staff of the most urgent environmental as well as the OHS measures that are to be adhered to.

No collection crewmembers are allowed to travel in the HCRW loading compartment.

Health Care General Waste:

The system used for HCGW collection from small generators will in most instances be determined by the system proposed by the local authority that renders the service. Should the service be outsourced, financial considerations for making it viable will have a significant impact on the selection process;

When justified by the rate at which HCRW is generated at any particular health care facility, onsite compactors are used to reduce the HCGW storage space required, whilst at the same time reducing the environmental impact of the HCGW;

Should bulk open containers (skips or roll-on roll-off containers) be used for on-

site collection and storage of HCGW, such containers should be readily accessible for deposition of waste, whilst at the same time protecting the environment against the impacts that rain and wind will have on the HCGW;

Vehicles used for transport of HCGW should meet both the national transport legislation as well as the bylaws from the local authorities in which area the vehicles are operating;

All vehicles are to be equipped with the necessary safety equipment that will include equipment appropriate for clearing any spillage of HCGW;

Records of waste removal recording are only required in terms of the billing system that is to be implemented;

Staff appointed to collect and transport HCGW are to be properly trained and equipped to execute their duties;

All inoculation programmes should be in place and all treatment be documented for staff that may come in contact with HCW;

Training programmes are to be developed against the background of the OHS Act, to ensure compliance with the relevant legislation;

The training as well as the inoculation programmes should apply to permanent as well as temporary staff used for HCW management.

The options available for implementation of an external transport system is presented in Box 5.3.

Box 5.3: Options available for external transport of HCW

Health Care Risk Waste:

The size of vehicle used to transport HCRW could be selected for light loads (e.g. <1000 kg payload), medium loads (e.g. 1000< payload < 3000 kg) or heavy load vehicles (e.g. > 3000 kg payload);

The HCRW vehicle design could allow for a single level loading bay or double level loading bay, with or without dedicated lifting mechanisms as required by the number of loading bay levels as well as the type of containers being used;

The logistics for daily collection of HCRW could be in single shifts or multiple shifts;

Cleansing of HCRW collection vehicle with an anti-septic could be done on a daily or less frequent basis, depending on the exposure to potentially infectious pollutants;

Billing for HCRW collection and transport could be according to the number of HCRW containers collected (volume billing), according to the total mass of HCRW collected (mass billing), or as a combination of volume and mass billing.

Health Care General Waste:

HCGW can be collected in a compacted or uncompacted state, depending on the rate of generation as well as the availability of storage space at the premises;

Uncompacted HCGW collection can be done by means of black plastic bags loaded into a Rear-end-Loader compactor truck, 240-litre wheelie bins loaded into a Rear-end-Loader compactor truck, 5 to 6,5 m³ skips loaded into a Rear-end-Loader compactor truck or collected with a loadligger truck, 20 to 30 m³ roll-on roll-off containers, collected with a roll-on roll-off truck;

Frequency of HCGW collection will be determined by the rate of generation, the temperature conditions that can result in the generation of odours, as well as the storage space available;

Kitchen waste may be collected separately when used as pigswill; **MEETING WILL BE SET UP WITH VETS TO DISCUSS WHETHER FOODSTUFF FROM HOSPITALS CAN BE USED AS PIGSWILL.**

Recyclable materials that were separated before there was any risk of contamination, may be collected separately.

Figure 5.1 below presents examples on different types of vehicles for external transport of HCW.

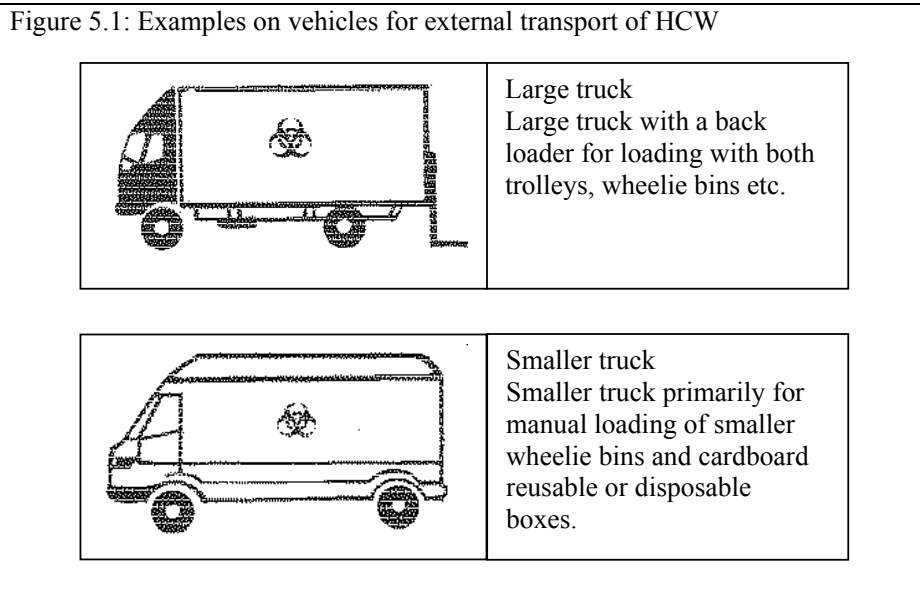
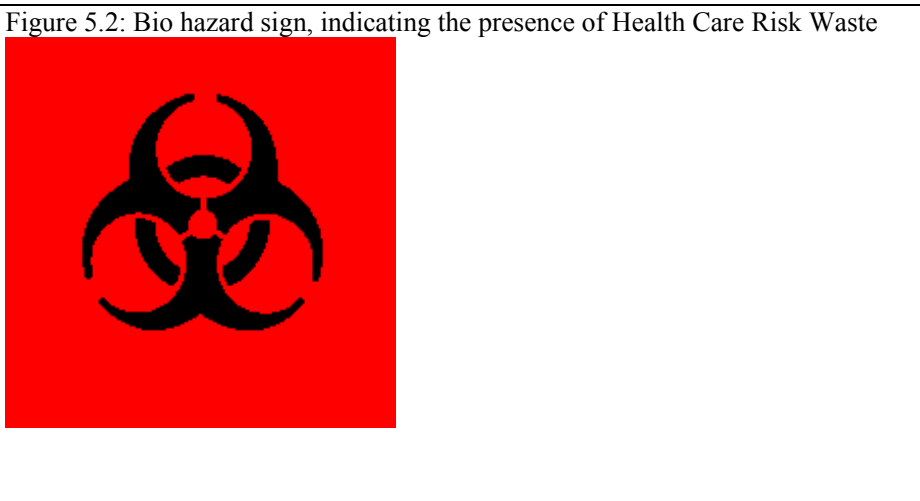


Figure 5.4 displays the biohazard sign to be used for labelling HCRW containers and marking HCRW transport vehicles.



5.6 How to Load and Transport HCRW Residues

Transport of residues from HCRW treatment facilities is the movement of treated HCRW by means of suitable designed containers and vehicles. This activity takes place from the point of treatment, to the point of final disposal at an appropriately permitted, designed, constructed and operated waste disposal facility. Due to the strong similarity in many respects between the transport of residues and that of untreated HCRW, it is considered appropriate to combine the aforesaid activities into one module.

A number of recommendations related to the loading and transport of HCRW residues are described in Box 5.4.

Box 5.4: Recommendations on the loading and transport of HCRW residues:

Volume reduction during treatment, resulting in an increased density of residues, results in more cost effective transport between the treatment- and disposal facility;

Low density residues could be transported more cost effectively by using compaction equipment to increase the material density;

The equipment required for containerising HCRW residues is appropriate receptacles (containers) to be used for the collection of the residues, which is determined by the state of the treated residues;

Residues are transported with vehicles that are appropriate for the type of containers being used, to a waste disposal site that meets the requirements for disposal of that particularly waste classification;

Similar to HCRW collection vehicles, these vehicles are once again to meet the standards laid down by the National Road Traffic Act (Act 93 of 1996).

Manual loading of HCRW residues should be discouraged;

Irrespective of the treatment process, is it recommended that the residues from any HCRW treatment process be managed as if it is potentially infectious;

The fine dust particles from incinerator ash could contain heavy metals, thus requiring effective dust suppression as well as the use of appropriate personal protective equipment (PPE) and emergency equipment, if required;

In addition to the occupational health and safety risks, there is also an environmental risk of pollution through heavy metals present in some treated residues;

Suitable covers are to be provided over containerised residues that will prevent the infiltration of water, as well as the scattering of residues through wind action;

People responsible for the handling of residues are to be capacitated in the environmentally sound, yet healthy and safe ways for handling of HCRW residues.

Box 5.5 provides various options for handling of residues, the equipment required for residue handling as well as the ways in which the payload of residues can be improved during transport thereof.

Box 5.5: Options for transport of residues.

- Residues can be loaded manually (although not recommended), mechanically or by means of automation;
- The vehicles used for the transport of residues could be a loadlifter for transporting skips with high density residues, a roll-on roll-off truck with 20-m³ to 30-m³ containers for transport of low density residues; a rear-end-loader (REL) compactor truck for transport of low density residues or a static compactor with roll-on-roll-off containers for transporting of low-density residues;
- An improved payload can be achieved by means of increased volume for bulk transport of low-density material, by means of increased density through shredding of low-density material or by means of increased density through compaction of low-density material.

5.7 Importance of Cooperation

The importance of cooperation in this module is focussed around the need for HCRW transport contractors to interact with the HCRW management staff from the health care facilities on the one end, and with the staff from the HCRW treatment facility on the other end. The contractor responsible for transport of residues will in turn interact with the staff from the treatment facility on the one end, and

with the staff at the waste disposal site on the other end. Significant delays and other irregularities can be averted through close cooperation and interaction on any matters that may have a negative impact on the operations of the respective parties.

Damaged containers, overloading of containers or storing of containers that are unprotected against the elements, are aspects over which the staff at the health care facility do have control and which will make the waste collection much more effective if addressed timely. Other important aspects to consider are for instance the provision of easy and unobstructed access, limiting the number of collection points per facility, limiting the transport distance between the central storage area and the loading bay, etc. Probably one of the more important aspects around this will be the efficiency with which the HCRW is containerised, as that will ultimately have a significant impact on the cost effectiveness of the transport operation, should the billing system be based on mass rather than volume, or even where the mass is to some extent incorporated in the billing system

Cooperation with the treatment facility operator on the other end will not only improve the effectiveness with which the transport contractor can undertake his work, but it will also be beneficial to the treatment facility operator if the mass recording is done effectively and the HCRW containers are stacked in the correct area and in the correct manner.

For the transport of residues it is important that the bulk containers are ready and available when called upon to collect it, once again with easy and unobstructed access. Easy access and limited disruption at the waste disposal site will be the important aspects to consider during disposal.

5.8 Annexure 5.1: Proposals for posters and other info materials

(TO BE FINALISED AND INSERTED ON COMPLETION OF THE PILOT PROJECTS)