Sustainable Health Care Waste Management in Gauteng

HCWIS - Health Care Waste Information System
Framework Document

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FINAL DRAFT

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1 Glossary of terms

Abbreviation	Meaning
DACEL	Department of Agriculture, Conservation, Environment and Land Affairs
DEAT	Department of Environmental Affairs and Tourism
DoH	Department of Health
DWAF	Department of Water Affairs and Forestry
HCRW	Health care risk waste
HCWIS	Health care waste information system
HCWM	Health care waste management
IIMS	Incinerator Information Management System
NWIS	National Waste Information System
NWMS	National Waste Management Strategy
RSA	Republic of South Africa
SoER	State of Environment Reporting
WIS	Waste Information System

2 Introduction

This framework document for the Health Care Waste Information System, forms part of the Sustainable Health Care Waste Management Project in Gauteng, funded by DANCED.

The framework document has been prepared to:

- identify the health care risk waste (HRCW) information and data needs of the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (DACEL);
- the possible HCRW reporting requirements to Government Departments, such as Department of Health (DoH), Department of Environmental Affairs and Tourism (DEAT) and Department of Water Affairs and Forestry (DWAF); and
- the role players in terms of data collection, submission, verification and reporting.

Decisions called for in this paper are analysed regarding implications on demands for resources to develop and operate a Health Care Waste Information System (HCWIS) for Gauteng.

The draft framework document was presented to a broad range of stakeholders at a workshop held on the 27 November 2001. The concerns and issues raised during the stakeholder workshop are listed in Appendix 1, and includes an indication as to where each concern raised was specifically addressed in this report. Results of discussing the paper with stakeholders will guide development of the detailed data pathways and specifications for development of software and/or revisions to existing software.

2.1 Structure of paper

This document includes the following sections:

Section 3 Objectives of the Health Care Waste Information System

Section 4 Identification and discussion of information needs.

Section 5 Assumptions in preparing the Waste Information System

Section 6 Limitations of the Waste Information System

Section 7 Discussion of information system concepts.

Section 8 Institutional requirements for implementation

Section 9 Existing systems - opportunities for reuse/upgrade.

Section 10 Obstacles

Section 11 Next steps – outline of next phase of work to develop systems.

3 Objective of the HCWIS

The major objective of the HCWIS is to support the improved management and strategic planning of HCRW in Gauteng. As this is mainly the responsibility of DACEL they will be the main guides as to the information to include in the system.

To determine the requirements of DACEL, meetings were held with representatives of DACEL on the 1 October and 4 October 2001 to assess their goals and objectives regarding HCRW management within the Province and to establish the Departments requirements regarding the HCWIS. These objectives were again reviewed with DACEL on the 13 December 2001, following the stakeholder workshop. Based on these discussions, the main aim of the HCWIS is to:

- Monitor trends in the amount of HCRW transported and treated within the Province on a monthly basis, and
- Assess available treatment capacity within the province and plan for sufficient and adequate future treatment capacity.

Additional issues to be addressed by the HCWIS, include:

- Information on HCRW generators, transporters and treatment facilities;
- Appropriate reporting from the HCWIS for amongst others, Provincial and National State of Environment Reporting (SoER);
- Identify priorities for HCRW management and source separation training;
- Monitor waste minimization programmes and the success of training for improved waste segregation;
- Identify unit generation data, i.e. typical waste tonnages produced for different generator types.

4 Information needs

In order to ensure the optimum benefit of money spent on data collection and handling it is important to:

- Collect only urgently needed data
- Collect those data from the fewest actors in the HCRW generation, transport, and disposal system where the necessary level of detail exists
- Make sure that the collected data are utilised effectively

A critical assessment must be conducted to identify the set of information to be included in the HCWIS, initially as well as in the longer term. That set of information must include standards for units of measurement, standards for marking of waste, etc.

A plan on how and when to extend the HCWIS set of information will be included in the assessment. Extending accuracy and detail level is a long and expensive process involving a good amount of training and education of the HCWIS actors.

When the initial set of information has been identified the system of HCRW generation, handling, and disposal must be examined to identify the level with the fewest operators, where that set of information is available. Different groups of data may well be best collected at different levels in the system. Alone for the sake of data quality assurance it is important to keep the number of operators reporting to the system as low as possible – but of course high enough to give the desired coverage of information.

The HCWIS will focus on health care risk waste only. No further classification of HCRW is required for the WIS, e.g. sharps, anatomical waste etc.

4.1 Target groups

In addition to DACEL, the HCWIS should where possible meet certain information requirements of other government departments. The needs of DoH, DEAT and DWAF, including the anticipated national waste information system (WIS) were also considered.

4.1.1 DoH

Discussions with Gauteng Provincial Department of Health, Health Information Systems indicated that there is currently little requirement from DoH Information Systems on HCRW information. Areas of overlap however include consistency in the unique identifier used by both the Health Information System and the HCWIS. Public Hospitals do not have a company registration number or tax number requiring. As such the unique identifier for Public Health Facilities used in the HCWIS may need to be obtained from the DoH Health Information System.

Discussions are to be held with Facility Planning, Provincial DoH to assess HCRW information requirements for planning and budgeting by the Department.

4.1.2 DEAT

Discussions were held with the representatives of National DEAT on the 24 October and 12 December 2001. DEAT are currently involved in establishing a National Waste Information System (NWIS), which will be operated and managed by DEAT. The NWIS will also contain information on HCRW.

Very little information is currently available regarding the NWIS. A Technical Specifications Document for the NWIS is currently being prepared, however this document is not as yet available for public scrutiny. At this stage, it is envisaged by DEAT, that the NWIS will require all generators, transporters and treatment/disposal facilities of HCRW, to register with DEAT. Reporting will be required from all groups, so as to track waste generation/transport/disposal. DEAT feel that, in terms of the proposed model for the HCWIS, HCRW generators should also be required to report on tonnages produced, to ensure that all HCRW which is being generated is treated and disposed of.

The detailed requirements for the NWIS will be collected during an upcoming Pilot Project, planned to begin in March 2002. Due to the magnitude of the NWIS, it is most probable that the Gauteng HCWIS will be implemented before finalisation of the NWIS. As such the framework for the NWIS may not yet be in place by the time the Gauteng HCWIS is implemented. It is important however, to continue discussions with DEAT, throughout the development of the HCWIS, to ensure consistency in thinking with the NWIS and to ensure that the HCWIS will contain enough information for the anticipated reporting requirements to the WIS.

National DEAT are planning to implement a fairly detailed classification framework for HCRW (elaborated BASEL classification):

- A{MSW},
- B1-B5{anatomical, sharp, pharmaceutical, cytotoxic drugs, blood},
- C{infect},
- D{other hazardous waste} and
- E{radioactive}) and their classification of HCRW

In addition, sources or generators of HCRW will be classified as

- Large - hospitals,
- Medium - clinics and
- Small-GP etc.

4.1.3 DWAF

Discussions were held with the representatives of Department of Water Affairs and Forestry on the 14 January 2002. Information requirements of DWAF in terms of health care waste focuses mainly on treatment facilities, including:

- Authorisation / permit status
- Location

- In terms of permit reporting requirements, tonnages of waste received for treatment and tonnages of final waste (residue) disposed of to landfill per annum.

Questions were raised as to whether the HCWIS will include information on incidences, such as down time, injuries, spills etc.

DWAF are currently in the process of replacing their existing Waste Information System (Waste Manager) with a Water Management System (WMS), which will include information on all water users, including landfills and treatment facilities.

5 Assumptions

In developing the HCWIS, the following assumptions are made.

5.1 Legal assumptions

Action to initiate the necessary revision of legislation must be taken quite soon as this process may take quite some time to pass through Government.

The major issue is to make it obligatory for anyone generating, transporting, treating or disposing of HCRW in Gauteng to register with DACEL and to report information to the HCWIS as described in Section 7. Legislation should also include measures to be taken on non-compliances.

The legislation must ensure that:

- HCRW is weighed.
- HCRW treatment facilities report quarterly to DACEL on monthly waste tonnages received per generator and the identification of the transporter who collected and delivered the HCRW.
- HCRW transporters report quarterly to DACEL on monthly waste tonnages removed from the Province for treatment /disposal in another Province.
- Only major generators to be specifically identified, minor generators such as GPs and Vets, may be grouped together as 'small generators'.
- Measures are defined to enforce reporting.
- All HCRW containers received by transporters and treatment facilities, are clearly marked with the generator name and registered unique number.

5.2 Technical assumptions

Either through legislation and/or the tender process, the following requirements are enforceable:

- Data is submitted to DACEL electronically, according to a strictly adhered to format or template for data capture and reporting.
- The HCWIS is managed and operated by suitably qualified DACEL personnel assigned the responsibility to make the HCWIS work.

6 Limitations of the HCWIS

The proposed framework for the HCWIS is based on the principle requirements for information for DACEL, as presented in Section 3, namely, to be able to:

- Monitor trends in the amount of HCRW transported and treated within the Province on a monthly basis, and
- Assess available treatment capacity within the province and plan for sufficient and adequate future treatment capacity.

Additional issues which are addressed by the HCWIS, include:

- Information on HCRW generators, transporters and treatment facilities.
- Appropriate reporting from the HCWIS for amongst others, Provincial and National State of Environment Reporting (SoER).

It is not the aim of the HCWIS to capture all possible information on health care waste within the province, or the environmental and human health impacts arising from health care waste treatment and disposal. The proposed framework for the HCWIS has certain limitations. These limitations include:

- The HCWIS is not a tracking system, tracking waste from generator to transporter to final treatment and disposal.
- The HCWIS does not incorporate the hazardous waste manifest system.
- Verification or auditing of data is limited to a simple cross check of serviced generators against total HCW generators.
- Information on incidences, illegal disposal, injuries, effectiveness of treatment/disposal, the quality of HCRW transportation etc, is not captured within the HCWIS.
- The HCWIS only captures tonnages of health care risk waste. Further subdivision of the classification into, for example, anatomical waste, sharps, blood etc, is not felt to add extra value to DACEL's requirements for using the HCWIS for planning and management. To keep the system as simple as possible, and request only urgently needed data, it is recommended that the broad category of HCRW suffice.

Many additional 'nice-to-haves' were identified in developing the framework document, as highlighted above. It must be emphasised that the current HCWIS framework allows for the capturing of data which will address the most critical questions facing DACEL. It is however recognised that the current development of the HCWIS is a phase 1 development, with additional components likely to be added to the system in the future, if and when required.

7 Information system concepts

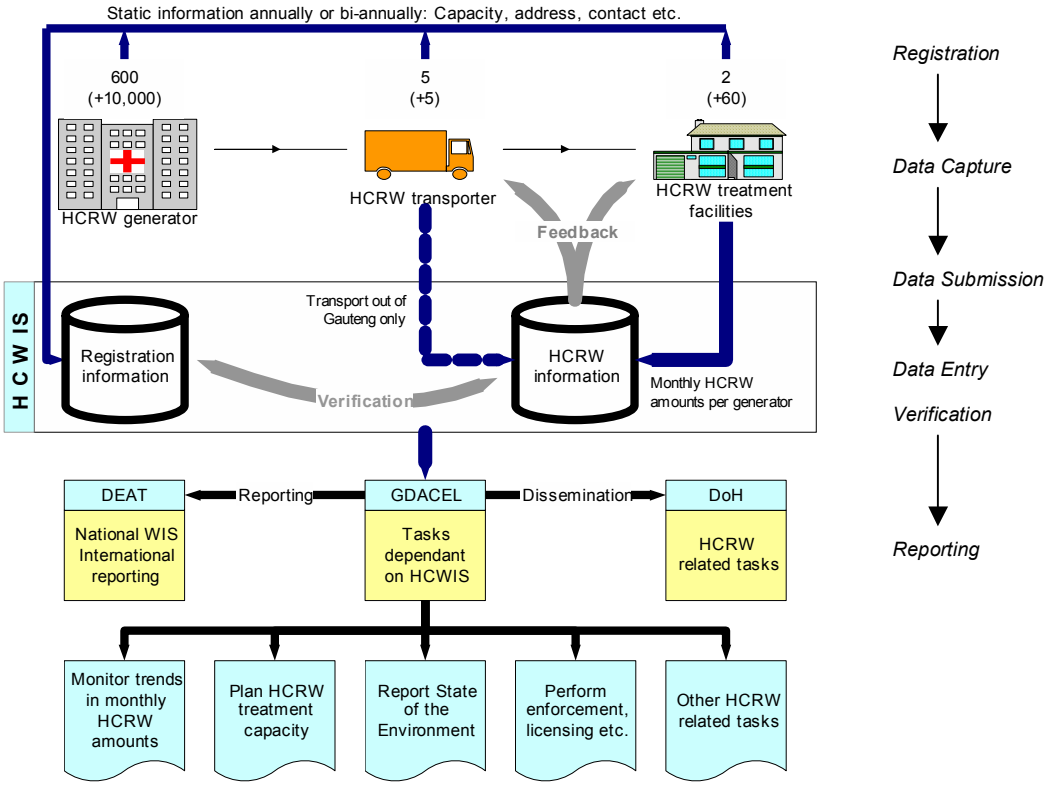
Data will be collected primarily from HCRW treatment facilities[1] and will include static data like name, address, contact person, capacity etc. as well as dynamic information on monthly amounts of HCRW treated. In addition, HCRW transporters will be required to report on HCRW transported out of Gauteng Province, for treatment/disposal in neighbouring Provinces.

It is recognised that the responsibility of appropriate waste treatment and disposal lies with the generator of that waste (NEMA, Duty of Care). The proposed HCWIS reporting structure does not free the generator of their responsibility with regard to the waste produced.

7.1 Overview of system

Information in the HCWIS is collected, processed and disseminated as illustrated below (Figure 1). The main principles are that each piece of information is collected only once, validated close to the source of information, and disseminated to relevant bodies.

Figure 1 Overall principles of the HCWIS



[1] In this context HCRW treatment facilities refers to facilities receiving HCRW for treatment and/or disposal.

The system must be able to handle dynamic as well as static information regarding HCRW generators, transporters and treatment facilities. The information required for the HCWIS will include:

- Basic information on HCRW generators
- Basic information on HCRW treatment plants (private and public).
- Basic information on HCRW transporters.
- From treatment plants (including onsite at hospitals and clinics): Monthly amount HCRW treated per generator per transporter.
- From transporters: Monthly amount HCRW transported out of the Province for treatment.

During implementation of the system monthly reporting of dynamic information from treatment plants will be needed. As the system gets up and running reporting frequency can probably be lowered to e.g. quarterly reporting of monthly amounts of HCRW.

It is assumed as described in Section 5 that HCRW treatment plants weigh the waste from each HCRW generator on receipt. This detailed information will ensure that the system is verifiable. The figures above each kind of actor in the HCRW management chain in Figure 1 indicate the approximate number of major actors. In parenthesis is shown the estimated number of small actors.

7.2 Registration

As shown in Figure 1, all HCRW generators, transporters and treatment facilities will be required to register with Gauteng DACEL. Initially only medium and large generators of HCRW (> 1kg per day) will be requested to register and will be issued with a unique registration number. Small generators of HCRW, for example GP's may be accommodated by means of central collection points for which the Local Authority is responsible. In which case the Local Authority would register as a HCRW generator. There are an estimated 227 large generators (> 10 kg per day) and 343 medium generators (1-10 kg per day) within the Province (HCRW Status Quo Report, 2000).

In registering with DACEL, certain basic static information is required, such as company name, postal address, telephone number, e-mail, contact person, permit status, coordinates. For treatment plants, information on treatment capacity would be required, while for generators, information on number of beds, occupancy and expected ranges in HCRW generated would be requested.

The unique identifier issued to generators, transporters and treatment facilities is required to distinguish between different companies submitting data to the HCWIS. A number of possible formats may be adopted for the company identifier. These include:

Company Registration Number
South African Company Registration Numbers take the form of YYYY/NNNNNN/NN, e.g. 1998/012345/00. Company Registration Numbers were

amended in January 2000, to be Year 2000 compliant (General Notice 1762 of 1999). Applicable to HCRW treatment facilities, transporters and private health care facilities (generators). Can not be applied to public health care facilities (generators).

Income tax reference number
South African Income Tax Reference Numbers take the form of NNNN/NNN/NN/N, e.g. 1234/567/89/0. Applicable to HCRW treatment facilities, transporters and private health care facilities (generators). Can not be applied to public health care facilities (generators).

DACEL Registration Number
In the DACEL Incinerator Information Management System (IIMS), treatment facilities were identified by a 4 digit Registration Number starting with 2***. These registration numbers were obtained from DACEL for the Health Care Risk Waste Status Quo Project. However, not all incinerators had Registration Numbers.

Health Practioners Registration Number
For public health care facilities which do not have a company or tax registration number, the Health Practioners Registration Number which is registered with the Health Professions Council of South Africa may be used.

Department of Health Information System
The Gauteng Department of Health will require unique identifiers for public health care facilities in Gauteng for their Health Information System (HIS). It may be practical to use the same unique identifier for the HCWIS. The format of the DoH unique identifier has not as yet been finalised (pers comm., Dept Health Information Systems). However, the HIS does not identify private health care facilities.

Other Identifier
A unique number may be assigned to generators, transporters and treatment facilities. In assigning a unique identifier, the number may include a character to distinguish between generators (G), transporters (T) and treatment/disposal facilities (F) and may include a reference to Gauteng Province (GP). A new unique identifier for all generators, transporters and treatment facilities provides perhaps the most simple and effective means of identifying role players.

7.3 Data collection

As indicated in Figure 1 HCRW treatment facilities, and to a lesser degree HCRW transporters, are the sources of information for the HCWIS. Static data will be collected on registration (Section 7.2) and thereafter annually or bi-annually. Dynamic data will initially be collected monthly and later in the process perhaps quarterly.

The value of the HCWIS depends on the reliability of its data. It is therefore required that all HCRW is weighed and that the amounts are reported in kilograms (kg) (units to be standardised for single reporting unit). Inclusion of measures in e.g. boxes or say m^3 would make calculation of tonnages impossible.

The request for treatment facilities to report on tonnages of HCRW per generator is not felt to add additional costs to their operations. Tonnages of HCRW per generator

may either be recorded by the transporter and submitted to the treatment facility with the waste, or by the treatment facility, on receipt of the waste. The recording of tonnages of HCRW per generator and the transfer of information on generators from transporter to treatment facility is a requirement of the Manifest System (National Road Traffic Act, Act 93 of 1996; SABS 0231), and is as such already a legislative requirement. (commencement 3 August 2001, Government Gazette No 22553).

The method used to weigh the HCRW either by the transporter or treatment facility is not prescribed here. Similarly the means of capturing generator information, whether it be labels, bar codes or transponder systems is not prescribed in the framework document. The only stipulation with regards to labelling is that each and every container be clearly marked with the generators name and unique number.

7.4 Data submission

Data submission to DACEL must be designed to cope with different reporting media, either as online reporting using the Internet, or reporting in computer file on diskette or via e-mail. The submission of data in paper format is not recommended. It is envisaged that software be provided to transporters and treatment facilities to capture the required information in the required format, for easy upload into the database. The reporter software will be developed in conjunction with the HCWIS as part of this project.

Reporting by either a treatment facility or transporter would have the following content:

- Identification of reporter
- Month and year
- Amount (kg)
- Waste type
- Generator registration number
- Transporter registration number
- Treatment facility registration number

Sample reports for HCRW treatment facilities and transporters are shown in Table 1 and Table 2.

Table 1 Sample report from HCRW treatment facility

HCRW Report 1-2002			Date: April 12, 2002		Reporter: GPT-0004	
Month	**Year**	**Amount**	**Waste type**	**Generator**	**Transporter**	**Treatment facility**
01	2002	412	HCRW	GPG-0313	GPT-0012	GPF-0004
01	2002	2208	HCRW	GPG-0087	GPT-0031	GPF-0004
01	2002	818	HCRW	Mpumalanga	Mpumalanga	GPF-0004
02	2002	571	HCRW	GPG-0313	GPT-0012	GPF-0004
02	2002	1807	HCRW	GPG-0087	GPT-0031	GPF-0004
02	2002	918	HCRW	Mpumalanga	GPT-0031	GPF-0004
03	2002	471	HCRW	GPG-0313	GPT-0012	GPF-0004
03	2002	1231	HCRW	GPG-0087	GPT-0012	GPF-0004
03	2002	57	HCRW	GPG-0221	GPT-0031	GPF-0004

Table 2 Example report from HCRW transporter

HCRW Report 1-2002			Date: April 4, 2002		Reporter: GPT-0012	
Month	**Year**	**Amount**	**Waste type**	**Generator**	**Transporter**	**Treatment facility**
01	2002	450	HCRW	GPG-0313	GPT-0012	Free State
02	2002	825	HCRW	GPG-0313	GPT-0012	Mpumalanga
02	2002	2200	HCRW	GPG-0087	GPT-0012	Free State
03	2002	56	HCRW	GPG-0313	GPT-0012	Free State

The sample reports for both the treatment facility and transporters are the same. The report allows for the capture of information on the Reporter, the generator producing the waste, the transporter delivering waste to the treatment facility (or outside of the province), and the treatment facility receiving the waste.

The content of *Month* and *Year* should be obvious as the content of *Amount*. The *Waste type* column can only contain entries from a fixed list. Right now *HCRW* will be the only valid entry. Although only HCRW is currently considered, the reporting will have to include information on waste type to prepare for future expansion of the system to cover the full waste stream in Gauteng.

For waste removed from Gauteng to another Province, only the Province name is listed under *Treatment facility*, since these treatment facilities will not be registered with Gauteng DACEL, and as such will not have a registered unique identifier. Similarly for waste received for treatment in Gauteng from neighbouring Provinces, only the Province name is listed under the *Generator* field.

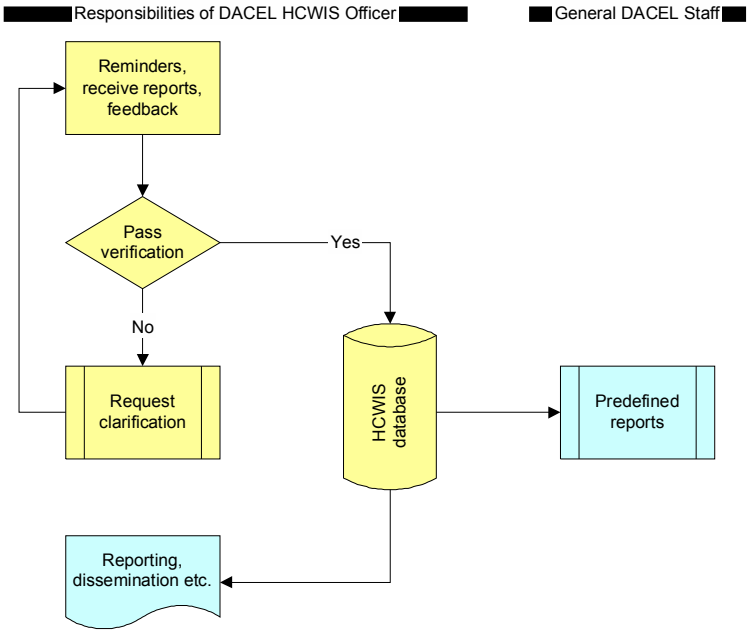
7.5 Administrative routines

For each reporting cycle a number of administrative routines will be needed:

- Before each reporting cycle a letter should go to all reporters reminding them of their reporting obligations.
- Reminder letters to all reporters not meeting the stated deadline for reporting. Probably a range of reminder letters will be necessary, ending up with substantial fines or lawsuits.
- Quality assurance or verification of information
- Calculation of statistics
- Dissemination of information to all relevant functions within the government and the public

Of course, the outlined tasks must be supported and preferably automated through the use of the HCWIS. That is, the HCWIS should facilitate automatic generation of reminder letters, any quality assurance activities, calculation of statistics etc.

Figure 2 Reporting cycle



7.6 Quality assurance and feedback

Quality assurance of the received information is essential to the success of the HCWIS. It will therefore be necessary to establish a training program that will enable the DACEL staff to perform high quality data verification.

Common verification routines will help increase the total value of the HCWIS. Only a few erroneous reports will be enough to jeopardise the value of the HCWIS.

Initially, verification of information will be quite difficult, but as the HCWIS gets established and contains information from previous reporting cycles the options for data verification will improve. Verification can take place on the basis of:

- Information from previous years
- Knowledge of the reporter
- Experience from DACEL EOs
- Comparison with similar reporters
- Common sense
- Generator information

Education and training of the verification staff is very important, both initially and on an on-going basis to compensate for job rotations and new employees etc. The following rules are used to validate a report:

- *Reporter* must be a registered HCRW transporter or treatment plant.
- *Month* and *year* must of course identify months for which we expect reporting. So e.g. month 01 in year 1854 or month 14 in 2002 should be rejected.

- *Amounts* must be positive integer numbers. Zero numbers are not reported and negative numbers doesn't make sense.
- *Unit* must be *kg*.
- Generator, Transporter and Treatment Facility fields must be filled in. If the reporter is both the transporter and the treater, both fields will be filled with their own ID number.
- Content of Treatment Facility and Transporter must either be a registered treatment plant or transporter respectively OR the Province name to signify treatment plant outside Gauteng.

If the reported amounts are far from the amounts in the last reporting, say 20% smaller or bigger, it should flag the reporting for further investigation.

No matter if the report is accepted or rejected by the system a feedback to the reporter is essential. Either thanking them for good co-operation or asking them to clarify the matters of concern in the report.

7.7 Reporting

Reporting to national level will have to follow the directions given by the future national WIS. Based on any directions from DEAT at this stage a preliminary reporting system will be included in the HCWIS, of course subject to further revisions as the WIS materialises.

7.8 Dissemination

Formats for reporting to DoH and other government bodies will be developed in co-operation with the affected parties. Of course, the agreed formats will be an integrated export format of the HCWIS.

7.9 Verification

Verification of data captured within the HCWIS is an important aspect of the system. Verification may take place in a number of ways:

- Generators are requested to submit data on tonnages of waste generated, to check against tonnages of waste treated;
- Manifest documents are submitted to track waste generated, transported and treated;
- Check of serviced generators against the total list of registered generators.

It is recognised that the first two points would have huge cost implications and capacity requirements, which are unlikely to be realised within the short to medium term. It is therefore recommended at this stage, that the registration database be used as a verification tool for the HCWIS.

The registration database will immediately identify generators which are not serviced by a registered transport company or treatment facility (in the case of onsite treatment). These generators may be approached to determine how they are dealing with the HCRW.

By obtaining information on the number of beds per generator and the occupancy rate, ranges in expected HCRW generated will be available. Reported tonnages of waste per generator may be checked against these ranges to assess possible under or over reporting. Waste generation ranges per facility may be amended as more data becomes available.

7.10 Data security and backup procedures

Measures must be put in place to ensure frequent backup of the database supporting the HCWIS. This may be built into the software to ensure regular backup.

It is envisaged that the database will be stored on the central DACEL server, making the information available to those within the Waste Directorate. The issue of security of this system will be addressed.

7.11 Access to information

At the stakeholder workshop on the 27 November 2001, the issue of confidentially of information submitted was raised. It was felt that information on ones client base and tonnages collected per generator could be used by the 'competition', to 'steal' business. During the plenary session (Group 3), it was agreed that the HCRW information was not confidential, and that information within the HCWIS should be 'available to all'.

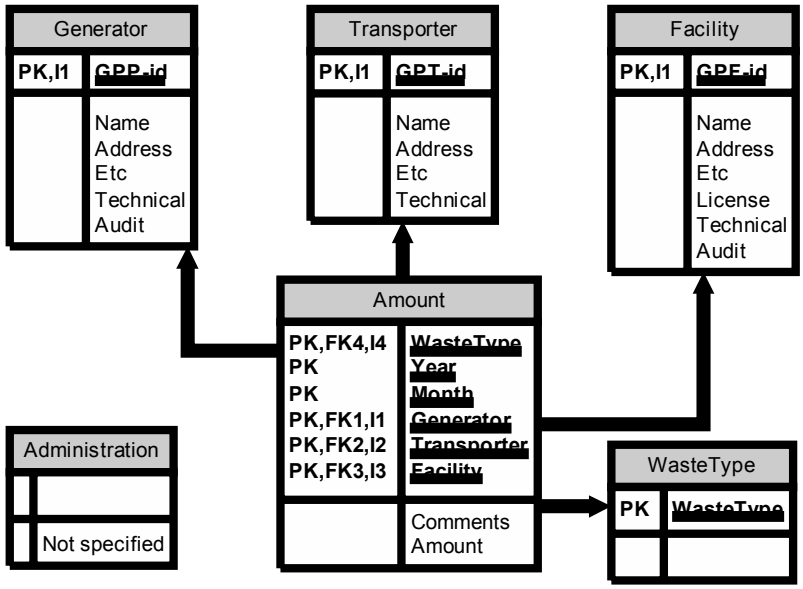
Confidentially of this information needs to be further investigated.

7.12 Data structures

Although a bit premature a few words about data structures are still in place. A properly defined data structure is the first step to ensure the integrity of the database. Hence, the database must be normalised to at least fourth normal form, ensuring in common words, that any piece of information is stored only once in the database.

At the same time the structure of the database must support easy and "foolproof" use of expert report generating tools. So it should as well be intuitively simple.

Figure 3 Conceptual database structure



The conceptual database structure shown in Figure 3 is not intended to be a complete database layout for the system. Rather it shows the main components of the database. PK indicates primary keys in the tables, i.e. unique identification of a record in the table, while FK are foreign keys that can only take values from an associated table.

The main entity of our system is Amounts of HCRW. As shown in the figure amounts are related through a unique ID-number to the generator, the transporter and the facility the treated the waste. Generators, transporters and facilities are described using the usual range of name, postal address, contact person, phone number, e-mail etc. Apart from that each of these actors will have some further information not detailed at this stage.

Amounts of waste are uniquely identified through a combination of Generator, *Transporter*, *Facility*, Year, Month, and WasteType. Initially, the only waste type in the system will be HCRW and by simply extending the range of waste types the system will be able to handle more waste types. All amounts are stored as an integer number representing the amount in kg.

7.13 GDACEL tasks

A number of HCWIS based tasks have been identified during our discussions with DACEL. Below these tasks are described together with an analysis of the suitability for the HCWIS to support these tasks.

Monitor trends in monthly HCRW amounts
Reliable information on the tonnage of HCRW generated and treated in the province is a high priority of DACEL. With the system outlined in this section monitoring of trends in the monthly amounts should be straightforward:

- HCRW treatment facilities will report monthly tonnages of HCRW treated, per generator, per transporter, in the province from inside or outside the province.
- HCRW transporters will report all HCRW transported to a treatment plant outside the province.

This approach assumes that all HCRW produced within the province is submitted for treatment/disposal.

Inventory of HCRW generators, transporters and treatment plants
It is assumed (Section 5) that all HCRW generators, transporters and treatment plants are required to register with DACEL. It is an integrated task of the HCWIS to keep this registration information up to date on an annual or bi-annual basis.

Plan HCRW treatment capacity
The inventory of HCRW treatment plant capacity and the trends in monthly amounts of HCRW generated, forms a solid basis for planning of future HCRW management capacity.

Report State of the Environment
For the State of the Environment reporting DACEL will need information on:
- Number of treatment facilities with capacity, permit status, compliance level etc.
- Tonnage of HCRW generated and treated within the province

Please note that with the proposed system design it is possible to group treatment capacity on geographical sub-divisions of the province while the geographic source of the HCRW, the generators, is not collected.

Perform enforcement, licensing etc.
Should DACEL need information beyond the detail level recorded in the HCWIS, e.g. in connection with enforcement or licensing, further details will be available on request from the HCRW treatment facilities, transporters, generators. As assumed they will be required to keep information on monthly amounts collected and treated from each HCRW generator.

Other HCRW related tasks
None defined so far.

8 Institutional requirements

8.1 DACEL

8.1.1 Staff

The current Waste Information Systems (See Section 9), are structured such, that data can be captured by a number of staff members within the Department. This includes:

- 16 Environmental Officers (EO's) (EO, senior EO, principle EO),
- 4 Assistant Directors (AD),
- 1 Deputy Director

The current information systems are installed on PC's with the database stored on the DACEL network. As such the systems are accessible from any computer within the Department, which has the WIS software installed on it.

This approach is very fragmented with regards to the responsibilities of the Department for data capture, verification, and reporting. It is therefore recommended that DACEL appoint ONE staff member, whose sole responsibility is management of the waste information systems. The responsibilities of the Waste Information System manager, should include:

- Ensuring that data is collected, either by informing Environmental Officers of the need to visit sites and collect data, or by contacting waste generators, transporters or treatment companies and requesting information
- Checking reporting compliance of companies
- Verifying data which is submitted both internally and externally
- Entering data into the system, or uploading data from files or from email.
- Producing reports and graphs on collected data and submitting this to the appropriate Environmental Officers and Assistant Directors, for further action.
- Forward appropriate reports to Gauteng and National DoH as well as DEAT.
- Address all queries that may be submitted and serve as line of communication between respective Departments and the reporters.
- Information support for Provincial and National State of Environment Reporting

This post may also include the duties of ensuring maintenance, upgrade and operation of the information systems. The need to enter or modify data into the system by other staff members should therefore be limited and controlled. Access to the information systems by DACEL staff should be for data review and reporting only.

Training of the quality assurance staff (that may be the HCWIS officer) requires an experienced teacher with solid knowledge of environmental data quality assurance. As the number of quality assurance staff is low (or even one) a suitable form would be something like a workshop where the applied techniques can be discussed and adjusted to any local requirements.

Of course the training must be planned in close co-operation with the company developing the supporting software, as one important issue on the agenda will be to

enable the staff to utilise that software efficiently. Likewise, any future revisions of the registration framework or the supporting software should be disseminated in a similar way.

It is suggested to develop a formal quality assurance manual and a formal data collection manual to support the staff and to ease the process of introducing new staff to the process. The later point is essential as frequent job rotation and replacement of staff must be anticipated.

8.1.2 Equipment/Computers

The waste information system should remain active on the network. However, the Waste Information Officer should have direct access to the system. A computer for use by the Waste Information Officer would be required.

8.1.3 Financial implications

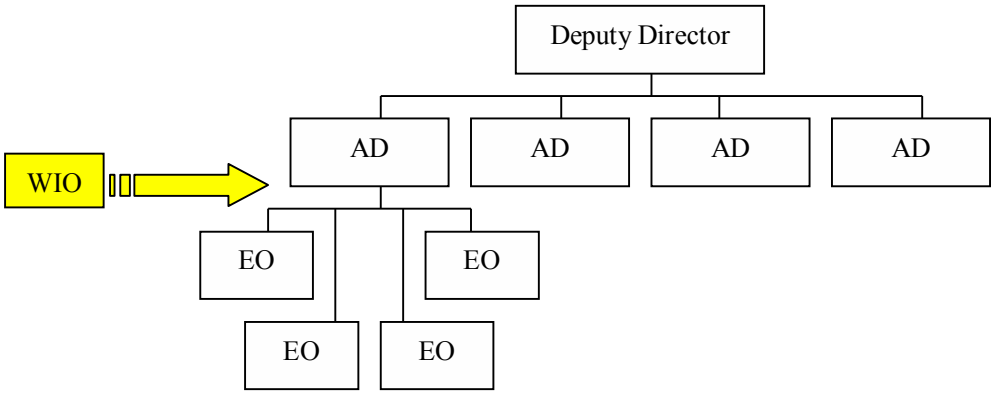
The financial implications for DACEL, of developing a HCWIS, include:

- Cost of staff member dedicated to management and operation of the WIS, which includes data capturing, verification, reporting, and system maintenance.
- Site visits by EO's to request and collect outstanding quarterly data, if not received from transporters/treatment facilities (part of existing duty).

The only costs envisaged for the continued operation of the HCWIS is the human resource cost and minimal routine upgrade cost. All additional costs, such as site visits, are already included in DACEL activities.

It is envisaged that the Waste Information Officer will occupy a similar staffing level as a Senior Environmental Officer or Assistant Director.

Figure 4 Expected institutional level of Waste Information Officer



Note: With the existing Incinerator Information Management System (Section 9) not operational within DACEL it is recommended that the HCWIS be audited at least two years after implementation to verify the success of the system and whether the system is meeting the requirements of DACEL. This activity will require funding from DACEL.

8.2 Information suppliers

Those vendors capturing information, such as the HCRW transporters and the HCRW treatment facilities will incur additional costs in obtaining the information required for the HCWIS.

Such costs may include:

- If treatment facilities request transporters to weigh the HCRW at the generator, transporters will need to purchase scales, if they do not already have. The cost of scales may vary from a few hundred to a few thousand Rand.
- Treatment facilities will need to install weigh bridges, if they do not already have, at a cost of approximately R140 000 (pers comm., N Brink).
- Transporters and Treatment facilities will need to purchase a computer on which to capture this information, if they do not already have.
- Literate staff, with a certain level of understanding of the operation and the data capture routines are required by the transporters and treatment facilities to capture this information and submit to DACEL. Such staff typically require higher wages, than would the average worker.
- Staff would need to be trained, to ensure accurate capture and recording of information, which would involve additional cost. These costs may however be recovered by the employer through the SAQA structure.

9 Existing systems

DACEL currently has 2 waste information systems operating on their systems:

- Incinerator Information Management System (IIMS)
- Landfill Information System

It is important to review these existing waste information systems with a view to gain from their experience. Also recording systems in use by the HCRW generators and operators must be examined to ensure that the system is designed to minimise the alterations needed in those systems.

The IIMS was developed for the Gauteng Province by CSIR during the beginning of 2000. The current system design was however based on quite different design criteria. It is therefore strongly recommended to review the current system in light of the design criteria given in order of importance above. Before the review it is of course important to adjust the list as needed to gain consensus among the stakeholders.

Southern Metropolitan Local Council (SMLC) is establishing a Waste Database to support development of a first generation waste management plan for the area. As that project has a number of items in common with this project it is strongly recommended to make the best use of experiences gathered during the two projects by holding a co-ordination meeting.

9.1 DACEL Incinerator information management system

A Phase 1 HCWIS, focussing on treatment facility information, was developed for Gauteng DACEL, and installed on their systems in August 2000. The information system which was Windows 98 based was upgraded in September 2001, to be Windows 2000 compatible.

The system, although installed and operational on their system for over a year, has not been implemented for the following reasons:

- Lack of personnel and equipment to enter data
- Problems with network installation and upgrading process
- Many "unnecessary" data fields within the HCWIS, for which data is currently not available
- HCWIS is focussed around the generator facilities and treatment facilities rather than the medical waste.
- A lot of the information captured in the WIS was facility information, which would not need to be captured or updated that often. Of more importance, is the Information and Handling Tab, and specifically, the Weights.
- No reason for operators to report on data and therefore to capture data (not currently enforceable).

Eagle IT developed the software using Visual Basic. The system allows data entry only through physical entering; no interfaces were created to allow electronic data

entry by means of files (disk) or via the Internet. The need for alternative means of data entry must be investigated.

The investment made in the existing Phase 1 WIS and the initiative taken by Gauteng DACEL to upgrade the system to be Windows 2000 compatible indicated that the existing WIS should be used as the basis for the Phase 2 version. The Phase 1 module must be reviewed though to ensure that only needed data is captured.

(Note: The information within the IIMS will most likely form part of the registration database for treatment facilities as it is mostly static information). In which case the IIMS will be dissolved into the HCWIS.

9.2 DACEL GIS system

When talking of information systems it is almost automatically assumed that the system must support GIS. The proposed structure and format of the HCWIS database will allow for easy integration with GIS, if coordinates of HCRW generators and treatment/disposal facilities are obtained during registration (static data).

10 Obstacles

A number of obstacles face the proposed HCWIS model. These include:

- Generators of HCRW do not have the equipment or personnel to effectively manage HCRW at source.
- Generators, (some) transporters and public, on-site treatment facilities do not currently weigh HCRW generated, with only truck weighing being done by one of the HCRW treatment contractors.
- The predominant means of recording of HCRW is in terms of number of boxes, rather that tonnes or kilograms.
- There is currently limited identification of generators of HCRW on the containers.
- Waste loads delivered by transporters to treatment facilities, contain multi loads from a number of generators.
- There is presently no or limited tracking systems in place to ensure that waste generated is ultimately treated and disposed of.

As mentioned in Section 5, legislation will need to be put in place and enforced to ensure that these obstacles are overcome, and that the required data is collected to populated the HCWIS.

11 Next steps

Task	Due Date	Progress
• Present draft framework to DACEL	October 2001	Completed
• Present final draft framework to key private and public stakeholders, this will include DEAT, Gauteng and National DoH and the identified WIS working group	November 2001	Completed
• Finalise draft WIS framework document	December 2001	Completed
• Review of draft final document by DACEL	December 2001	Completed
• Finalise WIS framework document	January 2001	Completed
• Approval by DACEL of WIS framework	February 2002	
• Programming of WIS	Feb – April 2002	
• Testing of WIS as part of the pilot project	May – Dec 2002	
• Review of WIS by DACEL and project team	Dec – Jan 2003	
• Make adjustments to the HCWIS where required;	Jan 2003	
• Train and inform users of the HCWIS in Gauteng	Jan – Mar 2003	
• Implement HCWIS in Gauteng	Mar 2003	
• Liase with DEAT to ensure compatibility with National WIS system.	Ongoing	
• Monitor efficiency of HCWIS	Ongoing	

APPENDIX 1

ISSUES / CONCERNS RAISED BY STAKEHOLDERS ON THE HEALTH CARE WASTE INFORMATION SYSTEM (HCWIS), WORKSHOP 27 NOVEMBER 2001

A number of issues raised by stakeholders in the afternoon plenary session on the Health Care Waste Information System, have been removed from this list, as they were issues regarding the HCW Policy Document and general HCRW management within the Province, rather than the HCWIS. Only issues regarding the HCWIS are listed here.

Where an issue has been raised in more than one group, the issue is only listed once.

ISSUES/CONCERNS RAISED	RAISED BY	ADDRESSED IN SECTION
Purpose of the HCWIS :		
Primary question to be asked of DACEL : 'What is the data to be used for' and ''What benefits will the data add to DACEL's understanding of HCW management in Gauteng?'	Group 1, 3	Section 3
Control of HCW, planning and resource management	Group 2	Section 3
National HCWIS needs : It was felt that the HCWIS could meet national needs as long as it was done with stakeholder consultation	Group 4	Section 3, Section 4
Data requirements :		
Where is the waste going?	Group 1	Section 6
Is the treatment effective and conforming to the set standards	Group 1	Section 6
How is the waste transported (Duty of Care principle)	Group 1	Section 6
There is an important need for facilities for recording exceptions, failures in the system	Group 3	Section 6
Contact number to report illegal dumping	Group 1	Section 6
Different waste types generated	Group 1	Section 7.3
HCWIS should allow for HCRW classification that ties in with the billing system	Group 2	Section 7.3
Suppliers of containers should ensure that the containers have the correct markings on them	Group 2	Section 5.1, Section 7.3
Generators must label their containers with the required information, including waste content	Group 3	Section 5.1, Section 7.3
Weighing facilities at all generators producing >10kg per day	Group 3	Section 7.3
Double check on tonnages received by the transporter and by the treatment facility by weighing the trucks on arrival at the treatment plant.	Group 3	Section 7.3
Some cost implications were expected	Group 3	Section 8.2
No additional resources were deemed necessary. Data is already being collected by generators and transporters, however the type of information collected may change.	Group 3	Section 8
More skilled personnel will be required to collect and record information and this may mean training costs and higher salaries	Group 3	Section 8.2
There is a need for a more detailed definition of HCRW	Group 4	Section 6
Registration/permitting of transporters/treatment plants: It was felt that this	Group 4	Section 7.2

ISSUES/CONCERNS RAISED	RAISED BY	ADDRESSED IN SECTION
was necessary and that generators should also be registered		
Data capture/submission :		
All generators should be included in the WIS, including small generators	Group 1	Section 7.2
Data capture should be done electronically on a template provided by DACEL	Group 2	Section 7.4
The HCW generator must be responsible for supplying the necessary information - a requirement under NEMA	Group 3	Section 7
Reporting should be mandatory as part of the licence requirements for treatment facilities	Group 3	Section 5.1
Local Authorities should report to DACEL on waste generation within their region - small generators would then be accounted for	Group 3	Section 7.2
Verification :		
Audit trail : Mass, date transported, date processed and Safe Disposal Certificate	Group 1	Section 6
Bar-coding should be introduced and the HCWIS be extended to become a HCRW tracking system	Group 2	Section 6, Section 7.3
Delivery notes are to be used as the reference information source to verify information captured in the WIS	Group 2	Section 6, Section 7.3
Verification of data was seen as being very important to provide an audit trail	Group 3	Section 7.9
Disposal of all HCRW via permitted treatment plants : it was felt that this was unrealistic to expect in the short term. It was expected that there would be cheating, most likely by generators of HCRW	Group 4	Section 7.9
Legislation :		
The HCWIS should be legislated in order to be effective	Group 2	Section 5.1
Legislation of compliance with HCWIS: the group felt strongly that the system would only work in conjunction with legislation	Group 4	Section 5.1
Monitoring of scale of compliance should be implemented	Group 4	Section 6, Section 7.9
Reporting :		
What should be reported, to whom, and level of detail	Group 1	Section 7.1, Section 7.7
Managerial information on the HCWIS is to be provided to the affected authorities, contractors and health care facilities	Group 2	Section 7.13
Reports should be generated quarterly and an annual "Static Report" generated	Group 2	Section 7.7
How does the DoH fit into the HCWIS - what are their responsibilities	Group 3	Section 4.1
The general view was that small generators are mostly responsible for illegal disposal of HCRW	Group 3	Section 7.2, Section 7.9
Dissemination:		
Three levels of dissemination: Client specific - DACEL, DoH, DWAF, Local authority Generic - state of HCRW within the province, larger picture	Group 3	Section 7.1, Section 7.7

ISSUES/CONCERNS RAISED	RAISED BY	ADDRESSED IN SECTION
Companies - should be able to produce their own reports from the HCWIS		
Confidentiality of the information was an issue raised. Some information is sensitive e.g. clients, tonnages	Group 3	Section 7.11
Comments regarding general operation of HCWIS :		
The system should be user friendly	Group 1	-
The HCWIS will be costly – who will pay?	Group 2	-
It is a good thing to have, but many practical issues will need to be addressed	Group 2	-
Timing and phasing in of the HCWIS: can be implemented as soon as legislation is in place	Group 4	-

AFTERNOON PLENARY SESSION

The issues and suggestions arising out of the afternoon breakaway groups were summarized by the reporters chosen by each group. The main issues and comments coming from the different groups can be summarised as follows:

Group 1:
- Key question: What is the data to be used for?
- Data collection is important to establish a reliable audit trail for HCRW
- Data needed: mass, date transported, date processed and Safe Disposal Certificate
- All generators of HCRW should be included in the HCWIS, even small generators

Group 2:
- A primary benefit of the HCWIS would be the control of HCW, planning and resource management
- The HCWIS should be legislated in order to be effective
- Bar-coding should be introduced and extended to become a HCRW tracking system
- Delivery notes could be used as the source of reference information to verify data
- Data capture should be done electronically on a standard DACEL template

Group 3:
- Key question: How will the data benefit DACEL's understanding of HCW management in Gauteng? Data must be useful for improved HCW management
- Data reporting should be mandatory as part of the licence requirements
- Local Authorities should report to DACEL on waste generation by small generators within their region. Small generators were regarded as the main culprits in illegal disposal of HCRW
- Data should be available to all stakeholders, bearing in mind that some information could be sensitive
- Audit trail: Weighing of waste by the transporter (spring scales), verification by the generator and double checking through weighing of the vehicles
- The ability to record exceptions and failures was seen as important

Group 4:
- There is a need for a more detailed definition of HCRW
- Registration/permitting should be required of generators, transporters and treatment facilities
- Legislation of HCWIS was seen as essential
- Monitoring of compliance is needed
- Timing: as soon as legislation is in place
- The HCWIS can meet national needs as long as there is stakeholder consultation

APPENDIX 2

STAKEHOLDER MEETINGS

In addition to the Stakeholder Workshops held, meetings were held with the following Government Departments and Private Companies:

Provincial and National Government Departments:

Gauteng Department of Agriculture Conservation Environment and Land Affairs (DACEL):
Ms D Fischer
Mr S Nkosi

Gauteng Department of Health (DoH):
Mr A Fernandes Deputy Director: Information Systems
Mr S Brusin Health Information Systems

Department of Environmental Affairs and Tourism (DEAT):
Mr B Mathebula Director: Atmospheric Protection and Chemical Management
Mr T Dioka Assistant Director: Waste Information System
Ms T Kumalo Deputy Director Hazardous Waste

Department of Water Affairs and Forestry (DWAF)
Ms T Hopkins

Private Companies:

Enviroserv / Sanumed:
Mr N Brink

Evertrade:
Ms S Di Cillo

Phambili:
Mr A Charnley