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TENDER

May 2002

HEALTH CARE WASTE GENERATION AND CHARACTERISATION STUDY FOR SELECTED PILOT HEALTH CARE INSTITUTIONS IN GAUTENG.

Sustainable Health Care Waste Management in Gauteng

With support from:

DANCED
Danish Cooperation for Environment and Development
Ministry of Environment and Energy

Implemented in partnership with:

RAMBOLL

P.O. Box 10610
Fourways East
2055

HEALTH CARE WASTE GENERATION AND CHARACTERISATION STUDY FOR SELECTED PILOT HEALTH CARE INSTITUTIONS IN GAUTENG.

Invitation to Tender
Conditions of Tender
Project Specification: Portion 1- General
Project Specification: Portion 2 - Operational
Schedule or Rates and Quantities
Annexures

Tender submitted by:

……
NAME OF TENDERER

Department of Agriculture, Conservation, Environment and Land Affairs
P O Box 8769,
Johannesburg,
2000

RAMBØLL
P.O. Box 10610
Fourways East
2055

INVITATION TO TENDER

HEALTH CARE WASTE GENERATION AND CHARACTERISATION STUDY FOR SELECTED PILOT HEALTH CARE INSTITUTIONS

Tenders are invited from single companies or joint ventures of i) health care waste management contractors, ii) waste management consultants, and/or iii) scientific institutions/laboratories or similar for undertaking of a Health Care Waste (HCW) generation and characterisation study at two (2) selected health care institutions before and after the execution of Pilot Studies, aimed at improving the overall state of HCW management at these facilities. The studies will be undertaken at the Itireleng Clinic in Dobsonville, Soweto and the Leratong Hospital in Krugersdorp. A further (fifth) Health Care Risk Waste (HCRW) generation and characterisation study is to be undertaken at a selected HCRW treatment facility in Gauteng, to be nominated by the Tenderer.

All single companies/joint ventures shall be able to demonstrate experience and knowledge in the handling of HCW as well as the required capacity to fully determine, implement and observe the necessary Occupational Health and Safety precautions. Such precautions are to include, but not be limited to, an inoculation programme and anti-retroviral response if required.

The proposed HCW generation and characterisation study is to be undertaken on highly infectious waste generated in the aforesaid two health care institutions and one regionalised treatment plant to determine the extent and composition thereof. This information will be used in the development of a sustainable HCW management system in Gauteng, being undertaken by the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (DACEL). The study will include the weighing of all HCW (infectious and non-infectious) generated, after which the infectious waste is to be analysed to determine the composition thereof. Once sorted and weighed, data is to be recorded on data sheets before being captured electronically on spreadsheets.

Analysis and interpretation of the data will be undertaken by a statistician already appointed by the employer, after which the latter party will prepare a HCW generation and characterisation report for final approval. In addition to determining the respective sample sizes, close communication with the statistician will be maintained throughout the project to ensure that the overall objectives are met.

Prospective Tenderers are to provide proof of previous experience in HCW management, and in particular HCRW management. The Tenders will, in addition to the financial implications, also be evaluated on the capability of the prospective Tenderers to deal with HCRW in a responsible manner.

The study is to be conducted during five phases, with fieldwork for the phases one and two being conducted between June and July 2002 as the “before study” at the pilot study health care institutions. The third phase will be anytime during 2002 at the selected HCRW treatment facility, but after completion of the “before study” at the two pilot institutions. The field work for the fourth and fifth phases will be conducted towards the end of the pilot period, assumed to be between March and April 2003 as the “after study” at the pilot institutions.

The Employer, the Consultant as well as the already appointed statistician expect to take an active role in all aspects of the Study, but the selected Contractor will perform all the fieldwork involved in the Study and will be solely responsible party and carry all liability for the quality of the Study as well as the health and safety of all persons that may in any way be affected by the Study. The Contractor will prepare data record sheets, after which data is to be entered and submitted in Microsoft Excel spreadsheet form, supported by photocopies of the data sheets to the Employer throughout the study.

The statistician will be responsible for (i) determining the sample design, (ii) determining the sample size, (iii) assisting with the design of the data input form and the Microsoft Excel spreadsheet (iv) statistical analysis of the data and (v) compiling a report on the results. The Contractor will be expected to liase closely with the appointed statistician (Dr. Mark Paiker from the Witwatersrand University) throughout the study to ensure that the data collected during the waste stream analysis meet with the set criteria and standards.

Tender documents are available from the receptionist (Ms. Matsietsi Sibondana) at DACEL Office on the 15 Floor, Glencairn Building, 73 Market Street, Johannesburg.

The closing time and date for submission of the Tenders is **12:00** on **Friday, 24 May 2002.**

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DEFINITIONS

The following definitions will apply:

Consultant:	RAMBØLL, the consulting company appointed by the Employer, to undertake the Health Care Waste (HCW) generation and characterisation study for Gauteng, represented in South Africa by the Chief Technical Advisor (CTA).
Contractor:	Successful Tenderer formally appointed by the Employer to undertake the HCW generation and characterisation study.
Employer:	Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (DACEL) in Corporation with the Danish Co-operation for Environment and Development (DANCED);
Health Care General Waste (HCGW):	Non-infectious waste (similar to domestic waste) generated in the process of rendering health care services;
Health Care Institutions:	Facilities generating HCW in the process of rendering health care service;
Health Care Risk Waste (HCRW):	Infectious waste (including sharps, pathological waste and chemical/pharmaceutical waste) generated in the process of rendering health care services;
Health Care Waste (HCW):	The combination of HCRW and HCGW generated at health care facilities in the process of rendering health care services;
Pilot Study:	A study executed at selected health care institutions that is aimed at improving the overall state of HCW management;
Project:	Development of a "Sustainable Health Care Waste Management System for Gauteng", on behalf of the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (DACEL);
Study:	The HCW generation and characterisation study to be undertaken at two (2) selected health care institutions and one selected HCRW treatment facility in Gauteng;
Tenderer:	Any waste management contractor, waste management consultant or research institution (or combination thereof) that is experienced in the management of HCRW, wishing to submit a Tender for the execution of the HCW generation and characterisation study;

CONDITIONS OF TENDER

CT 1. Background and Purpose of Tender

During the year 2000, the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (DACEL) undertook a study to determine the status quo of Health Care Waste management in Gauteng. After completion of the status quo study, RAMBØLL was appointed by the Danish Co-Operation for Environment and Development (DANCED) to undertake a project for the development of "Sustainable Health Care Waste Management for Gauteng" on behalf of DACEL.

As part of the overall project, pilot studies are to be conducted at two health care institutions aimed at improving the current Health Care Risk Waste (HCRW) management procedures, include piloting of new equipment for containerisation, collection and transportation of HCRW.

The amounts and composition of Health Care General Waste (HCGW) and HCRW generated at the pilot study institutions before and after execution of the pilot studies are to be determined to assist in evaluating the effectiveness of the pilot studies.

The second objective is to obtain reliable information on the present composition of the overall HCRW stream in Gauteng. As all HCRW management procedures and equipment selected for implementation in Gauteng have to meet the requirements of the overall HCRW stream, with the HCRW from the two pilot institutions not being representative of the overall HCRW stream, a further study is to be undertaken at a regional HCRW treatment facility in Gauteng. All of this information is considered to be vitally important for strategic planning purposes aimed at achieving sustainable HCW management in Gauteng.

CT 2. Issuing of Documents

Tenderers that were invited to submit Tenders after adjudication of the Pre-qualification Tenders will be issued with one copy of the Tender Document. No deposit is required.

Tender documents will be available as from **12:00** on **Wednesday, 8 May 2002**. Documents can be collected from:

The Receptionist: Ms. Matsietsi Sibondana.
Department of Agriculture, Conservation, Environment and Land Affairs,
15th Floor Glencairn Building,
73 Market Street,
Johannesburg.

CT 3. Queries and Discrepancies

Tenderers must examine the Tender documents upon receipt to ensure that all pages and all Annexures are included and are to report any missing pages or Annexures, any pages or Annexures that are illegible or indistinct, and errors or ambiguities in the Specifications, Schedule of Rates and Quantities and Annexures or any contradictions between the Specifications, Schedule of Rates and Quantities and Annexures in order to obtain rulings on all such errors, ambiguities or discrepancies.

No claim for extras based on such errors, ambiguities or discrepancies will be considered after the opening of Tenders. Tenderers having any queries relating to discrepancies in or omissions from the Tender Document shall contact the Consultant at:

Chief Technical Advisor: Torben Kristiansen.
15th Floor Glencairn Building,
73 Market Street,
Johannesburg.

Tel: (011) 355-1664
Fax: (011) 355-1663
E-mail: tok@ramboll.dk

CT 4. Alterations to Documents

Tenderers should not make alterations or erasure to the documents, as these will not be recognised. The use of erasing fluid is not permitted and incorrect figures are to be deleted by crossing out and initialising it.

CT 5. Alternative Tenders

If a Tenderer wishes to submit an alternative for any of the items in the Schedules of Rates and Quantities, he/she shall do so in a covering letter submitted with his/her Tender. The letter shall contain details of the alternative together with the relevant amendments to the Specifications or the Schedules of Rates and Quantities.

No alternative Tender will be considered, unless a Tender strictly on the basis of the Tender documents is also submitted.

CT 6. Tenderers to Comply with Documents and Annexures

By submission of a Tender, the Tenderer will be deemed to have acquainted himself/herself fully with the Tender documents, and all aspects of the work envisaged in the documents, local requirements, laws, by-laws, permits, licences and costs pertaining to the Study prior to pricing and submission of his/her Tender. Any possible conflict with the Employer's operations or that of the pilot study health care institutions shall be investigated and allowed for.

Tenderers must allow in their Tenders for all labour, materials, equipment and everything necessary for the execution and completion of the Contract in accordance with the Tender documents, including the Annexures.

All information is furnished in good faith for the guidance of the Tenderer, but in no way shall such information relieve him/her of the responsibility of ascertaining to his/her own satisfaction the scope and conditions of the Contract. He/she shall make all investigations necessary to inform himself/herself thoroughly as to the character and extent of the work, the facilities for delivery, placing and operating the necessary equipment and for handling and processing of HCW at the site. No plea of ignorance of conditions that exist or may hereafter exist or ignorance of conditions or difficulties that may be encountered will be accepted as a reason for failure to complete the Contract or as a basis for a claim for additional compensation or an extension of time.

CT 7. Site Inspection

A site inspection meeting for all invited Tenderers will be held at **14:00** on **Thursday, 24 May 2002**. Tenderers are requested to meet at the DACEL Conference Room on the second floor of the Diamond Corner House, Cor. of Eloff and Market Street, Johannesburg, where a Tender Meeting will be conducted. This meeting will be followed by visits to the Itireleng Clinic in Dobsonville and the Leratong Hospital in Krugersdorp.

Failure to attend such meeting and site inspection will not absolve the Tenderer from any lack of knowledge of the site conditions. Tenderers are advised that they are to return the duly signed Annexure C: "Certificate of Site Inspection" confirming that they have visited and inspected the respective sites.

The site inspection will be at the Tenderer's own expense insofar as transport and accommodation is concerned and the Tenderers must make their own arrangements in this regard. No Tenderer will be allowed access to the site for any purpose whatsoever without prior authority from the Consultant.

Attention is drawn to the fact that information given orally at any other time prior to the award of the Contract, will not be regarded as binding on the Employer or the Consultant, and only information given formally in writing to Tenderers by the Consultant will be regarded as amending the Contract documents. See Clause CT 32 hereof regarding enquiries.

It is to be pointed out that the Employer reserves the right to revise the Scope of the Tender prior to, during, or after the site inspection meeting, but before closure of Tenders. Revisions to the Tender shall be faxed or E-mailed to all potential respondents that were invited based on the outcome of the pre-qualification tender.

CT 8. Completion of Tenders

A Tender will not be regarded as bona fide unless it is complete in all respects, comprising the following Tender documents:

- Priced Schedule of Rates and Quantities;
- Annexures to the Tender;
- CV's of Key Supervisory Staff;
- Details of proposed Method Statement.

CT 9. Compliance with Conditions of Tender

Any Tender submitted that does not comply with these Conditions of Tender will be deemed to be incomplete and will be liable to rejection without further consideration.

CT 10. Programme, Human Resources, Plant and Cash Flow

The Tenderer shall return with his/her Tender documents a bar chart copy of his/her proposed programme of the work to be executed, sufficiently detailed to substantiate his/her ability to meet the various completion times reflected for the different phases, indicating clearly the human resources and equipment to be provided for each phase of the Contract. Annexure F: "Schedule of Labour and Equipment" detailing the labour establishment and equipment which the Tenderer will provide on site shall be completed and returned with the Tender.

A cash flow diagram shall also be submitted either separately or as part of the proposed programme.

CT 11. Form of Tender and Board Resolution

The "Form of Tender" and the "Appendix to Tender" shall be completed in full and signed by an authorised director of the tendering company. A copy of the relevant Resolution of the Board of Directors, authorising signature, duly signed and dated is to be submitted with the Tender.

Where Tenders are submitted by Joint Ventures, a copy of the Joint Venture Agreement is to be attached.

CT 12. Staffing and Curriculum Vitae

Tenderers are advised that they are to return the duly completed Annexure I: "Schedule of Supervisory Staff" indicating key personnel that they intend placing on the Contract.

Curriculum Vitae for the key personnel responsible for supervision of the Contract, shall accompany the Tender.

CT 13. Sub-Contractors

The use of subcontractors will be permitted, with the understanding that the Contractor will be responsible for the performance as well as the Occupational Health and Safety of all subcontractors. The Contractor is to complete Annexure H: "Schedule of proposed Sub-Contractors" detailing the sub-Contractors, which the Tenderer intends to employ for the Contract. Even if no Sub-Contractors are to be employed this shall be indicated and the form completed and signed.

CT 14. Sureties

Tenderers are referred to Annexure N: "Form of Bond" that will be required from the successful Contractor. Tenderers are required to name the proposed Surety and to submit a letter of Intent of Suretyship with the Tender. No wording to the Surety other than that in Annexure N will be accepted.

CT 15. Indemnity and Insurance

The Contractor shall be solely responsible for the health and safety of workers, health care facility staff and members of the public that may be affected by the Study, securing of workplaces, suitability of equipment used, as well as compliance to any acts and regulations. The Contractor is to provide adequate insurance, including third party insurance for the activities under this work (See Annexure B for details). **RAMBØLL, DACEL, Gauteng DoH, the pilot study health care institutions or any of their representatives will not accept any liability or other type of responsibility for illnesses, injuries, loss or damaged suffered during or as a consequence of the Study.**

Tenderers are to provide evidence of its ability and commitment to provide the required insurance in accordance with the requirements of Annexure B.

CT 16. Value Added Tax (VAT)

Tenderers are referred to Clause 8 of the Preamble to the Schedule of Quantities in respect of allowance for VAT.

CT 17. Submission of Tender

Tenders must be submitted on the Form of Tender attached hereto and shall be accompanied by all the documents issued herewith, duly completed.

Three (3) copies of Tenders are to be submitted in sealed envelopes and shall be placed in a Tender Box in the office of the project secretary, Ms. Stompie Darmas, on the 15th Floor, Glencairn Building, 73 Market Street, Johannesburg. Tenders should preferably be printed double-sided and on recycled paper. Tenders will close by **12:00** on **Friday, 24 May 2002**, and will be opened in public immediately thereafter in a venue to be indicated at the close of Tenders.

All Tenders shall be marked:

"Do not open until **12:00** on **24 May 2002**.

Sustainable Health Care Waste Management in Gauteng.
Tender for HCW Generation and Characterisation Study.

Attn.: Chief Technical Advisor: Torben Kristiansen.
Department of Agriculture, Conservation, Environment and Land Affairs,
15th Floor Glencairn Building,
73 Market Street,
Johannesburg."

No late Tenders will be considered.

CT 18. Telegraphic Tenders

Telegraphic, e-mailed or telefax Tenders will **not** be considered.

CT 19. Process to be Confidential

Information supplied by Tenderers relating to the examination, clarification, evaluation and adjudication of Tenders and recommendations for the award of a Contract will not be disclosed to Tenderers or any other persons not officially concerned with such processes.

If a Tender contains any information that the Tenderer in particular do not wish to be disclosed for instance to persons involved in the Project, but not necessarily involved with the Tender process, sheets containing such information must be marked "Confidential" to indicate the specific information to be held confidential. In the event however that a Contract be awarded to any particular Tenderer as a result of or in connection with submission of such information, the Consultant shall have the right to duplicate, use, or disclose this information.

For reasons of transparency the Consultant shall have the right to disclose the bid prices of all Tenders received after the award of the contract or after the rejection of all Tenders.

Any effort by a Tenderer to influence the persons processing the Tenders or deciding on the award of the Tender may result in the rejection of his/her Tender.

CT 20. Employer and Consultant not Liable for Tenderer's Expenses

The Employer and Consultant will not be held liable for any expense incurred in preparing and lodging Tenders.

CT 21. Consultant's Right To Adjust Errors

The Consultant reserves the right to adjust arithmetical or other errors in the Tender in accordance with Clause 11 of the Preamble to the Schedule of Quantities.

CT 22. Period of Validity and Escalation

Tenders shall hold good for 60 (Sixty) days after the closing date for submission. Tenderers are to note that the Tender Rates shall be fixed and firm and therefore no escalation will be payable.

CT 23. Withdrawal of Tenders

Should a Tenderer:

- Withdraw his/her Tender during the period of its validity; or
- Give notice of his/her inability to execute the Contract or fail to execute the Contract; or
- Fail to sign the Contract Agreement or furnish the required surety within the period fixed in the Appendix to the Contract or any extended time agreed to by the Employer;

then he/she shall be liable for and pay to the Employer:

- All expenses incurred in calling for fresh Tenders, if required;
- The difference between his/her Tender and any less favourable Tender accepted either by calling for new Tenders or by accepting another Tender from those already received;
- Any escalation of the final Contract Price resulting from any delay caused in calling new Tenders.

Provided always that the Employer may exempt a Tenderer from the provisions hereof if he/she is of the opinion that the circumstances justify the exemption.

CT 24. Repudiation of Tender or Invalidation of Contract

If the Employer is satisfied that the Tenderer or any person being an employee, partner, director or shareholder of the Tenderer or a person acting on behalf of or with the knowledge of the Tenderer:

(a) Has offered, promised or given a bribe or other gift or remuneration to any person in connection with the obtaining or execution of a Contract;

(b) Has acted in a fraudulent or corrupt manner in obtaining or executing a Contract;

(c) Has approached an officer or employee of the Employer or the Consultant with the object of influencing the award of a Contract in the Tenderer's favour;

(d) Has entered into any agreement or arrangement, whether legally binding or not, with any other person, firm or company -

(i) to refrain from Tendering for this Contract;

(ii) as to the amount of the Tender to be submitted by either party;

(e) Has disclosed to any other person, firm or company other than the employer, the exact or approximate amount of his/her proposed Tender, except where the disclosure, in confidence, was necessary in order to obtain insurance premium quotations required for the preparation of the Tender;

the Employer may, in addition to using any other legal remedies, repudiate the Tender or declare the Contract invalid should it have been concluded already.

CT 25. South African Jurisdiction

The laws of the Republic of South Africa shall apply to each Contract created by the acceptance of a Tender, and each Tenderer shall indicate a place in the Republic and specify it in his/her Tender as his/her domicilium citandi et executandi, where any legal process may be served on him/her.

CT 26. Ability to Perform

In the adjudication of the Tenders, similar to the Pre-qualification Tenders, due account will be taken of the Tenderer's past performance in the execution of similar work of comparable nature and magnitude, and the degree to which he/she possesses the necessary technical, financial and other resources to enable him/her to complete the work successfully within the Contract period, whilst meeting the required Environmental as well as the Occupational Health and Safety standards.

CT 27. Adjudication Method

27.1 Contract Award

Award for the Contract will be made to the Tenderer with the highest score based on evaluation criteria and any results of investigation into the Tenderer's ability to perform the tasks outlined in these Conditions of Tender and Tender Specifications. It is the Consultant’s intent to select the Tender that is most advantageous based on the comprehensiveness and the accuracy of the data to be provided, the knowledge by the Tenderer as to proper methods to collect and record the data, and the Tenderer's ability to carry out the requirements of the Study. The Consultant’s objective is to get statistically the most representative results based on the required amount of data and the level of accuracy that will characterise the HCW generated at the three facilities, within the constraints of the available funds.

The Consultant does however reserve the right to reject any or all Tenders if such rejection would be considered to be in the public interest. In addition to this, the Consultant also reserves the right to cancel this solicitation if such cancellation would be in the public interest. The Consultant finally reserves the right to negotiate with the selected Contractor on any changes in the Scope of Work such as the number of samples to be analysed and the location and dates of sampling, as allowed for in the Tender.

27.2 Evaluation Criteria

Certain items will be evaluated as "pass/fail" criteria and could cause Tenders to be rejected if the required information is not supplied. These include the Items referred to in Paragraph CT 8 of these Conditions of Tender.

Tenders will each be scored on a 100-point scale based on the following criteria:

1. *Method Statement indicating the project work plan and methodology (25 points);*

    a. Demonstration of understanding of the project objectives and responsiveness of the Tender to those objectives;

    b. Clear detailing of the project work plan;

    c. Appropriateness of the protocol to be used for selecting samples from loads at all 3 facilities (including discussion of bias avoidance), and appropriateness of sorting methodology to be used for sampling;

    d. Appropriateness of cleaning/drying/sorting methodology outlined for detailed sample analysis;

    e. Appropriateness of steps to assure quality data (including integrity of samples under detailed sample analysis);

    f. Appropriateness and sufficiency of steps to be taken to assure the occupational health and safety of those working on the project, as well as those affected by the project.

2. *Qualifications, experience and ability to undertake the project (25 points);*

    a. Demonstration of commitment of the Tenderer to the project and to assign experienced personnel to the project;

    b. Demonstration of sufficient qualifications and experience for indicated project as well as team managers and/or consultants;

    c. Demonstration of knowledge of waste management issues and issues related to waste characterisation;

    d. Demonstration of successful work record of the firm and the key assigned personnel and consultants, including ability to complete projects and adhere to an agreed-upon work schedule.

3. *Quality of procedures and equipment for data collection, capturing and reporting (10 point);*

    a. Compliance with statistical expert's requirements;

    b. Proposed data collection, capturing and reporting structure;

    c. Previous experience with work of a similar nature.

4. *Cost (40 points);*

    a. Overall cost of sorting, as well as collection and recording of data on the number of samples designated in the Tender;

b. Reasonableness of field schedule and the number of samples to be sorted per crewmember per day at all 3 facilities;

c. Reasonableness of the time/cost involved per sample for detailed sample analysis;

d. Appropriateness of in-kind services required and acquisition/disposition of capital equipment (Tenderers having excessive requirements for in-kind services will have their score lowered in this category to make them comparable to other Tenders);

e. Appropriateness of the budget expenses.

27.3 Role of Evaluation Committee

An evaluation committee consisting of at least three, but up to five persons, including at least one representative from the Consultant, will review all Tenders submitted. The following process will be used:

a. Tenders will be evaluated for completeness and compliance with the requirements of this Tender. Incomplete Tenders may be rejected. If a portion of a Tender is unclear, the respondent may be asked to provide written clarification.

b. Members of the Evaluation Committee will be scoring Tenders. If the total scores for the highest scoring Tenders are close, or if the Evaluation Committee feels that it needs more information, top-scoring respondents may be asked to attend interviews.

c. On completion of interviews, if any, the Evaluation Committee will review the results of their evaluation of finalists, and will forward their recommendation to the Chief Technical Advisor of the Project, who will then review the recommendation and approve the selection, or should he be of a different opinion, he will enter into discussion with the Evaluation Committee until a final decision is reached.

d. All competing Tenderers shall be notified in writing of the selection of the successful Tenderer.

27.4 Outcome of Evaluation Process

Based on the Tenders received and the scores determined by the Consultant's Evaluation Committee, the Consultant may take any of the following actions:

a. Accept a Tender and enter into a Contact based on the Tender to carry out the Scope of Work as detailed in this document;

b. Negotiate a revised Scope of Work and accordingly revised remuneration with the Tenderer whom in the Consultant's opinion will be best equipped to meet the needs for the waste characterisation study that falls within the Consultant's budgetary constraints; or

c. Reject all Tenders.

CT 28. No Tender returned

All Tenders become the property of the Consultant, and will not be returned to the Tenderers.

CT 29. Acceptance of Offer

The Employer does not bind itself to accept the lowest or any Tender.

CT 30. Contract Formulation

The Contractor shall use recyclable products to the maximum extent economically feasible in the performance of the Study set forth in this document.

The Consultant reserves the right to negotiate possible amendment to any of the terms of the Contract at any time prior to the termination date, including, but not limited to time extensions and funding changes necessary for the execution of any program. All amendments or extensions to the Contract require the prior written approval of the Employer, the Consultant and the Contractor.

CT 31. Terms of Payment

Tenderers shall submit a detailed Tender that includes all actions required to carry out the Study, including assessment and reporting of data. For ease of evaluation as well as to allow for possible changes in the Scope of Work due to time limitations or financial constraints, Tenderers will be required to complete the condensed Schedule of Rates and Quantities. Considering the possibility of changes in the Scope of Work, Tenderers are advised to submit balanced Tenders, that will allow for all fixed and variable costs as envisaged. It is further pointed out to Tenderers that the tendered rates are to be fixed and firm and no escalation will apply to the tendered rates.

In completing the Schedule of Rates and Quantities, Tenderers shall submit:

Fixed Preliminary and General Costs:

a. Unit rates for establishment and removal of the infrastructure and equipment required for each of the 5 phases of the Study;

b. Daily rates for providing the staff and maintaining the equipment and infrastructure required to execute the project for each of the 5 phases;

c. Recording the total daily mass of HCRW and HCGW generated at the Pilot Study Institutions.

Variable Operational Costs:

d. Rates per container of HCRW analysed, re-containerised, transported, treated and disposed of on an appropriately permitted disposal facility, forming the basis for any reduction or increase in work that may be required by the Employer. HCGW segregated from this is considered to be infected and should be returned to the HCRW stream for treatment and disposal;

e. Rates per container of HCGW analysed, re-containerised, transported and disposed of on an appropriately permitted disposal facility, forming the basis for any reduction or increase in work that may be required by the Employer. HCRW segregated from this is infected and should be added to the HCRW stream for treatment and disposal

The Contractor shall carry out any additional work that may be required by the Employer with compensation being based on the rates submitted. Should for some or other reason agreement on

the price of any additional work not be reached before the work is to be carried out, the Contractor shall continue the work and the disagreement shall be resolved subsequently.

CT 32. Enquiries

Commercial and technical enquiries may be directed to Mr. T. Kristiansen, Chief Technical Advisor representing RAMBØLL, at e-mail: tok@ramboll.dk or Tel: (011) 355-1664, Fax: (011) 355-1663

All enquiries are to be submitted in writing. Enquiries forwarded to RAMBØLL will be answered, summarised and distributed to all Tenderers two (2) days before the close of Tenders.

PROJECT SPECIFICATION

SCOPE

This Project Specification covers the requirements for undertaking of a Health Care Waste (HCW) generation and characterisation study at two (2) selected health care institutions before and after the execution of Pilot Studies, aimed at improving the overall state of HCW management at these facilities. The studies will be undertaken at the Itireleng Clinic in Dobsonville, Soweto and the Leratong Hospital in Krugersdorp. A further (fifth) Health Care Risk Waste (HCRW) generation and characterisation study is to be undertaken at a selected HCRW treatment facility in Gauteng, to be nominated by the Tenderer.

This Project Specification is set out in two portions:

· Portion 1 cover the general description of the project and the facilities available.

· Portion 2 covers the technical operational description of the project.

PORTION 1 – GENERAL

PSG 1. Read in conjunction

This specification is to be read in conjunction with the South African Occupational Health and Safety Act (Act No. 85 of 1993).

PSG 2. General Description of Scope of Study

It is envisaged that the HCW generation and characterisation study be broken down into the following 5 clearly defined phases:

Phase 1 - Itireleng Clinic ("Before Study" starting at the smallest facility to resolve any problems that may be experienced, before commencement of the Pilot Studies);

Phase 2 - Leratong Hospital ("Before Study" undertaken based on the experienced gained from the Itireleng Clinic, before commencement of the Pilot Studies);

Phase 3 - Regional HCRW treatment facility (With experience gained from both Pilot Study Institutions);

Phase 4 - Itireleng Clinic ("After Study", on completion of the Pilot Study.);

Phase 5 - Leratong Hospital ("After Study", on completion of the Pilot Study.)

The Scope of Work for the HCW generation and characterisation study will include the activities to be undertaken on a daily basis over a period of **1 test day plus 10 weekdays** each at the Itireleng Clinic in Dobsonville for phases 1 and 4, **1 test day plus 12 calendar days** (including weekends where waste is removed over weekends) each at the Leratong Hospital in Krugersdorp for phases 2 and 5 and **1 test day plus 12 calendar days** at a selected HCRW treatment facility in Gauteng for phase 3, which is to be nominated by the Tenderer. In the case of the clinic and hospital, the HCW generation and characterisation study is to be undertaken before commencement of the pilot studies as well as after completion of the pilot studies.

2.1 Itireleng Clinic in Dobsonville and Leratong Hospital in Krugersdorp.

For HCRW, the following will be required for each of the pilot study institutions over a period of **1 test day plus (i) 10 weekdays for Itireleng Clinic and (ii) 12 calendar days for Dobsonville Hospital** for each of the respective phases:

- Weighing and recording the mass of all HCRW containers generated at each of the pilot study institutions;
- Randomly selecting and marking a predetermined number of HCRW containers for further segregation and recording of data (See Annexure R for more details on sample size);
- Collection and transport of the selected sample to a venue suitable for the execution of the waste composition study;
- Sorting the selected HCRW sample in accordance with the predetermined categories as prescribed in Annexure Q.
- Weighing and recording the mass for each of the HCRW categories;
- Re-containerising the HCRW for transport and treatment and disposal at an approved HCRW treatment facility.

For HCGW, the following will be required for each of the pilot study institutions over a period of **1 test day plus (i) 10 weekdays for Itireleng Clinic and (ii) 12 calendar days for Dobsonville Hospital** for each of the respective phases:

- Weighing and recording the mass of all HCGW generated at each of the pilot study institutions;
- Randomly selecting a predetermined number of HCGW containers for separation of HCRW from HCGW and recording of data (See Annexure R for more details on sample size);
- Collection and transport of the selected sample to a venue suitable for the execution of the waste composition study;
- Separating the HCRW from the selected HCGW sample and sorting the HCRW into a number of categories as prescribed in Annexure Q.
- Weighing and recording the mass for each of the HCRW categories as well as that of the remaining HCGW sample;
- Re-containerising the HCGW for disposal at a general waste disposal site as well as containerising of HCRW for treatment and disposal at an approved HCRW treatment facility;

2.2 Regional HCRW treatment facility:

For the regional HCRW treatment facility, the HCW generation and characterisation study will be similar to that of the pilot study institutions, with the exception that only HCRW will be investigated. The study is further to be undertaken once only, as the effect of improved HCW segregation for the whole of Gauteng will not be observed over such a short period of time.

The activities to be undertaken at the regional HCRW treatment facility on a daily basis over a period of **1 test day plus 12 calendar days**, will be as follows:

- Weighing and recording or determining the total mass of all HCRW containers delivered for treatment at the regional HCRW treatment facility (the total mass is required, and not that of the individual containers);

- Randomly selecting and marking a predetermined number of HCRW containers for further segregation and recording of data (See Annexure R for more details on sample size) **It is important to ensure that the sample consists 50% of HCRW generated at public health care facilities and 50% of HCRW generated at private health care facilities.** This is considered to be representative of the HCRW generation ratio for the respective sources;

- Collection and transport of the selected sample to a venue suitable for the execution of the waste composition study;

- Sorting the selected HCRW sample in accordance with the predetermined categories as prescribed in Annexure Q. Sorting of HCRW from private and public health care facilities is to be done separately;

- Weighing and recording the mass for each of the HCRW categories for both private and public health care facilities;

- Combined re-containerising of HCRW for transport, treatment and disposal at an approved HCRW treatment facility.

No regional survey is to be undertaken on the HCGW generated in Gauteng.

The Tenderer's work under this appointment will be all-inclusive, excluding the data processing and reporting earmarked for execution by the Statistician.

PSG 3. Description of Facilities and Access

3.1 Itireleng Clinic in Dobsonville, Soweto.

The Itireleng Clinic in Dobsonville, Soweto is owned and operated by the Gauteng Department of Health.

The following is the estimated number of containers collected per week, but it may vary considerable:

- 142 litre boxes - 43
- 50 litre boxes - 9
- 10 litre sharps containers - 4

The mass of HCGW being generated is unknown. Pikitup is responsible for collection thereof.

Access to the clinic is from Main Reef East Road in Roodepoort, along Dobsonville road and Roodepoort Road and into Luthuli road.

3.2 Leratong Hospital in Krugersdorp.

The Leratong Hospital in Krugersdorp is a Regional hospital owned and operated by the Gauteng Department of Health. The hospital is equipped with 704 beds with an average occupancy rate of 72 %, but can vary significantly.

The following number of containers collected per week is considered to be estimated numbers, and is also likely to vary:

- 142 litre boxes - 435
- 50 litre boxes - 14
- 5 litre sharps containers - 4
- 10 litre sharps containers - 77
- 10 litre specican - 25

The mass of HCGW being generated is unknown. The Local Council of Krugersdorp does the HCGW collection.

Access to the Leratong hospital is from Road R41, situated on the corner of Randfontein Road and Adcock Road in Kagiso, Krugersdorp.

3.3 Regional HCRW treatment facility

The regional HCRW treatment facility to be used for the HCRW study is to be nominated by the Tenderer and no information is therefore available on the facility, other than that the facility should be equipped to treat HCRW in an environmentally sound manner, whilst meeting the appropriate Occupational Health and Safety standards.

PSG 4. Project Programme

Tenderers are required to evaluate the proposed key dates provided below and submit a preliminary programme with their Tenders, which shall include an indication of the activities in which the Tenderer proposes to carry out the Study, the equipment required and the duration of each activity. The preliminary programme will be taken into consideration in the adjudication of the Tenders and will become part of the Contract document.

The following activities are considered to be crucial in the Health Care Waste (HCW) generation and characterisation study and completion thereof will be adhered to as interim completion dates. Penalties for non-compliance as described in Section PSG 21 will be applicable to interim completion (milestone) dates as well as the overall completion date.

The Contract is expected to begin in June 2002 and shall expire in April 2003 unless terminated at an earlier date or amended in accordance with Contract provisions.

Activity	Deadline
Main Tender issued.	8 May 2002
Site Inspection conducted..	9 May 2002
Main Tender closure.	24 May 2002
Adjudication Report submitted.	3 June 2002
Contractor appointed.	14 June 2002
Study commencement (training and logistics).	19 June 2002

Test series (1 day each) at the three institutions	24 – 26 June 2002
Sampling and analyses Phase 1 (at Clinic).	1 – 12 July 2002
Submission of on-site sample forms for Phase 1.	15 July 2002
Submission of analysis data in electronic format for Phase 1.	18 July 2002
Preliminary report for Phase 1 circulated for comments.	29 July 2002
Submission of comments to report for Phase 1.	5 August 2002
Final Draft Generation and Characterisation Study Report Prior to Pilot Activities for Phase 1 available.	12 August 2002
Sampling and analyses Phase 2 (at Hospital).	15-26 July 2002
Submission of on-site sample forms for Phase 2.	29 July 2002
Submission of analysis data in electronic format for Phase 2.	1 August 2002
Preliminary report for Phase 2 circulated for comments.	12 August 2002
Submission of comments to report for Phase 2.	19 August 2002
Final Draft Generation and Characterisation Study Report Prior to Pilot Activities for Phase 2 available.	26 August 2002
Sampling and analyses Phase 3 (at Treatment Facility).	29 July – 9 August 2002
Submission of on-site sample forms for Phase 3.	12 August 2002
Submission of analysis data in electronic format for Phase 3.	13 August 2002
Preliminary report for Phase 3 circulated for comments.	26 August 2002
Submission of comments to report for Phase 3.	2 September 2002
Final Draft Generation and Characterisation Study Report Prior to Pilot Activities for Phase 3 available.	9 September 2002
Sampling and analyses Phase 4 (at Clinic).	3 – 14 February 2003
Submission of on-site sample forms for Phase 4.	17 February 2003
Submission of analysis data in electronic format for Phase 4.	20 February 2003
Preliminary report for Phase 4 circulated for comments.	3 March 2003
Submission of comments to report for Phase 4.	10 March 2003
Final Draft Generation and Characterisation Study Report Prior to Pilot Activities for Phase 4 available.	17 March 2003
Sampling and analyses Phase 5 (at Hospital).	17 – 28 February 2003
Submission of on-site sample forms for Phase 5.	3 March 2003
Submission of analysis data in electronic format for Phase 5.	6 March 2003
Preliminary report for Phase 5 circulated for comments.	17 March 2003
Submission of comments to report for Phase 5.	24 March 2003
Final Draft Generation and Characterisation Study Report Prior to Pilot Activities for Phase 5 available.	31 March 2003
Final Draft Overall Generation and Characterisation	7 April 2003

Study Report circulated for comments.	
Submission of comments to Final Draft Overall Generation and Characterisation Study Report	14 April 2003
Final Overall Generation and Characterisation Study Report available.	21 April 2003

The above interim (milestone) dates must be shown on the programme.

The preliminary programme to be submitted by the Tenderer shall not be limited to a bar chart only, but shall clearly show the anticipated resources, quantities and value of work to be performed each week. The proposed programme must clearly indicate how soon after appointment the Study will commence as well as the period required for completion of each phase.

The Contractor shall liase with the Consultant in the drawing up of a detailed programme of work, based on the preliminary programme within 14 days of the date of award of the Contract. The work programme shall be presented in detail before implementation to allow for the timely incorporation of any comments or concerns that may be expressed by the Employer, the Consultant, the management of the health care institutions, the DoH or any of their elected specialist advisors.

For the purpose of submitting this Tender, the Tenderer should specify the approximate dates of sample collection at each site. Tenders should also address the issue of waste generation on weekends versus weekdays as well as the maximum duration that waste will remain on site, before being removed for treatment and disposal.

PSG 5. Interfacing

5.1 Interfacing with Pilot Study Health Care Institutions

If at all possible, it is proposed that the survey be undertaken without the knowledge of the pilot study health care institution's operational staff, and should the presence of the Contractor be noticed, the purpose of the survey should not be disclosed, as that could result in a distorted representation of the state of segregation due to increased awareness by the staff. This requirement will not apply to the regional HCRW treatment facility.

The survey at each of the two pilot study health care institutions shall be conducted twice: Once before the Pilot Study activities are introduced and once after a period of running the Pilot Studies, thus, allowing for detection of the impact of the Pilot Studies on the waste generation and the waste composition as well as the sorting efficiency. The survey at the regional HCRW treatment facility will be undertaken once only.

Hence, for each of the sampling days at the pilot study health care institutions the total HCW stream shall be weighed and recorded based on individual recordings of the HCRW and HCGW streams respectively. For each sampling day representative samples of HCRW and HCGW (as prescribed in Annexure R) shall be taken and removed from site to determine the waste composition for that particular day. Average values will then be calculated for the full duration of the particular phase of the Study.

During the fourth and fifth phases of the Study, undertaken at the pilot study health care institutions on completion of the Pilot Studies, the Contractor shall introduce a suitable interview programme for members of the health care institutions in order to capture information on all observations made during the Study, for example on waste collectors, infection control nurses, and senior nursing staff. The purpose of this is to record special or pertinent events that may have had an impact on the quality or representativeness of the samples taken during the Study.

The Tender shall include a description of such an interview programme as part of the Method Statement.

Tenderers should not communicate or deal with the Pilot Study Health Care Institutions directly in order to prepare their respective Tenders, but is encouraged to enquire with the Consultant if any further information is required.

5.2 Interfacing with Statistician

The reports that are to be compiled by the Statistician are as follows:

- Health Care Waste Generation and Composition (Sampling before Pilots): Survey Results and Analyses (based on the first round of sampling only)
- Health Care Waste Generation and Composition (Sampling after Pilots): Survey Results and Analyses (based on the second round of sampling only)
- Final Analyses of Waste Generation, Segregation Efficiency and Waste Composition (based on the results of the total survey carried out)
- Representative Health Care Waste composition for Gauteng.

For the purpose of sampling, a methodology for taking representative samples have been developed and documented by the statistician (See Annexure R). The Contractor will be responsible for selection of the samples. The sampled HCW is then to be removed from site and sorted into different components, after which each component is to be weighed.

Tenderers should suggest how the actual sample is to be drawn for sorting, and what steps will be involved to ensure that no bias of the composition is introduced in the process of drawing samples for sorting. The Tender shall include a preliminary sampling and analysis programme to be detailed after possible award of contract.

The selected Contractor is expected to carry out all data capturing in this study, and to perform data quality control checks and to resolve any issues encountered by checking the data. All data is to be recorded on data sheets at the time of sorting in the field. The aim with the field recording of data is to allow quality control checks to be run and any issues encountered to be resolved before the sampled materials are removed for safe treatment and disposal, thus no longer being available for examination.

Once data on the record sheets were verified for its accuracy, data is to be recorded on a database or similar computer format agreeable to the Statistician and the Consultant. It is proposed to make use of Access or a similar database for recording data or in the spreadsheet format prescribed by the statistician (e.g. Microsoft Excel).

5.3 Interfacing with other Waste Management Contractors.

Other waste management contractors responsible for the removal and treatment/disposal of HCRW and HCGW will be operating at the health care institutions. Tenderers are to take cognisance of this and specify in the Amendments and Qualifications by Tenderer (Annexure E) what restrictions (if any) are to apply in this regard.

5.4 Interfacing with regional HCRW treatment facility owner.

Interfacing between the Contractor and the owner of the regional HCRW treatment facility will be addressed by the Contractor and neither the Employer, nor the Consultant will become involved in such interfacing.

PSG 6.Site Facilities

6.1 Contractor's offices and stores

No offices or stores will be available for the Contractor at any of the two pilot study institutions. The Contractor shall further make his/her own arrangements for any temporary offices or stores at the regional HCRW treatment facility.

6.2 Accommodation

No accommodation will be available for the Contractor or any of his employees at the Pilot Study institutions and any arrangements related to the regional HCRW treatment facility is to be made by the Contractor.

6.3 Water, sewage and electricity

As the HCW is to be removed from site for the purpose of undertaking the analysis, there will not be a need for services other than during the time that the total daily HCRW and HCGW mass is recorded.

Potable water will be available at the pilot study health care institutions, but Contractor's attention is drawn to the fact that the water should under no circumstances to be wasted.

The use of public toilets at the pilot study health care institutions will be permitted, provided that the facilities are left in a neat and tidy condition. Should this privilege be abused, the contractor and his/her staff will not be allowed access to the public toilet facilities in which case the Contractor will have to provide temporary chemical toilets.

A single-phase electricity supply will be made available for any weighing equipment used by the Contractor at no extra cost, but the Contractor will be required to provide any extension cords that may be required. Any electrical equipment found to be faulty or unsafe is to be removed from the premises and is not to be used until repaired by a suitable qualified electrician.

All arrangements related to the use of services at the regional HCRW treatment facility will be the Contractor's responsibility.

6.4 Site Instruction book

A triplicate book for site instructions, provided by the Contractor for each of the Pilot Study facilities, shall at all times be kept on the site at a location agreed upon with the Employer, the Consultant and senior management at the pilot study institutions. All instructions by the Employer, Consultant or dedicated personnel from the pilot study institutions will be recorded in this instruction book.

6.5 Site Diary

A diary is to be provided by the Contractor for each of the Pilot Study facilities, which will be completed daily.

6.6 Refuse

Any material that may spill from HCGW or HCRW containers during the handling thereof, is to be collected in an appropriately safe manner and re-containerised for removal during existing collection rounds.

The Contractor shall provide suitable and dedicated refuse containers for all types of HCW at the Study sorting area. It is to be ensured that employees make use of the containers for the disposal of refuse so that the site of the Study will not become polluted. The Contractor shall dispose of the refuse in the containers at regular intervals in accordance with the Gauteng HCW Policy for appropriate treatment and/or disposal of the respective types of HCW.

PSG 7. Key Personnel

Tenderers are to provide a list of proposed key project personnel listed by name, title, duties they will responsible for as well as relevant experience in the form of CV's. Although more than one function listed may be performed by any individual, personnel to be listed should include at least the following:

a) The overall coordinator for the Study;

b) The person responsible for selection of the sample to be sorted;

c) The person(s) responsible for overseeing and training the sorting crews and field staff;

d) The person(s) responsible for interviewing waste collectors, senior nursing staff etc;

e) The person(s) responsible for carrying out the data recording;

f) The person(s) responsible for carrying out the data capturing;

g) The responsible person in terms of the OHS Act. Prove of required first aid qualifications of this person is to be included.

If Tenderers expects to hire new personnel to fill any of these positions, they should describe the minimum qualifications and experience that will be required for the various positions.

Tenderers are also to provide a concise description of the experience of the firm and each of the key personnel that is relevant to this Study. Included in this description should be a list of similar projects for which work of similar complexity and nature has been completed successfully.

Finally, if possible, provide the names, addresses, and phone numbers of at least two references from each of two or more projects that are similar to the Scope of Work, with similar complexity and nature of this Study.

The Contractor shall furnish the Employer and the Consultant with a list of addresses and telephone numbers of key personnel in the Contractor's organisation who may be contacted in an emergency both during and outside office working hours in connection with the Study.

PSG 8. Contractor's personnel and equipment

If during the course of the Contract the Consultant considers that any personnel or item/s of equipment are in any way inefficient or inadequate to complete the Study within the Contract period he/she shall have the right to call on the Contractor to either:

- Provide additional training for the personnel, or
- Remove such incompetent personnel and replace them with competent personnel, or

- Put the equipment in order, or
- Remove such equipment and replace it with other efficient equipment, or
- Provide additional personnel or equipment.

No additional payment shall be made to the Contractor for expenses incurred in complying with any or all of the above, the cost being deemed to be included in the Contractor's tendered rates.

PSG 9. Orders

On acceptance of this Tender the Contractor is to ascertain if all equipment and material to be supplied by him can be obtained in South Africa, and if not, steps will be taken to import the same so that the Study is not delayed. Delay in the Study owing to non-delivery of equipment or materials will not be considered a cause for delay in completing the Study.

PSG 10. Personnel training

All of the Contractor's personnel must receive sufficient technical as well as Occupational Health and Safety training before actually sorting waste and collecting data in the field. This training is vital for maintaining accuracy and consistency in data collection and for ensuring worker health and safety. All of or selected personnel involved in sorting waste may have to successfully pass a Consultant-administered test in identification and categorisation of wastes before actually sorting samples in the field. In addition, all personnel must be trained and be familiar with the contractor's health and safety plan, as well as any emergency procedures that may be required.

PSG 11. Security and safety regulations

The Contractor is to familiarise himself and comply with all safety regulations, statutes and regulations governing HCW management activities. The safety of all personnel on site shall be the sole responsibility of the Contractor. Although only serving as background information, Contractors are referred to an extract from the ***Guidelines for Occupational Exposure to Bloodborne Pathogens, 2001*** (ICASA Working Group: Roberts S; Van Wyk A; Pearse J) presented in Annexure P.

As part of the Method Statement to be provided by Tenderers, the Contractor is to provide a health and safety plan that is designed to ensure the safety of the persons being involved in or affected by the Study that is to be implemented during the execution of the Study. This health and safety plan should fully conform to the requirements of the South African Occupational Health and Safety (OHS) Act, and the successful Tenderer is to ensure that all workers adhere to the requirements stipulated in the plan. A description is to be provided of amongst others all equipment, procedures, training, and other measures that will be taken to ensure the health and safety of all personnel working on the project.

Tenders submitted should outline all aspects that are to be included in the health and safety plan. The Contractor is to indicate for instance what vaccination programme will be implemented for all workers, and what retroviral will be available to workers in the event of needle stick injuries. A record of each person working should be kept daily and each person shall state on that record any occupational health incidents that may have been experienced during the day, particularly including any needle stick injuries or other abrasions of the skin, feet and hands.

In order to detect the presence of radioactive waste incorrectly disposed of, the Contractor will be required to provide "Dose Rate Meters" as appropriate for the particular phase of the Study. Should any radioactive waste be detected, this is to be reported immediately to

the infection control officer (or similar) at each of the institutions for guidance on further measures to be taken.

All personnel employed (whether permanent or temporary) shall be adequately insured and no untrained persons shall be allowed to carry out any work under this agreement.

PSG 12. Sub-Contractors (Nominated or approved)

The Contractor shall be responsible for work carried out by both nominated and approved sub-contractors on his/her behalf. The Consultant will not liase directly with any sub-contractors. Problems related to payments, programming, materials, equipment, quality of work, etc, shall be the concern of the Contractor and the sub-contractor, and the Consultant will not become involved.

Contractors will be held responsible for the Occupational Health and Safety of all nominated or approved subcontractors (including temporary staff employed for the duration of the Study), and is therefore inter alia to ensure that the required Occupational Health and Safety training, as well as the necessary Personal Protective Equipment (PPE), be provided and implemented/utilised.

PSG 14. Labour Returns

The Contractor shall provide the Consultant with daily returns showing the number and grade of all employees and the number and type of equipment used for the Study. This information is to be recorded daily in the site diary.

PSG 15. Standing Time

Although not envisaged at this stage, it may happen that there will be times during which the Contractor will not be able to undertake the required work affected by the Pilot Study institutions. Should this delay be attributable to any actions by the Employer, the Consultant or the Pilot Study institutions, the Contractor will be eligible to submit a standing time claim. An item that allows for this is provided in the Schedule of Rates and Quantities and the rates tendered under this item will be deemed to cover all expenses incurred by the Contractor for having his staff and equipment on site, without being able to perform the required duties.

Standing time will not be considered when work is suspended as a result of inclement weather or default on the part of the Contractor, particularly when the Contractor is at default with the implementation of the Occupational Health and Safety Act requirements.

Standing time will only be considered when work is suspended by the written order of the Consultant. The Contractor shall not be entitled to recover any standing costs unless he provides full details in writing to the Consultant within 48 hours of the Consultant's order.

No standing time will be paid for work undertaken at the regional HCRW treatment facility, as the efficiency of that operation will depend on the agreement entered into by the Contractor and the owner of the HCRW treatment facility.

PSG 16. Study Project Meetings

The Consultant shall hold regular site meetings and keep and circulate minutes. The Contractor **shall** be represented by a person with sufficient delegated powers to act on behalf of the Contractor and **shall** further ensure that all sub-contractors are represented.

The Consultant will provide a venue for the meetings, which is likely to be at either of the Pilot Study institutions or alternatively at the DACEL office in Johannesburg.

PSG 17. Site maintenance

During progress of the work and upon completion, the site of the Study shall be kept and left in a clean and orderly condition, irrespective of whether the Study being undertaken on private property. The Contractor shall store materials and equipment for which he is responsible in an orderly manner, and shall keep the site free from debris and obstructions.

PSG 18. Access to properties

The Contractor shall organise the work to cause the least possible inconvenience to staff at health care facilities or the regional HCRW treatment facility or to members of the public.

The Consultant, including his/her representative, will at all times have unobstructed access to the site, irrespective of whether the Study being undertaken on private property.

PSG 19. Restricted Areas

The Contractor as well as his/her workers or sub-contractors shall remain within the demarcated area of the Study at the pilot study intitutions. No persons will in particular be allowed in areas at any of the Pilot Study Institutions used by its staff members, patients or members of the public.

Should any clothes or safety equipment used by the Contractor's employees be contaminated during the time when work is undertaken on the premises of the pilot study institution, it will prevent them from being allowed in any ablution facilities provided at the Pilot Study institutions, as that could result in the spread of infectious organisms.

The areas that are considered to be restricted areas at the regional HCRW treatment facilities are to be indicated by the owner of the facility.

PSG 20. Minimum nuisance to persons from the surrounding area

The Contractor is to ensure that he/she causes an absolute minimum nuisance to persons from the areas surrounding the pilot study institutions by complying strictly with the following:

- Work to be executed only between the hours of 07h00 and 18h00;
- No temporary access facilities other than the main security gates are to be used at the Pilot Study institutions;
- The Study area is to be continuously cleared of any loose debris.

PSG 21. Penalties

The events or requirements for which penalties shall be applied, and the corresponding amounts of the penalties are as follows:

a. Failure by the Contractor to provide suitable training and competent staff for the Study:

R 2 000 for the first incident, escalating by R 1 000 per incident to a maximum of R 5 000 per incident.

b. Failure by the Contractor to ensure adherence to the Occupational Health and Safety Act (including the use of Personal Protective Equipment) by any of its staff members or any of its subcontractors:

R 2 000 for the first incident, escalating by R 1 000 per incident to a maximum of R 5 000 per incident.

c. Failure by the Contractor to ensure that all HCW being cleared and containerised by the end of each working day:

R 1 000 for the first incident, escalating by R 200 per incident to a maximum of R 2 000 per incident.

d. Failure by the Contractor to tidy up the study area and remove any debris from the study area.

R 1 000 for the first incident, escalating by R 200 per incident to a maximum of R 2 000 per incident.

e. Failure by the Contractor to separate the HCW according to the categories indicated in Annexure Q.

R 1 000 for the first incident, escalating by R 1 000 per incident to a maximum of R 5 000 per incident.

f. Absence of the required dose rate meters to detect the presence of incorrectly disposed of radioactive waste.

R 1 000 for the first incident, escalating by R 500 per incident to a maximum of R 5 000 per incident.

The Employer reserves the right to terminate the Contract if the Contractor is in breach of Contract and fails to rectify such breach of Contract after a second written warning was issued to the Contractor without the necessary remedial action being taken.

PSG 22. Notices, Signs, Barricades And Advertisements

The Contractor shall erect the necessary signs, notices and barricades for the duration of the Contract to safeguard the Study as well as other contractors, Pilot Study institution personnel or the public.

Notices, signs and barricades as well as advertisements may be used only if approved by the Consultant. The Contractor shall be responsible for its supply, erection, maintenance and ultimate removal and shall make provision for this in his/her Tendered rates.

The Consultant has the right to have any sign, notice or advertisement moved to another position or to have it removed from the site of the Study should it in any way prove to be unsatisfactory, inconvenient or dangerous.

Such notices, signs and barricades shall be provided and erected at the Contractor's own expense.

PSG 23. Publications and Advertising

The Contractor shall not publish, or cause to be published any papers, articles or information relating to the Study nor permit any advertising mentioning the subject of this contract and he shall not display or allow his Sub-Contractors to display any advertisements at the Pilot Study Institutions or elsewhere in connection with the Study without the prior permission in writing of the Employer.

PSG 24. Applicable Standardised Regulations and Legislation

For the purpose of this Contract, the following standardised Regulations and Legislation, together with all sub-sections thereof shall apply:

- Occupational Health and Safety Act (Act 85 of 1993)

PORTION 2 – OPERATIONAL

PSO 1. General

The following Project Specification (Operational) is to form the basis for the Method Statement that is to be submitted as part of the Tender. In the Method Statement Tenderers are to indicate specifically how they intend to meet the requirements of the Project Specification, which is to be used during the evaluation of Tenders, in determining the Tenderer's capability of dealing with the particular HCW stream that will be analysed during the Study.

Notwithstanding the above, Tenderers are to ensure that their Method Statements meet all appropriate legal requirements. Compliance with the Project Specification, will not indemnify Contractors from any legal requirements that may have to be adhered to, and in particular the Occupational Health and Safety Act requirements.

PSO 2. Anticipated Activities for Execution of the HCW Study

It is envisaged that the HCW generation and characterisation study be broken down into the following 5 clearly defined phases:

Phase 1 - Itireleng Clinic ("Before Study" starting at the smallest facility to resolve any problems that may be experienced, before commencement of the Pilot Studies);

Phase 2 - Leratong Hospital ("Before Study" undertaken based on the experienced gained from the Itireleng Clinic, before commencement of the Pilot Studies);

Phase 3 - Regional HCRW treatment facility (With experience gained from both Pilot Study Institutions);

Phase 4 - Itireleng Clinic ("After Study", on completion of the Pilot Study.);

Phase 5 - Leratong Hospital ("After Study", on completion of the Pilot Study.)

The activities that are anticipated for the execution of the HCW study shall include, but not be limited, to the following:

Activity 1:

The detailed Method Statement for execution of the waste characterisation survey that is to be submitted as part of the Tender for approval by the Employer and the Consultant, shall include:

i) A detailed timeframe;

ii) Sampling methods;

iii) Sorting methods;

iv) An outline of the way in which data will be recorded, captured and presented during the surveys;

v) Information on the measures that will be implemented as part of the quality control system to enhance the correctness and accuracy of the data that is to be collected;

vi) Use of equipment for collection segregation, weighing, re-containerisation, treatment and disposal of HCRW;

vii) List of all staff to be employed on the project;

viii) Details on the experience (CV's) of key personnel and supervisory staff to be employed on the project. Cognisance is to be taken of the fact that there are existing contractors that are responsible to render both the HCRW and HCGW management service, and interfacing with staff from the waste management contractors is of the utmost importance.

ix) Utilisation/deployment of staff;

x) Training programme for staff;

xi) Occupational health and safety measures to be implemented;

xii) Availability of Personal Protective Equipment (PPE);

xiii) Emergency response procedures (injuries, spillage, etc.);

xiv) Specifications of inputs required during the Study by other affected parties (Pilot Study health care institutions, HCW collection contractor(s), Employer, Consultant, etc.)

Activity 2:

Approval of detailed Method Statement by the Employer, the Consultant, the proposed pilot study health care institution, Gauteng DoH and their specialist advisors as part of the Tender adjudication process. Input from the existing HCW management contractor(s) on ways in which any possible impact on its operation can be minimized, will also be obtained.

Activity 3:

Entering into detailed agreements with the pilot study health care institution (clinic/hospital) as well as the regional HCRW treatment facility nominated by the Tenderer. Further agreements are to be entered into with the existing HCW management contractor(s).

Activity 4:

Specialised training of staff that will be used for the Study as well as any backup staff that may be required, in waste sorting and waste characterisation procedures, including:

i) Expected risks and safety procedures;

ii) Correct use of equipment provided for execution of the Study;

iii) Hygiene and use of PPE;

iv) Detailed sorting, characterisation and data recording procedures for both HCRW and HCGW.

Activity 5:

Submission of a Status Report to the Consultant and Gauteng DoH prior to commencement of physical segregation and handling of HCRW, stating the level of training, availability of human and physical resources (including backup), suitability of characterisation procedures and safety/emergency measures that are put in place.

Activity 6:

On approval (one week) of the Status Report, the Consultant will give permission to commence with the physical waste characterisation Study for Phase 1, all in accordance with the agreed Method Statement.

Activity 7:

Report on progress and problems experienced during sampling and characterisation process.

Activity 8:

Upon completion of sampling and data recording, submit data captured in electronic format to the Statistician for processing.

Activity 9:

Once approval was received from the Statistician on the way in which the first phase of the Study was undertaken and the format in which the unprocessed data was submitted, the Contractor will be allowed to continue with Phase 2 of the Study.

Activity 10:

After processing the data and resolving any queries or uncertainties, the Statistician will submit a Draft Report (Health Care Waste Generation and Characterisation Study Phase 1: Survey Results and Analyses – First Draft) for commenting. The Report will include a description of the sampling and characterisation methods used and an assessment of the suitability of this method, statistical significance of results with statistical assessment carried out. The Report may possible include recommended adjustments to subsequent phases (3, 4 and 5) of the sampling and characterisation Study, as time constraints would require that the survey and data recording for phase 2 already commenced by that time.

Activity11:

The Employer, the Consultant, the pilot study health care institution, Gauteng DoH and their specialist advisors as well as the Contractor appointed to undertake the Study is to comment on the Report.

Activity 12:

A Final Draft Report for Phase 1 of the Study is then to be compiled for circulation by the Statistician, although reporting on consecutive phases will be in the form of an extension to the phase 1 Report. Only once all 5 phases are completed, will the Statistician, based on comments received on the Final Draft Reports for each of the 5 phases, amend the overall Final Draft Report for submission to the Employer and Consultant.

Activity 13:

Once the Final Draft Report for phases 1 and 2 were compiled, the Contractor will be allowed to continue with phase 3 of the Study at the HCRW treatment facility nominated by the Contractor at the time of Tender.

Activity 14:

On completion of Phases 3, 4 and 5 of the Study, the Contractor is to implement the required survey consisting of interviews conducted with employers on different levels at the pilot study institutions, as well as employers of the regional HCRW treatment facility. The purpose of the

interviews is to identify any factors that could have had an influence on the outcome of the Study. The records of such interviews are to be presented in a format suitable for inclusion as an Annexure to the overall report.

Activity 15:

Upon completion of sampling and data processing for phases 1 through 5, the Draft Report (Health Care Waste Generation and Characterisation: Survey Results and Analyses (based on the 5 phases of sampling the Study) will be compiled. The Report will be submitted for comments, including a description of the sampling and characterisation methods used and an assessment of the suitability of this method, statistical significance of results and possible recommendations on adjustments to future sampling and characterisation studies.

Activity 16:

The Employer, the Consultant, the proposed pilot health care institution, Gauteng DoH and their specialist advisors as well as the Contractor is to comment on Report.

Activity 17:

The Statistician will then amend the Draft Report based on comments received and prepare the Final Draft Report.

Activity 18:

The Employer, the Consultant, the pilot study health care institution, Gauteng DoH and their specialist advisors as well as the Contractor is to comment on the Final Draft Report.

Activity 19:

The Statistician will amend the Final Draft Report based on comments received before submission of the Final Report.

The Consultant reserves the right to negotiate a modified Method Statement with the selected Contractor to optimise allocation of the available financial resources. Modifications may for instance include decreasing the number of samples or other cost-cutting measures should the bids received exceed the available funds, or increasing the number of samples taken or number of sites sampled and paying for additional sampling efforts in order to increase the statistical representativeness of the Study. Modifications could further include conducting other types of waste composition work similar in nature to the waste composition work outlined in this Tender if the Consultant determines that there is a need for the additional work. Tender Rates are therefore required as fixed and time related rates, as well as variable rates for undertaking the actual analysis of the waste samples.

PSO 3. Method Statement

As indicated under Activity 1 of Section PSO 2, Tenderers are to provide a concise Method Statement in narrative form outlining the manner and timeframe within which the requirements of the Tender will be accomplished. This Method Statement should be based on the Scope of Work and Project Specification as well as all other requirements outlined in this Tender. The Method Statement may include comments or suggestions for improvements to the proposed work, but where such suggestions will have a significant impact on the outcome or extent of the overall Tender, it is to be submitted as an Alternative Tender.

The following items are inter alia to be included as part of the Method Statement:

a. A description of the start-up tasks to be completed before fieldwork begins, including the extent and contents of training that will be provided to each HCW handler, enabling them to work in a safe manner, whilst accurately classifying the materials into the categories required for the Study;

b. Confirmation that the sample size will be in accordance with the requirements stipulated by the statistician, the sampling methods to be used, sorting and other operational procedures to be adopted during normal operations but also in the event of emergencies, etc.

c. A schedule of the days when fieldwork will actually be done at each site as well as information on the time required for initial establishment and final removal of equipment. The schedule is further to indicate how much time the crew will actually be sorting waste per day, and how that will accomplish the targets set by the statistician in terms of the number of people to be deployed.

d. The proposed method of selecting containers for sorting should also be specified. It is expected that sampling from the regional HCRW treatment facility is to be done in such a way that 50% of the sample will be made up from HCRW generated at public health care facilities, whilst the remaining 50% will be sourced from private health care institutions. Sorting of these groups is to be done separately in order to draw a comparison between the two main HCRW streams, after which the results will be combined to present the overall composition of HCRW in Gauteng. The schedule and time frame included in the Tender will therefore serve as the basis from which any change in locations or sample sizes may have to be negotiated;

e. A description of the crew size for each particular activity to be performed with details on the activities that will form part of the duties for each category of fieldworkers, as well as any specialised activities (i.e. supervisor, interviewer, data recorder) that persons may have to carry out. Any person expected to fulfil a key function is to be identified and the person's CV attached in accordance with the requirements of Annexure F.

Tenderers are further invited to provide any additional information that would help the Consultant to have a better understanding of and evaluate the particular Tender in terms of any other matters that may not exactly fit with any of the above categories.

PSO 4.Sample design

The statistician, Dr. Mark Paiker from the University of the Witwatersrand, was appointed by the Employer to take responsibility for the sample design.

The methodology used for on-site sampling will, where possible and suitable, correspond with the methodology used in the ASTM standard (D 5231 – 92 (Re-approved 1998) Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste. www.astm.org) with necessary adjustments given the nature of the waste, except where specified differently below. A copy of the ASTM standard is attached as Annexure O for information to Tenderers.

Adequate incorporation of high-level occupational health and safety measures are of the utmost importance.

Based on recommendations made by the statistician and discussion with the affected parties, it may for financial or logistical reasons be necessary to reduce the level of statistical confidence, to avoid excessive handling of infectious waste. Although the sample size is determined on number of containers from each category, all data recordings shall be based on mass by means of physical weighing of samples. The statistician will be available during the execution of the

Study for consultation, also assisting in addressing any uncertainties that may exist regarding the procedures used for sampling.

Tenderers are once again referred to Item (d) of Section PSO 3 regarding the requirements for the sample composition to be drawn from the regional treatment facility.

PSO 5. Equipment Required

The selected Contractor will provide all equipment required for carrying out the Study.

Tenderers are to provide a list of capital equipment such as scales and containers that will be purchased or rented specifically for execution of the Study (See Annexure F). This list should include the cost of the equipment, and whether the equipment is to be purchased or hired. If the respondent already owns major capital equipment for carrying out this Study, this equipment should also be listed with a notation that the Tenderer owns the equipment. If the Tenderer proposes to purchase equipment, the expected final disposition of the equipment on completion of the Study should also be included in the description. The Tenderer is also to list the supplies or types of equipment required to undertake the Study at the HCRW treatment facility.

The Contractor is to note that all measures required for the security of equipment is to be allowed for in the Tendered rates, as the Employer, Consultant and the Pilot Study Institutions, will not take any responsibility for any loss or damage to equipment.

The required equipment is inter alia expected to include the following:

5.1 Sorting equipment

The Contractor will be responsible to provide all temporary shelters (where necessary) together with equipment required for the sorting, weighing, data recording, data capturing and re-containerising of HCW. The Tenderer should list the equipment and supplies that will be provided by the Contractor, as well as any support expected from the Pilot Study Health Care Institutions and the Consultant (if any).

The Contractor should provide a sufficient number of suitable containers for sorting waste without any interruption to the sorting process while weighing and recording of data is completed on previous samples. The number of sorting containers should allow for the retention of sorted HCW until data entry is complete, quality control checks are executed for the sample, and any discrepancies, errors, or omissions are resolved. Alternatively, Tenderers may specify a different method of resolving discrepancies, errors, or omissions that does not involve retaining the entire sample until computer data entry is complete.

All HCRW containers are to be weighed and sorted individually, in accordance with the requirements stipulated by the statistician.

Special attention is to be given to Clause PSO 13 of the Project Specification that deals with disinfection / disposal of equipment on completion of any phase of the Study.

5.2 HCRW containers

Existing HCRW boxes and sharps containers can be reused, but the plastic liners inside the boxes are to be replaced when the waste is to be re-containerised for transport and treatment.

Any reused sharps containers are to be placed inside a plastic lined cardboard box for storage and transport to the HCRW treatment facility, to prevent any human contact with possible contaminated outsides of sharps containers.

5.3 Scales

At least one scale with 1-150 kg capacity capable of reading accurately to 50 g will be required to weigh the full HCW containers, whilst a second scale with a capacity in the range of 1-20 kg, capable of reading accurately to 10 g, should be provided for weighing sorted components of the HCW stream. All items or materials that weigh less than 1 kg must be weighed on the smaller, more accurate scale. Scales are to be calibrated in accordance with the supplier's requirements. All scales must be practical to operate in field conditions.

Tenderers should specify the types of scales that will be provided and what the contingency plan will be in the event of a breakdown of any of the scales.

All measurements and data recording are to be done in the metric system.

5.4 Occupational Health and Safety Equipment:

The Contractor will also provide all health and safety-related equipment, in accordance with the requirements of the Occupational Health and Safety Act. The Contractor's attention is once again drawn to the need for dose rate meters for the detection of any radioactive HCRW that was incorrectly sorted during segregation and containerisation of HCW.

PSO 6. In-kind Services and Equipment Expectations

Tenderers are to provide a list of in-kind services or equipment that may be required from the Employer, the Consultant, the Pilot Study Institutions, the nominated HCRW treatment facility owners or others.

Specify the in-kind services or equipment that are expected for the Pilot Study Institutions separate from that of the HCRW treatment facility, as negotiations for the latter will have to be undertaken by the Contractor.

PSO 7. Handling of HCW

The need for manual handling of HCW in particular shall be reduced to the minimum, whilst achieving the required level of detail and confidence. In particular, the work must be arranged to ensure:

- Availability of washing facilities, soap, hand-disinfectant, clean work clothes, first aid kit, separate dining facilities, etc.
- Availability of spill kits inter alia including disinfectant to be used in the event of spills, etc.
- Availability of additional gloves and other Personal Protective Equipment (PPE).
- Availability of safe, convenient and environmentally sound receptacles for sorted waste.
- Availability of easy-to-use and effective forms for record keeping and tracking of events.
- That work is carried out in a well-ventilated area that is protected from the elements, with good lighting and ergonomically acceptable workplaces, e.g. large tables with smooth surfaces allowing for easy cleaning/disinfection. Due to restriction in the availability of space it will be necessary to transport waste off site to be analysed at a venue provided by the Contractor. The Tenderers are required to inspect the pilot study health care institutions during the compulsory Tender Site Meeting.

- That where equipment is leased for the duration of the Contract, a formal agreement be entered into between the Contractor and the third party supplying the equipment, clearly stating the purpose for which the equipment is to be used as well as the measures that will be taken to disinfect all equipment that may in future be used for purposes other than HCRW management. **Authenticated copies of all such agreements are to be submitted to the Consultant before commencement of the Study.**

- That a competent supervisor be present at all times of work.

- That all HCW, including both HCRW and HCGW, be regarded as potentially infectious waste that may also contain infected sharps. Hence, the work shall be performed in a careful manner and at a suitable low and controlled speed, allowing sufficient individual workspace.

- That the work area be kept clean and free from any debris and be cleared and disinfected by the end of each working day, even where sorting is undertaken on private property.

- That no un-containerised waste remains within the work area overnight. Containerised waste is to be secured if left overnight.

PSO 8.Sampling

Based on the sample design undertaken by the statistician, it is assumed that the respective Phases at the respective Institutions will have durations of **1 test day plus 10 weekdays** for the clinic and **1 test day plus 12 calendar days** for the hospital and HCRW treatment facility. Ten number of each type of container of both the HCRW and HCGW stream generated is to be surveyed daily over that period (See Annexure R). The sampling requirements may however have to be altered to meet any practical or budget constraints that may exist.

Radioactive waste is not included in the survey, but should be reported when encountered in the waste stream for special handling by the responsible hospital staff.

The protocol on selection of samples should be described in the Tender as well as the way in which the sample is to be sorted. The method of choosing a sample should avoid any possible bias due to such factors as density of materials or the type of different materials. It is further to be indicated how the sampling method would deal with any large bulky items that may be encountered.

The sorting/data recording techniques to be used are also to be described. Included in this description should be any equipment that will be used (sorting table, screens, containers) as well as the way in which fines and or "supermix" materials will be dealt with.

PSO 9.Sorting of Waste Samples

It is necessary for Tenderers to understand the practicalities of sorting HCW samples in the field. Field samples are not easy to separate into components, as the HCW items will often be squashed together. In addition to this, external sources of moisture (rain) and intrinsic sources (discarded drinks, liquid spill cleanup, etc.) can add considerable weight to the paper, plastic, and other component categories.

Samples are to be sorted into the various categories as detailed in Annexure Q. Care should be taken during the sorting and weighing of each sample to ensure the highest possible level of accuracy. A separate data record form is to be completed for each HCW container analysed,

where after the data is to be captured on a Microsoft Excel spreadsheet in accordance with the requirements defined by the statistician.

Tenderers are to provide rates for analysing the HCW streams from the 2 Pilot Study Institutions as well as the regional HCRW treatment facility. It is to be noted that the extent of the survey could be increased or decreased to fit the budget constraints and Tenderers are therefore advised to submit balanced Tenders.

Tenderers are expected to concentrate on:

a. The sorting of samples and recording of data in the field;

b. The detailed sample examination and data recording, and

c. Ensuring that the data recorded and submitted to the Consultant meets high quality standards in terms of correctness and accuracy.

It is important to outline and document the initial training provided to the sorting crew (ensuring that all staff is aware of the risks of handling HCRW) as well as the use of personal protective equipment supplied by the Contractor.

Tenderers should specify how they intend to deal with the following sorting problems:

a. “Leaking containers”, blood bags etc.

b. "Fines" material including mixtures of very small items (and parts of items) with dirt, such that it is impractical to separate the materials in the field. If waste samples are placed on a screen for sorting, the materials that fall through the screen might be treated as "fines".

c. "Supermix" materials that include small amounts of materials that are difficult to identify or separate, that are left at the bottom of the sorting pile after the easily sorted items are removed. "Supermix" materials are not necessarily small, but may be difficult to separate due to adhesion, wetness, or partial decomposition of the materials.

d. Handling of sharps, as gloves may not provide sufficient protection to workers.

Tenderers should outline standards or procedures used to limit the amount of "supermix" not physically separated and methods that will be used to estimate the composition of “supermix” and fines.

PSO 10. Data Recording and Capturing

Tenderers are to include a description of the processing of samples taken, e.g. containerisation, tagging, use of identification numbers, use of data forms, data capture on computer, etc. The processing shall be further detailed and documented after possible award of contract for approval before sampling commences.

Before sorted samples are re-containerised for treatment and disposal, a field quality control check is to be made of the data form. Items to be considered include the following:

a. Were any materials missed or erroneously recorded in the wrong column?

b. Does the total mass of all the categories roughly equal the estimated total sample mass?

c. Has the information from the interviews undertaken during phases 3, 4 and 5 been recorded properly or transferred to the sample data form?

d. Was the mass of containers deducted from the sample mass?

Wherever possible, the Contractor should record data on the sorted samples on computer at the time of sorting. The sorted sample should be retained until data entry and automated quality control checks are complete. Alternatively, other methods for resolving discrepancies through the quality control checks may be proposed.

It will be the Contractor's responsibility to make daily backups of all electronically captured data. The Contractor is further to ensure that the latest version of the Norton Antivirus programme (or similarly approved by the Consultant) is installed on all computers used for data capturing.

PSO 11. Quality Control

The Contractor shall take all steps required to ensure that his/her work complies with the standard of accuracy required.

Tenderers are to specify, by means of a concise description of the methods, what quality-control measures they propose to introduce that will ensure the accuracy of the data collected for both the Pilot Study Institutions as well as the HCRW treatment facility (QA/QC).

No separate payment will be made for such quality control, the cost of which will be deemed to be included in the Contractor's Tendered rates.

PSO 12. Data Reporting

Data recorded during each week of the Study shall be delivered (or faxed and E-mailed) to the Consultant immediately on completion of each week's fieldwork. A brief standardised report should also accompany the data record forms and spreadsheet that describes:

a. The location sampled and number of containers sorted;
b. The personnel present, including those sorting samples;
c. The equipment used;
d. Any problems or special conditions that existed during the field sorting, including missed or substituted samples, weather-related conditions, and health-related problems.

By the end of the Study period, all remaining data forms are to be delivered to the Consultant within 1 week after the last sample was taken.

The statistician will carry out the analysis of the waste composition data. The contractor should however be prepared to respond to any queries or uncertainties of the statistician/Consultant regarding the completed data forms or other reporting, and to provide any other information that may be required about the wastes sorted and implementation of the study.

PSO 13. Disinfection/disposal of equipment used

All equipment used during the Study should either be disinfected or alternatively treated and disposed of as HCRW by the end of the Study, or during any extended break in the Study.

Where equipment is leased from a third party, a written agreement is to be entered into with the owner of the equipment clearly stating the purpose for which the equipment is to be used. This

agreement is to be signed by the owner as well as the Contractor, and an authenticated copy of the said contract is to be made available to the Consultant.

PSO 14. Treatment / Disposal of HCW after recording

No indiscriminate spoiling, stockpiling or storage of HCRW or HCGW material used during the study is permitted. After sorting and recording of waste samples, surplus or already surveyed materials shall be re-containerised immediately and stored at an approved area, before being transported off site for treatment and/or disposal in accordance with the applicable statutory regulations.

The cost of replacement of containers that are not reusable, the cost for replacement of plastic liners as well as the cost for re-containerisation, transport, treatment and/or disposal of HCW shall be included in the Tendered rates.

PSO 15. Existing services and structures

The Contractor is to exercise care when working in the vicinity of any known existing infrastructure or services. Any damage caused shall be repaired to the satisfaction of the Consultant at the Contractor's expense.

The Contractor is to ensure that access to the pilot study institutions will only be through the main security gate on site.

SCHEDULE OF RATES AND QUANTITIES

Preamble

1. The Schedule of Rates and Quantities must be read in conjunction with the Conditions of Tender, the Project Specifications and Annexures and all other data included in these documents for the full intent and meaning of each clause or item.

2. The Tenderer is advised to check the number of pages and, should any be found to be missing or in duplicate or the figures or writing indistinct or this Schedule of Rates and Quantities contains any obvious errors, the Tenderer must inform the Consultant at once and have it rectified. No liability whatsoever will be admitted in respect of errors due to the foregoing.

   Should there be any doubt or obscurity as to the meaning of any particular item, the Tenderer must obtain an explanation of it, in writing, from the Consultant. No claims for extras arising from any such doubt or obscurity will be admitted after submission of the Tender.

3. The Tenderer is advised to read carefully the Specifications in so far as they apply to items in the Schedule of Rates and Quantities. Descriptions of activities described in the Schedule of Rates and Quantities are abbreviated.

   No claim whatsoever will be allowed in respect of errors in pricing due to abbreviation of the description of items which are fully described when read in conjunction with the relevant specification.

4. The Tenderer is hereby advised that the quantities provided in the Rates and Quantities are preliminary estimates, any errors (whether in excess or short of the actual quantity, or insufficiently or incorrectly described) will be adjusted on completion of the contract by the Consultant. For this purpose, the whole of the contents of the Schedule of Rates and Quantities are to be considered as provisional and therefore subject to re-measurement and adjustment in part or as a whole. All such adjustments will be based on, or pro-rata to, the schedule unit prices submitted by the Contractor.

5. It is deemed that provision for head office overheads, consumable stores, profit, etc., as well as all labour, material and equipment costs, is made in the priced items of the measured schedule following the preliminary schedule and that any increases and decreases in the measured quantities will correspondingly adjust for these charges.

6. Tenderers are referred to the Project Specification in which further information in respect of certain scheduled items can be obtained. This is meant as an aid to Tenderers but does not imply that the Specifications or clauses referred to are the only sources of information in respect of these items and further information and explanations may be found elsewhere in the contract documents and on the Annexures.

7. The sum and unit prices to be inserted in the Schedule of Quantities are to be fully inclusive value of the work described under the several items, including all costs and expenses which may be required in and for the execution of the work described, together with all general risks, liabilities and obligations set forth or implied in the documents on which the tender is based.

8. All unit prices shall be quoted nett and be exclusive of Value Added Tax (VAT). Provision is made in the summary page for the addition of Value Added Tax to the total of the various Sections comprising the Schedule of Rates and Quantities.

9. All unit prices, extensions and totals must be entered in the Schedule in BLACK INK.

   A sum or unit price is to be entered against each item in the Schedule of Rates and Quantities, whether quantities are stated or not. Items against which no price is entered will be considered as covered by other prices or rates in the schedule.

   The Tenderer is at liberty to insert a rate of his own choosing for each item in the schedules and his attention is drawn to the fact that the Contractor has the right, under various circumstances to payment for additional works carried out, and that the Consultant is obliged to base his assessment of the rates to be paid for such additional work on the rates inserted in the schedule by the Contractor.

   In cases where schedule rates are considered to be too high, such rates may be of sufficient importance to warrant rejection of a tender.

10. All prices shall be quoted in the currency of the Republic of South Africa and will be held to be firm without any escalation over the period required for the execution of the overall Study.

11. Where any discrepancy exists between the unit price and the extended total against any item, the discrepancy will be adjusted by altering the total amount filled in against such item and, consequently, the total tender sum.

SCHEDULE OF RATES AND QUANTITIES

- Phase 1 -

Section A: Pre Pilot Study survey at Itireleng Clinic.

Item No	Item Description	Unit	Quantity	Rate (Rand)	Amount (Rand)
Fixed Preliminary and General Costs:					
A1	Establish and remove temporary infrastructure required for execution of the 1-day test Study at the clinic.	Sum	1		
A2	Establish and remove temporary infrastructure required for execution of the complete Phase 1 Study at the clinic.	Sum	1		
A3	Maintenance of temporary infrastructure required for execution of the Study at the clinic.	Day	11		
A4	Daily weighing of the total HCRW and HCGW stream generated at the clinic.	Day	11		
A5	Execution of interview programme at the clinic and reporting on aspects that may have influenced the Study results (Phases 3 to 5 only)	Sum	0		
Total Fixed Preliminary and General Costs for Section A (VAT Excluded):					
Variable Operational Costs:					
A6	Sorting, recording and capturing of data at the clinic including re-containerising, transport, treatment and disposal of HCRW from:				
A6.1	142 litre cardboard boxes	Number	90		
A6.2	50 litre cardboard boxes	Number	20		
A7	Sorting, recording and capturing of data at the clinic including re-containerising, transport, treatment and disposal of HCRW from:				
A7.1	5 litre sharps containers	Number	5		
A7.2	10 litre sharps containers	Number	10		
A7.3	20 litre sharps containers	Number	5		
A8	Sorting, recording and capturing of data at the clinic from HCGW containers including re-containerising, transport and disposal of HCGW from:				
A8.1	85-litre bags	Number	20		
A8.2	240-litre wheelie bins	Number	20		
Total Variable Operational costs for Section A (VAT Excluded):					
Total Costs for Section A (VAT Excluded):					

- Phase 2 -

Section B: Pre Pilot Study survey at Leratong Hospital.

Item No	Item Description	Unit	Quantity	Rate (Rand)	Amount (Rand)
Fixed Preliminary and General Costs:					
B1	Establish and remove temporary infrastructure required for execution of the 1-day test Study at the hospital.	Sum	1		
B2	Establish and remove temporary infrastructure required for execution of the complete Phase 2 Study at the hospital.	Sum	1		
B3	Maintenance of temporary infrastructure required for execution of the Study at the hospital.	Day	13		
B4	Daily weighing of the total HCRW and HCGW stream generated at the hospital.	Day	13		
B5	Execution of interview programme at the hospital and reporting on aspects that may have influenced the Study results (Phases 3 to 5 only)	Sum	0		
	Total Fixed Preliminary and General Costs for Section B (VAT Excluded):				
Variable Operational Costs:					
B6	Sorting, recording and capturing of data at the hospital including re-containerising, transport, treatment and disposal of HCRW, from:				
B6.1	142 litre cardboard boxes	Number	130		
B6.2	50 litre cardboard boxes	Number	40		
B7	Sorting, recording and capturing of data at the hospital including re-containerising, transport, treatment and disposal of HCRW, from:				
B7.1	5 litre sharps containers	Number	10		
B7.2	10 litre sharps containers	Number	130		
B7.3	20 litre sharps containers	Number	10		
B8	Sorting, recording and capturing of data at the hospital specican containers including re-containerising, transport, treatment and disposal of HCRW, from:				
B8.1	5-litre buckets	Number	10		
B8.2	10-litre buckets	Number	50		
B8.3	20-litre buckets	Number	10		
B9	Sorting, recording and capturing of data at the hospital from HCGW containers including re-containerising, transport and disposal of HCGW, from:				
B9.1	85-litre bags	Number	65		
B9.2	240-litre wheelie bins	Number	65		
	Total Variable Operational costs for Section B (VAT Excluded):				
	Total Costs for Section B (VAT Excluded):				

- Phase 3 -

Section C: Survey at Regional HCRW Treatment Facility.

Item No	Item Description	Unit	Quantity	Rate (Rand)	Amount (Rand)
Fixed Preliminary and General Costs:					
C1	Establish and remove temporary infrastructure required for execution of the 1-day test Study at the regional treatment facility.	Sum	1		
C2	Establish and remove temporary infrastructure required for execution of the complete Phase 3 Study at the regional treatment facility.	Sum	1		
C3	Maintenance of temporary infrastructure required for execution of the Study at the regional treatment facility.	Day	13		
C4	Determining the daily overall HCRW mass delivered to the regional treatment facility.	Day	13		
C5	Execution of interview programme at the regional treatment facility and reporting on aspects that may have influenced the Study results (Phases 3 to 5 only)	Sum	1		
Total Fixed Preliminary and General Costs for Section C (VAT Excluded):					
Variable Operational Costs:					
C6	Sorting, recording and capturing of data at the regional treatment facility including re-containerising, transport, treatment and disposal of HCRW, from:				
C6.1	142 litre cardboard boxes	Number	130		
C6.2	50 litre cardboard boxes	Number	130		
C6.3	240 litre wheelie bins	Number	130		
C6.4	660 litre wheelie bins	Number	65		
C7	Sorting, recording and capturing of data at the regional treatment facility including re-containerising, transport, treatment and disposal of HCRW, from:				
C7.1	5 litre sharps containers	Number	130		
C7.2	10 litre sharps containers	Number	130		
C7.3	20 litre sharps containers	Number	130		
C8	Sorting, recording and capturing of data at the regional treatment facility specican containers including re-containerising, transport, treatment and disposal of HCRW, from:				
C8.1	5-litre buckets	Number	130		
C8.2	10-litre buckets	Number	130		
C8.3	20-litre buckets	Number	130		
Total Variable Operational costs for Section C (VAT Excluded):					
Total Costs for Section C (VAT Excluded):					

- Phase 4 -

Section D: Post Pilot Study survey at Itireleng Clinic.

Item No	Item Description	Unit	Quantity	Rate (Rand)	Amount (Rand)
Fixed Preliminary and General Costs:					
D1	Establish and remove temporary infrastructure required for execution of the Study at the clinic.	Sum	1		
D2	Maintenance of temporary infrastructure required for execution of the Study at the clinic.	Day	10		
D3	Daily weighing of the total HCRW and HCGW stream generated at the clinic.	Day	10		
D4	Execution of interview programme at the clinic and reporting on aspects that may have influenced the Study results (Phases 3 to 5 only)	Sum	1		
Total Fixed Preliminary and General Costs for Section D (VAT Excluded):					
Variable Operational Costs:					
D5	Sorting, recording and capturing of data at the clinic including re-containerising, transport, treatment and disposal of HCRW, from:				
D5.1	142 litre cardboard boxes	Number	120		
D5.2	50 litre cardboard boxes	Number	35		
D5.3	240 litre wheelie bins	Number	10		
D5.4	660 litre wheelie bins	Number	5		
D6	Sorting, recording and capturing of data at the clinic including re-containerising, transport, treatment and disposal of HCRW, from:				
D6.1	5 litre sharps containers	Number	10		
D6.2	10 litre sharps containers	Number	120		
D6.3	20 litre sharps containers	Number	10		
D7	Sorting, recording and capturing of data at the hospital specican containers including re-containerising, transport, treatment and disposal of HCRW, from:				
D7.1	5-litre buckets	Number	50		
D7.2	10-litre buckets	Number	10		
D7.3	20-litre buckets	Number	10		
D8	Sorting, recording and capturing of data at the clinic from HCGW containers including re-containerising, transport and disposal of HCGW, from:				
D8.1	85-litre bags	Number	65		
D8.2	240-litre wheelie bins	Number	65		
Total Variable Operational costs for Section D (VAT Excluded):					
Total Costs for Section D (VAT Excluded):					

- Phase 5 -

Section E: Post Pilot Study survey at Leratong Hospital.

Item No	Item Description	Unit	Quantity	Rate (Rand)	Amount (Rand)
Fixed Preliminary and General Costs:					
E1	Establish and remove temporary infrastructure required for execution of the Study at the hospital.	Sum	1		
E2	Maintenance of temporary infrastructure required for execution of the Study at the hospital.	Day	12		
E3	Daily weighing of the total HCRW and HCGW stream generated at the hospital.	Day	12		
E4	Execution of interview programme at the hospital and reporting on aspects that may have influenced the Study results (Phases 3 to 5 only)	Sum	1		
Total Fixed Preliminary and General Costs for Section E (VAT Excluded):					
Variable Operational Costs:					
E5	Sorting, recording and capturing of data at the hospital including re-containerising, transport, treatment and disposal of HCRW, from:				
E5.1	142 litre cardboard boxes	Number	120		
E5.2	50 litre cardboard boxes	Number	120		
E5.3	240 litre wheelie bins	Number	60		
E5.4	660 litre wheelie bins	Number	12		
E6	Sorting, recording and capturing of data at the hospital including re-containerising, transport, treatment and disposal of HCRW, from:				
E6.1	5 litre sharps containers	Number	60		
E6.2	10 litre sharps containers	Number	60		
E6.3	20 litre sharps containers	Number	60		
E7	Sorting, recording and capturing of data at the hospital from HCGW containers including re-containerising, transport and disposal of HCGW, from:				
E7.1	85-litre bags	Number	60		
E7.2	240-litre wheelie bins	Number	60		
Total Variable Operational costs for Section E (VAT Excluded):					
Total Costs for Section E (VAT Excluded):					

Summary to Schedule of Rates and Quantities

Section A:	Phase 1 - Pre Pilot Study survey at Itireleng Clinic.	R……..
Section B:	Phase 2 - Pre Pilot Study survey at Leratong Hospital.	R……..
Section C:	Phase 3 - Survey at Regional HCRW Treatment Facility.	R……..
Section D:	Phase 4 - Post Pilot Study survey at Itireleng Clinic.	R……..
Section E:	Phase 5 - Post Pilot Study survey at Leratong Hospital.	R……..

Total (Excluding VAT)	R……..
VAT @ 14%	R……..
Total Tender Amount	R……..

LIST OF ANNEXURES

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HEALTH CARE WASTE GENERATION AND CHARACTERISATION STUDY FOR SELECTED PILOT HEALTH CARE INSTITUTIONS

A. Form of Tender

(Note: The forms to be completed by the Tenderer form part of the Contract document)

Gauteng Department of Agriculture, Conservation, Environment and Land Affairs
P O Box 8769
Johannesburg
2000

Sir/Madam,

Having examined the complete tender enquiry, we offer to execute the whole of the Health Care Generation and Characterization Study for selected health Care Institutions detailed therein in conformity with all specified requirements as well as the duly completed Appendix, Schedules and Forms (all attached hereto) for the sum of

R ……………………………………………… (in words) …………………………………………………………………………………

………

or such other sum as may be ascertained in accordance with the Contract.

In the event of there being any errors of extension or addition in the priced Schedules of Rates and Quantities, we agree to it being corrected, the rates being taken as correct.

If our tender is accepted, we will if requested to do so, and within the time stipulated, provide a good and sufficient Surety Bond in the format annexed hereto, granted by a financial institution (to be approved in any case by the Employer) to be jointly and severally bound with us in a sum not exceeding 10% (ten percent) of the total Contract sum for the due performance of the Contract. The surety we propose is:

Financial Institution: ……………………………………………………………………………

Address: ……………………………………………………………………………

……………………………………………………………………………

……………………………………………………………………………

……………………………………………………………………………

Unless and until a formal Agreement is proposed and issued, this Tender, together with written acceptance thereof by yourselves, shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any offer you may receive and that no reason for the acceptance or rejection of an offer will be given.

This offer shall remain valid for **sixty (60) days** from closing date for the submission of offers.

Signed on behalf of contractor ……………………………………………………………………………

Name of Signatory: ……………………………………………………………………………

Name of Contractor (Firm): .....

We choose domicilium citandi et executandi in South Africa at:

Physical Address: .....

.....

.....

.....

Postal Address: .....

.....

.....

.....

Telephone Number: .....

Fax Number: .....

E-mail Address: .....

Date: .....

Witnesses: 1. .....

2. .....

B. Appendix to Tender

Address of Employer:	Gauteng Department of Agriculture, Conservation, Environment and Land Affairs P O Box 8769 Johannesburg 2000
Address and contact details of Consultant:	RAMBOLL P O Box 10610 Fourways East 2055 Tel: (011) 355-1664 Fax: (011) 355-1663 E-mail: tok@ramboll.dk
Address and contact details of Contractor:	Address …… …….. …….. Tel: …….. Fax: …….. E-mail: ……..
Amount of Surety:	10% (ten percent) of Contract Price
Time within which Surety to be provided:	Fourteen (14) days from the Commencement date
Duration of Surety:	Until issue of Certificate of Completion
Time within which Study to Commence:	14 days after Award Date
Special Risks insurance to be arranged by:	Contractor.
Amount of Special Risks Insurance:	R 500 000-00
Liability insurance to be arranged by:	Contractor.
Minimum amount of Liability Insurance:	R 3 000 000-00
Special Non-working Days:	None.
Time for Completion of respective phases:	Phase 1 - Itireleng Clinic (Before Study): 2 weeks Phase 2 - Leratong Hospital (Before Study): 2 weeks Phase 3 - Regional HCRW treatment facility: 2 weeks Phase 4 - Itireleng Clinic (After Study): 2 weeks Phase 5 - Leratong Hospital (After Study): 2 weeks

Amount of Penalty for delay	See Project Specification Clause PSG 21
Percentage advance on Study:	0 %
Percentage Retention:	0 %
Delivery of Contractors final Statement:	Within 60 days after certified date of completion of Study
Defects Liability Period:	Not Applicable.
Settlements of disputes to be by reference to:	Mediation or, if failing to resolve the dispute, Arbitration
Escalation:	**Fixed Price - No escalation.**
Period of validity of Tender:	**Sixty (60) days** from closing date for submission of tenders.

…… ……..……..
SIGNED ON BEHALF OF TENDERER: DATE

C: Certificate of Site Inspection

This is to certify that I, ……..…….. as authorised representative of

…… have visited and inspected the sites of the Study on ……..……..

2002 and satisfied myself as regards all conditions and other factors which may affect our Tender.

……..	……..
Signature of Tenderer's Representative	Signature of Consultant
……..	……..
Signature of Tenderer	Date

D: Authority for Signatory

Signatories for closed corporations and companies shall confirm their authority by attaching to this form a duly signed and dated copy of the relevant resolution of their members or the board of directors, as the case may be.

An example of a resolution for a company is shown below:

By resolution of the board of directors taken on ……2002

Mr/Ms ……..….. was duly authorised to sign all documents in connection with the tender for the Health Care Generation and Characterization Study for selected health Care Institutions and any contract that may arise there from on behalf of

……
(Block Capitals)

……..…..
SIGNED ON BEHALF OF THE COMPANY/CLOSED CORPORATION

IN HIS CAPACITY AS: ……..….

DATE: ……..….

SIGNATURE OF SIGNATORY: ……..….

E: Amendments or Qualifications by the Tenderer

Should the prospective Contractor desire to make any departures from or modifications to the Conditions of Tender, Specifications, Schedule of Quantities or Annexures, or to qualify his/her Tender in any way, he/she shall set out his proposals clearly hereunder or alternatively state them in a covering letter attached to his Tender and referred to hereunder, failing which the Tender will be deemed to be unqualified.

If no departures or modifications are desired, the Schedule hereunder is to be marked NIL and signed by the Tenderer.

PAGE	CLAUSE OR ITEM	DESCRIPTION

…… ……..……..

SIGNED ON BEHALF OF TENDERER: DATE

F: Schedule of Labour and Equipment

The Contractor shall list the labour and equipment establishment in detail, which he/she intends to provide for the execution of the Study.

The Contractor guarantees all the items of major equipment listed will be provided on the respective sites in perfect working order. The list of items of equipment shall provide the Contractor's warranty of ownership of such equipment unless specifically endorsed in this Annexure to the contrary as "hired" or "hire purchase equipment".

NOTES:

1. The daily rate in the Schedule of Rates and Quantities for supply and maintenance of all labour and equipment listed shall include all profit, overheads, operating costs including wages of operators and attendants, transport to and from site etc.

2. This schedule must be accurately completed. Phrases such as "adequate equipment will be provided" will not be accepted.

Acceptance of the Tender does not imply acceptance by the Consultant of the labour establishment and equipment proposed herein.

LABOUR ESTABLISHMENT

CATEGORY OF EMPLOYEE	NUMBER EMPLOYED	
	Minimum	Maximum

EQUIPMENT

MAKE and MODEL	Size or capacity	Owned / hired	Capital Value

…… ……..……..

SIGNED ON BEHALF OF TENDERER: DATE

G: Schedule of Similar Work Carried out by the Tenderer

The Tenderer must insert in the spaces provided below a complete list of similar Contracts awarded to him. This information shall be deemed to be material to the award of the Contract.

EMPLOYER (Name, tel. no. and fax no.)	**CONSULTANT. (Name, tel. no. and fax no.)**	**NATURE AND LOCATION OF WORK AND YEAR COMPLETED.**	**VALUE OF WORK.**

…… ……..

SIGNED ON BEHALF OF TENDERER: DATE

H: Schedule of Sub-Contractors

The Tenderer is to complete the schedule below specifying all Sub-Contractors he intends using on the Contract. Detailed references, examples and magnitude of work undertaken by such sub-contractors shall be submitted to the Consultant for consideration prior to commencement of the portion of the Study that the Contractor intends to sublet.

Acceptance of a Tender does not imply acceptance by the Consultant of the Sub-Contractors proposed herein, and the Contractor is deemed to be responsible for carrying out all of this work himself should agreement to the proposed sub-contractor(s) not be reached.

If no sub-contractors are proposed, the schedule hereunder is to be marked NIL and signed by the Tenderer.

NAME OF SUB-CONTRACTOR	SECTION OF THE WORK	TOTAL VALUE OF ITEMS COVERED BY SUB-CONTRACT

…… ……..……..

SIGNED ON BEHALF OF TENDERER: DATE

I: Supervisory Staff

The Tenderer is to complete the schedule below specifying all supervisory staff he intends placing on the contract full-time. The CV's of the supervisory staff are to be attached.

Acceptance of a tender does not imply acceptance by the Consultant of the staff proposed herein.

STAFF MEMBER	DESIGNATION	YEAR'S SERVICE WITH TENDERER	SECTION OF CONTRACT TO BE SUPERVISED

These staff members or any subsequent replacement thereof shall be designated "key personnel" and shall not be removed from the Study without the prior written consent of the Consultant.

…… ……..……..

SIGNED ON BEHALF OF TENDERER: DATE

J: Programme of Work

ACTIVITY	WEEK																			
	Phase 1: Itireleng Clinic (Before Study) Starting:……...				**Phase 2**: Leratong Hospital (Before Study) Starting:……				**Phase 3**: Regional HCRW treatment facility Starting:……				**Phase 4**: Itireleng Clinic (After Study) Starting:……				**Phase 5**: Leratong Hospital (After Study) Starting:……			
Week No. → Activity Description↓	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1.																				
2.																				
2.																				
4.																				
5.																				
6.																				
7.																				
8.																				
9.																				
10.																				
11.																				
12.																				
13.																				
14.																				
15.																				

…… ……..……..

SIGNED ON BEHALF OF TENDERER: DATE

K: Estimated Weekly Expenditure

The Tenderer shall state the estimated value of work to be completed every week, based on his preliminary programme and his tendered unit rates, in the table below. The amounts for contingencies shall not be included.

WEEK	VALUE
Phase 1: Itireleng Clinic (Before Study)	
1	R
2	R
3	R
4	R
Phase 2: Leratong Hospital (Before Study)	
1	R
2	R
3	R
4	R
Phase 3: Regional HCRW treatment facility	
1	R
2	R
3	R
4	R
Phase 4: Itireleng Clinic (After Study)	
1	R
2	R
3	R
4	R
Phase 5: Leratong Hospital (After Study)	
1	R
2	R
3	R
4	R
TOTAL	R

…… ……..……..

SIGNED ON BEHALF OF TENDERER: DATE

L: Transfer of Skills

The Tenderer is to indicate which sections of work are to be sub-contracted to emerging contractors, or local labour employed for.

SECTION OF WORK	SUBCONTRACT OR EMPLOY LOCAL LABOUR	VALUE OF WORK

…… ……..……..

SIGNED ON BEHALF OF TENDERER: DATE

M: Form of Agreement

This agreement is made between RAMBØLL (hereinafter called "the Consultant") of the one part,

and ……..

of ……..

(hereinafter called "the Contractor") of the other part, herein represented by

……

in his/her capacity as ……..

Whereas the Consultant is desirous that certain Study be executed, viz, **Health Care Waste Generation and Characterisation Study for Selected Pilot Health Care Institutions.** and has accepted a tender by the Contractor for the execution, of such works;

Now therefore this agreement witness as follows:

1. In this agreement words and expressions shall have the same respective meanings as are assigned to them in the Conditions of Tender hereinafter referred to.

2. The following documents shall be deemed to form and be read and construed as part of this agreement, viz:

   i) The Conditions of Tender;
   ii) The Specifications;
   iii) The priced Schedule of Rates and Quantities and Preamble thereto;
   iv) The said Form of Tender and forms to be completed by the Tenderer;
   v) The Annexures;
   i) The Notices, if any, issued to the Tenderer between the first issue of Tender Documents and the submission of Tenders;
   vii) The correspondence, if any, between the Tenderer and the Consultant with and after submission of the tenders;
   viii) The Letter of Acceptance;
   ix) The Guarantee;

3. In consideration of the payments to be made by the Consultant to the Contractor as hereinafter mentioned, the Contractor undertakes to the Consultant to execute the Study so as to conform in all respects with the provisions of the Contract.

4. The Consultant hereby undertakes to pay the Contractor in consideration of the execution of the Study, the Contract Price at times and in the manner prescribed by the Contract.

Signed in the presence of the subscribing witnesses, at …….. for and

on behalf of the CONSULTANT on this …….. day of …….. 2002

……..
SIGNATURE:

……..
CAPACITY:

AS WITNESS: 1. …….

2. ……..

Signed in the presence of the subscribing witnesses, at …….. for and on behalf of the CONTRACTOR on this ……. day of ……... 2002

……..
SIGNATURE:

……..
CAPACITY:

AS WITNESS: 1. ……..

2. ……..

Affix the appropriate revenue stamp and cancel with signature and date

N: Form of Bond

Employer: GAUTENG DEPARTMENT OF AGRICULTURE, CONSERVATION, ENVIRONMENT AND LAND AFFAIRS (DACEL).

Consultant: RAMBØLL, represented by the Chief Technical Advisor.

Contract No: …….

Project No: ……..…..

Contractor: ……..……..

Description of Contract: **HEALTH CARE WASTE GENERATION AND CHARACTERISATION STUDY FOR SELECTED PILOT HEALTH CARE INSTITUTIONS.**

REFERENCE OF SURETY:

With reference to the above contract about to be entered into in terms of the Contractor's tender, I/We* the undersigned

……
(Name of responsible person/s)

and

……
(Name of responsible person/s)

in my/our respective capacity/capacities as

……..
(Capacity)

and

……..
(Capacity)

of

……
(Financial Institution/Insurance Company)

do hereby bind

……
(Financial Institution/Insurance Company)

as surety and co-principal debtors in *solidum* for the due performance of the Contract by the above-named Contractor, and for all losses, damages and expenses that may be suffered or incurred by the Employer or Consultant as a result of non-performance of the Contract by the Contractor, renouncing all benefits from the legal expectations *ordinis seu excursionis et divisionis* "No value received" and all other exceptions which might or could be pleaded against the validity of this guarantee, with the meaning and effect of which exceptions we declare ourselves to be fully acquainted; provided that the liability of the undersigned under this guarantee is limited to and shall not exceed.

R…….. (Amount of surety bond in words) ……..
(Being 10% of the Contract sum)

The said sum, or portion thereof, is payable upon our receiving written demand from the Consultant that such sum, or portion thereof, is due and payable in terms of the Contact.

This Surety Bond is irrevocable and will lapse and be returned to us upon the issue of the Consultant's Certificate of Completion in terms of the Contract and after written approval by RAMBØLL or his/her nominee unless the Surety is advised in writing by the Consultant before issue of the said Certificate of his intention to institute claims and the particulars thereof, in which event this guarantee shall remain in force until all such claims are paid or settled.

We acknowledge that upon the termination of this Bond the Consultant shall, in terms of Treasury Regulations, retain the cancelled document for the prescribed period.

Executed For and on Behalf of: ……...
(Financial Institution/Insurance Company)

Signed at …… on this …… day of …… 20……..

…….. ……..…….
Responsible Person Capacity

1. ……..
Witness

2. ……..
Witness

duly authorised to sign on behalf of ……..
(Financial Institution/Insurance Company)

Full Address of Surety: (which the surety also chooses as its *domicilium citandi et executandi*):

……

……

……

……...

O: Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste.

ASTM STANDARD (D 5231 – 92 (RE-APPROVED 1998)

Designation: D 5231 – 92 (Re-approved 1998)

Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste 1

This standard is issued under the fixed designation D 5231; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last re-approval. A superscript epsilon (e) indicates an editorial change since the last revision or re-approval.

1. Scope

1.1 This test method describes procedures for measuring the composition of unprocessed municipal solid waste (MSW) by employing manual sorting. This test method applies to determination of the mean composition of MSW based on the collection and manual sorting of a number of samples of waste over a selected time period covering a minimum of one week.

1.2 This test method includes procedures for the collection of a representative sorting sample of unprocessed waste, manual sorting of the waste into individual waste components, data reduction, and reporting of the results.

1.3 This test method may be applied at landfill sites, waste processing and conversion facilities, and transfer stations.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see Section 6.

2. Terminology

2.1 *Definitions:*

2.1.1 *composite ite*m—an object in the waste composed of multiple waste components or dissimilar materials, such as disposable diapers, bi-metal beverage containers, electrical conductors composed of metallic wire encased in plastic insulation, etc.

2.1.2 *solid waste composition or waste compositio*n—the characterization of solid waste as represented by a breakdown of the mixture into specified waste components on the basis of mass fraction or of weight percent.

2.1.3 *sorting sampl*e—a 200 to 300-lb (91 to 136-kg) portion deemed to represent the characteristics of a vehicle load of MSW.

2.1.4 *unprocessed municipal solid waste*—solid waste in its discarded form, that is, waste that has not been size reduced or otherwise processed.

2.1.5 *waste component*—a category of solid waste, composed of materials of similar physical properties and chemical composition, which is used to define the composition of solid waste, for example, ferrous, glass, newsprint, yard waste, aluminium, etc.

3. Summary of Test Method

3.1 The number of samples to be sorted is calculated based on statistical criteria selected by the investigators.

3.2 Vehicle loads of waste are designated for sampling, and a sorting sample is collected from the discharged vehicle load.

3.2 The sample is sorted manually into waste components. The weight fraction of each component in the sorting sample is calculated from the weights of the components.

3.4 The mean waste composition is calculated using the results of the composition of each of the sorting samples.

4. Significance and Use

4.1 Waste composition information has widespread applications and can be used for activities such as solid waste planning, designing waste management facilities, and establishing a reference waste composition for use as a baseline standard in both facility contracts and acceptance test plans.

4.2 The method can be used to define and report the composition of MSW through the selection and manual sorting of waste samples. Where applicable, care should be taken to consider the source and seasonal variation of waste.

4.3 After performing a waste composition analysis, laboratory analyses may be performed on representative samples of waste components, or mixtures of waste components, for purposes related to the planning, management, design, testing, and operation of resource recovery facilities.

5. Apparatus

5.1 *Metal, Plastic, or Fibre Container*s, sufficient for storing and weighing each waste component, labelled accordingly. For components that will have substantial moisture content (for example, food waste), metal or plastic containers are recommended in order to avoid absorption of moisture by the container and thus the need for a substantial number of weighing to maintain an accurate tare weight for the container.

5.2 *Mechanical or Electronic Weigh Scal*e, with a capacity of at least 200 lb (91 kg) and precision of at least 0.1 lb (0.045 kg).

5.3 *Heavy-Duty Tarps, Shovels, Rakes, Push Brooms, Dust Pans, Hand Brooms, Magnets, Sorting Table, First Aid Kit, Miscellaneous Small Tools, Traffic Cones, Traffic Vests, Leather Gloves, Hardhats, Safety Glasses, and Leather Boot*s.

1 This test method is under the jurisdiction of ASTM Committee D34 on Waste Disposal and is the direct responsibility of Subcommittee D34.01.06 on Analytical Methods.

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6. Hazards

6.1 Review the hazards and procedures with the operating and sorting personnel prior to conducting the field activities.

6.2 Sharp objects, such as nails, razor blades, hypodermic needles, and pieces of glass, are present in solid waste. Personnel should be instructed of this danger, and they should brush waste particles aside while sorting rather than projecting their hands with force into the mixture. Personnel handling and sorting solid waste should wear appropriate protection, such as heavy leather gloves, dust masks, hardhats, safety glasses, and safety boots.

6.3 During the processes of unloading waste from collection vehicles and handling waste with heavy equipment, projectiles may issue from the mass of waste. The projectiles can include flying glass particles from breaking glass containers and metal lids from plastic and metal containers that burst under pressure when run over by heavy equipment. The problem is particularly severe when the waste-handling surface is of high compressive strength, for example, concrete. Personnel should be informed of this danger and wear eye and head protection if in the vicinity of either the collection vehicle unloading point or heavy equipment, or both.

6.4 Select a location for the discharge of designated loads, manual sorting activities, and weighing operations that is flat, level, and away from the normal waste handling and processing areas.

6.5 Weigh storage containers each day, or more frequently, if necessary, in order to maintain an accounting of the tare weight.

6.6 Loss of mass from the sorting sample can occur through the evaporation of water. Samples should thus be sorted as soon as possible after collection.

6.7 Containers of liquids or other potentially dangerous wastes shall be put aside and handled by the crew chief.

7. Calibration

7.1 All weigh scale equipment shall be calibrated according to the manufacturer's instructions. Take appropriate corrective action if the readings are different from those of the calibration weights.

8. Procedure

8.1 Secure a flat and level area for discharge of the vehicle load. The surface should be swept clean or covered with a clean, durable tarp prior to discharge of the load.

8.2 Position the scale on a clean, flat, level surface and adjust the level of the scale if necessary. Determine the accuracy and operation of the scale with a known (that is, reference) weight.

8.3 Weigh all empty storage containers and record the tare weights.

8.4 Determine the number of samples to be sorted. The determination is a function of the waste components to be sorted and the desired precision as applied to each component. Weights of 200 to 300 lb (91 to 136 kg) for sorting samples of unprocessed solid waste are recommended. The number of samples is determined using the calculation method described in 9.1.

8.5 A comprehensive list of waste components for sorting is given in Table 1. A description of some of the waste component categories is given in Table 2. Other waste components can be defined

and sorted, depending on the purpose of the waste composition determination. The list in Table 1 is comprised of those components most commonly used to define and report the composition of solid waste. It is recommended that, at a minimum, the complement of left-justified categories in Table 1 be sorted. Similar breakdowns of solid waste composition are therefore available for purposes of comparison, if desired. Label the storage containers accordingly.

8.6 Vehicles for sampling shall be selected at random during each day of the one-week sampling period, or so as to be representative of the waste stream as agreed upon by the affected parties. With respect to the random selection of vehicles, any method is acceptable that does not introduce a bias into the selection. An acceptable method is the use of a random number generator. For a weekly sampling period of *k* days, the number of vehicles sampled each day shall be approximately *n*/k, where *n* is the total number of vehicle loads to be selected for the determination of waste composition. A weekly period is defined as 5 to 7 days.

8.7 Direct the designated vehicle containing the load of waste to the area secured for discharge of the load and collection of the sorting sample.

8.8 Collect any required information from the vehicle operator before the vehicle leaves the discharge area. Direct the vehicle operator to discharge the load onto the clean surface in one contiguous pile, that is, to avoid gaps in the discharged load in order to facilitate collection of the samples.

8.9 Using a front-end loader with at least a 1-yd^3 (0.765-m^3) bucket, remove the material longitudinally along one entire side of the discharged load in order to obtain a representative cross-section of the material. The mass of material shall be sufficient to form a mass of material, which, on a visual basis, is at least four times the desired weight of the sorting sample (that is, approximately 1000 lb (454 kg)). Mix, cone, and quarter the material, and select one quarter to be the sorting sample, using a random method of selection or a sequence agreed by all affected parties, for the purpose of eliminating or minimizing biasing of the sample. If an oversize item (for example, water heater) composes a large weight percent of the sorting sample, add a notation on the data sheet and weigh it, if possible. Unprocessed solid waste is a heterogeneous mixture of materials. Care must thus be taken during application of the procedures for sample collection in order to obtain a representative sample.

TABLE 1 List of Waste Component Categories

Mixed paper	Other organics
High-grade paper	Ferrous
- Computer printout	- Cans
- Other office paper	- Other ferrous
Newsprint	Aluminum
Corrugated	- Cans
Plastic	- Foil
- PET bottles	- Other aluminium
- HDPE bottles	Glass
- Film	- Clear
- Other plastic	- Brown
Yard waste	- Green
Food waste	Other inorganics
Wood	

TABLE 2 Descriptions of Some Waste Component Categories

Mixed paper:	Office paper, computer paper, magazines, glossy paper, waxed paper, and other paper not fitting the categories of newsprint and corrugated
Newsprint:	Newspaper
Corrugated:	Corrugated medium, corrugated boxes or cartons, and brown (kraft) paper (that is, corrugated) bags
Plastic:	All plastics
Yard waste:	Branches, twigs, leaves, grass, and other plant material
Food waste:	All food waste except bones
Wood:	Lumber, wood products, pallets, and furniture
Other organics/ combustibles:	Textiles, rubber, leather, and other primarily burnable materials not included in the above component categories
Ferrous:	Iron, steel, tin cans, and bi-metal cans
Aluminum:	Aluminium, aluminium cans, and aluminium foil
Glass:	All glass
Other inorganics/ non-combustibles:	Rock, sand, dirt, ceramics, plaster, non-ferrous non-aluminum metals (copper, brass, etc.), and bones

8.10 One sorting sample is selected from each collection vehicle load designated for sampling. All handling and manipulation of the discharged load and longitudinal and sorting samples shall be conducted on previously cleaned surfaces. If necessary, remove the sorting sample to a secured manual sorting area. The sorting sample may be placed on a clean table for sorting for the convenience of the sorting personnel. The sorting area shall be a previously cleaned, flat, level surface.

8.11 Position the storage containers around the sorting sample. Empty all containers from the sorting sample, such as capped jars, paper bags, and plastic bags of their contents. Segregate each waste item and place it in the appropriate storage container.

8.12 In the case of composite items found in the waste, separate the individual materials where practical, and place the individual materials into the appropriate storage containers. Where impractical, segregate the composite items for classification by the crew chief according to the following order:

8.12.1 If there are many identical composite items (for example, plastic-sheathed aluminium electrical conductor), place them into the waste component containers corresponding to the materials present in the item, and in the approximate proportions according to the estimated mass fraction of each material in the item.

8.12.2 If there are only a few of the identical composite item, place them in the storage container corresponding to the material that comprises, on a weight basis, the majority of the item (for example, place bi-metal beverage cans in the ferrous container).

Waste Composition Data Sheet

Day/Date: _____ Collection Company: _____

Site: _____ Vehicle Type: _____

Weather: _____ Route No: _____

Recorded by: _____

Component	Weight in Pounds			Percent of Total
	Gross	Tare		
Mixed Paper				
High Grade Paper				
Computer Printout				
Other Office Paper				
Newsprint				
Corrugated				
Plastic				
PET bottles				
HDPE bottles				
Film				
Other Plastic				
Food Waste				
Wood				
Other Organics				
Ferrous				
Cans				
Other Ferrous				
Aluminium				
Cans				
Foil				
Other Aluminium				
Glass				
Clear				
Brown				
Green				
Other Inorganic				

Totals _____

Notes: _____

_____

_____

Lab sample taken? Yes _____ No _____

FIG. 1 Waste Composition Data Sheet

8.12.3 If composite items represent substantial weight percents of the sorting sample, a separate category should be established, for example, composite roofing shingles.

8.12.4 If none of the above procedures is appropriate, place the item(s) (or proportion it (them)) in the storage container labelled“ other non-combustible” or “other combustible,” as appropriate.

8.13 Sorting continues until the maximum particle size of the remaining waste particles is approximately 0.5 in. (12.7 mm). At this point, apportion the remaining particles into the storage containers corresponding to the waste components represented in the remaining mixture. The apportionment shall be accomplished by making a visual estimate of the mass fraction of waste components represented in the remaining mixture.

8.14 Record the gross weights of the storage containers and of any waste items sorted but not stored in containers. The data sheet shown in Fig. 1 can be used to record both gross and tare weights.

8.16 After recording the gross weights, empty the storage containers and weigh them again, if appropriate. Reweighing is important and necessary if the containers become moisture laden, for example, from wet waste.

8.17 Clean the sorting site, as well as the load discharge area, of all waste materials.

9. CALCULATION

9.1 *Number of 200 to 300-lb (91 to 136-kg) Sample*s:

9.1.1 The number of sorting samples (that is, vehicle loads) *(n*) required to achieve a desired level of measurement precision is a function of the component(s) under consideration and the confidence level. The governing equation for *n* is as follows:

$$n = (t^* s/e\bar{x})^2 \qquad (1)$$

where:

t^* = student t statistic corresponding to the desired level of confidence,
s = estimated standard deviation,
e = desired level of precision, and
$\bar{x}$ = estimated mean.

9.1.1.1 All numerical values for the symbols are in decimal notation. For example, a precision value *(*e) of 20% is represented as 0.2.

9.1.1.2 One sorting sample is chosen per vehicle load.

9.1.1.2 Suggested values of s and of $\bar{x}$ for waste components are listed in Table 3. Values of t* are given in Table 4 for 90 and 95 % levels of confidence, respectively.

9.1.2 Estimate the number of samples (n8) for the selected conditions (that is, precision and level of confidence) and components using (Eq. 1). For the purposes of estimation, select from Table 4 the t* value for n = ` for the selected level of confidence. Since the required number of samples will vary among the components for a given set of conditions, a compromise will be required in terms of selecting a sample size, that is, the number of samples that will be sorted. The component that is chosen to govern the precision of the composition measurement (and therefore the number of samples required for sorting) is termed the "governing component" for the purposes of this method.

TABLE 3: Values of Mean ($\bar{x}$) and Standard Deviation(s) for Within-Week Sampling to Determine MSW Component Composition A

Component	Standard Deviation(s)	Mean (x)
Newsprint	0.07	0.10
Corrugated	0.06	0.14
Plastic	0.03	0.09
Yard waste	0.14	0.04
Food waste	0.03	0.10
Wood	0.06	0.06
Other organics	0.06	0.05
Ferrous	0.03	0.05
Aluminium	0.004	0.01
Glass	0.05	0.08
Other inorganic	0.03	0.06
		1.00

[A]The tabulated mean values and standard deviations are estimates based on field test data reported for MSW sampled during weekly sampling periods at several locations around the United States.

TABLE 4: Values of t Statistics (t*) as a Function of Number of Samples and Confidence Interval

Number of Samples, N	90 %	95 %
2	6.314	12.706
3	2.920	4.303
4	2.353	3.182
5	2.132	2.776
6	2.015	2.571
7	1.943	2.447
8	1.895	2.365
9	1.860	2.306
10	1.833	2.262
11	1.812	2.228
12	1.796	2.201
13	1.782	2.179
14	1.771	2.160
15	1.761	2.145
16	1.753	2.131
17	1.746	2.120
18	1.740	2.110
19	1.734	2.101
20	1.725	2.093
21	1.729	2.086
22	1.721	2.080
23	1.717	2.074
24	1.714	2.069
25	1.711	2.064
26	1.708	2.060
27	1.706	2.056
28	1.703	2.052
29	1.701	2.048
30	1.699	2.045
31	1.697	2.042
36	1.690	2.030
41	1.684	2.021
46	1.679	2.014
51	1.676	2.009
61	1.671	2.000
71	1.667	1.994
81	1.664	1.990
91	1.662	1.987

101	1.660	1.984
121	1.658	1.980
141	1.656	1.977
161	1.654	1.975
189	1.653	1.973
201	1.653	1.972
∞	1.645	1.960

9.1.3 After determining the governing component and its corresponding number of samples (n_o), return to Table 4 and select the student t statistic (t^*_o) corresponding to n_o. Recalculate the number of samples, that is, n^1, using t^*_o.

9.1.4 Compare n_o to the new estimate of n, that is, n^1, which was calculated for the governing component. If the values differ by more than 10 %, repeat the calculations given in 9.1.2 and 9.1.3.

9.1.5 If the values are within 10 %, select the larger value as the number of samples to be sorted. Refer to Appendix X1 for a sample calculation of n.

9.2 *Component Composition*:

9.2.1 The component composition of solid waste is reported on the basis of the mass fraction (expressed as a decimal) or percent of waste component i in the solid waste mixture. The reporting is on the basis of wet weight, that is, the weight of materials immediately after sorting.

9.2.2 The mass fraction of component i, mf_i, is defined and computed as follows:

$$mf_i = \frac{w_i}{\sum_{i=1}^{j} w_i} \quad (2)$$

where:
w_i = weight of component i and
j = number of waste components.
In those cases in which a containers is used to store and weigh the materials,

w_i = gross weight – tare weight of container (3)

9.2.3 The percent of component i, P_i, is defined and computed as follows:

$$P_i = mf_i \bar{x}\ 100 \quad (4)$$

9.2.4 For the data analysis to be correct, the denominator of (Eq 2) must be unity, and

$$\sum_{i=1}^{j} P_i = 100 \quad (5)$$

9.3 The mean component composition for the one-week period is calculated using the component composition results from each of the analysis samples. The mean mass fraction of component i, $\overline{mf_i}$, is calculated as follows:

$$\overline{mf_i} = \frac{1}{n} \sum_{k=1}^{n} (mf_i)_k \quad (6)$$

and the mean percent of component i, P_i, is calculated as follows:

$$\overline{P}_i = \frac{1}{n} \sum_{k=1}^{n} (P_i)_k \quad (7)$$

where:
n = number of samples.

10. PRECISION AND BIAS

10.1 A precision and bias statement cannot be made for this test method at this time. However, the committee is interested in conducting an inter-laboratory test program and encourages interested parties to contact ASTM Headquarters.2

11. KEYWORDS

11.1 composition; municipal solid waste; waste characterization

APPENDIX

(Non-mandatory Information)

X1. EXAMPLE CALCULATION OF THE NUMBER OF SAMPLES FOR ANALYSIS

X1.1 Example Assumptions:
X1.1.1 Corrugated is selected as the governing component.
X1.1.2 A 90 % confidence level is selected.
X1.1.3 A precision of 10 % is desired.
X1.1.4 Therefore:
$s = 0.06$ *(from Table 3),*
$\overline{x} = 0.14$ *(from Table 3),*
$e = 0.10$, *and*
$t^*(n = \infty) = 1.645$ *(from Table 4).*

Using (Eq 1):

$$n = \left[t^* s/(e\bar{x})\right]^2$$

$$= \left[\frac{1.645(0.06)}{0.1(0.14)}\right]^2$$

$$= 50$$

$$= n_o \quad (X1.1)$$

Referring again to Table 4, for n = 50,

$$t^*_{90}(n=50) = 1.677 \quad (X1.2)$$

and,

$$n = \left[\frac{1.677(0.06)}{0.1(0.14)}\right]^2$$

$$= 52$$

$$= n^1 \quad (X1.3)$$

Since 52 (that is, n^1) is within 10 % of 50 (that is, n_o), 52 samples should be selected for analysis.

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P: Guidelines for Occupational Exposure to Bloodborne Pathogens

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INTRODUCTION

Guidelines to for the management of Health Care Workers (HCW) after accidental exposures to blood or body fluids which may contain Hazardous Biological Agents e.g. HIV, Hepatitis B. This document is a response to recently enacted South African legislation:

Occupational Health and Safety Act No. 85 0f 1993 (OH&S Act)
The Compensation for Occupational Injury and Diseases Act no 61 of 1997 (COID)
The Draft Hazardous Biological Agents Regulations No.R.1248
The Employment Equity Act No. 55 of 1998
The Basic Conditions of Employment Act No 75 of 1997.

The document includes:

- Preventative and protective measures for exposures to potentially harmful blood and body fluids in the Health Care Setting.
- Measures to take after exposures have occurred.
- Measures to take in the event of an infection arising from an exposure.

The document only includes bloodborne pathogens and excludes other infectious agents transmitted by other routes.

DEFINITIONS

Blood borne pathogens - Any micro-organism, carried in the blood, which is capable of causing disease.

Body fluids, which should be handled with the same precautions as blood, include:

- cerebrospinal fluid,
- peritoneal fluid,
- pleural fluid,
- pericardial fluid,
- synovial fluid,
- amniotic fluid,
- semen,
- vaginal secretions and
- breast milk,
- Any other body fluid containing visible blood, including saliva in association with dentistry and any unfixed tissues and organs.

Exposure - an exposure that may place a HCW at risk is defined as:

- a percutaneous injury (e.g. a needle stick or cut with a sharp object),
- contact of mucous membrane or non intact skin(e.g. when exposed skin is chapped, abraded, or afflicted with dermatitis), or
- contact with intact skin, with blood, tissue, or other body fluids when the duration of contact is prolonged and involves an extensive area[, with blood, tissue, or other body fluids].

Hazardous Biological Agents - Any microorganism, cell culture or human endoparasite, which may cause any infection, allergy, toxicity or otherwise create a hazard to human health.

Health Care Workers (HCW) – All personnel (both professional and non professional) working in health care settings whose activities involve contact with patients or who handle blood products and body fluids.

Standard Precautions - are applied at all times to all patients irrespective of their diagnosis. All body fluid (except sweat) are regarded as potentially infectious (see discussion)

Sharps are needles, sharp edged instruments, broken glassware or any other item which may be contaminated in use by blood or body fluids and which may cause laceration or puncture wounds. Sharp tissues such as spicules of bone or teeth may also pose a risk of injury.[1]

3. SUMMARY OF RECOMMENDATIONS

a) **Preventative measures** (Precautions)
HCW's carrying out clinical procedures should at all times observe written policies produced by their employing authority, which in turn should observe the OH&S Act and it's accompanying regulations. The regulations require employers to carry out an assessment of the work to be done and of current procedures in order to be able to prevent or control exposures to substances hazardous to health.

(i) Protective clothing:

- Gloves should be worn when there is contact with blood or body fluids. This includes venupunctures and the insertion of Intravenous lines. Gloves cannot prevent percutaneous injury but they may reduce the risk of acquiring a blood borne pathogen. Although punctured gloves allow blood to contaminate the hand, the wiping effect can reduce the amount of blood to which the worker's hand is exposed and in turn the volume of inoculated in the even of percutaneous injury.[2]
  The employer should provide latex free gloves for those members of staff experiencing problems with latex sensitivity. Junior members of staff should be taught to do these procedures using gloves from the start of their training.
- Visors/eye protection – protect the mucous membranes of the eyes with protective eyewear eyewash should be available accidental exposure. Contact lenses must be removed prior to eye washing.
- Masks protect the mucous membranes of the mouth. The type of eye and mouth protection will be guided by the amount of splashes anticipated from a procedure.
- Gowns/ plastic aprons are worn when splashing is anticipated to protect clothing and skin.

(ii) Decontamination and disposal of clinical waste:

- All clinical waste should be safely disposed of in a manner that ensures that no persons are exposed to harmful substances such as blood or body fluids once the waste has been disposed of. In urban areas these services are usually contracted out to an accredited provider of services. The waste remains the responsibility of the generator of the waste and therefore the generator must ensure that waste is disposed of in accordance with the relevant legislation.

(iii) Safe Handling and disposal of Sharps:

- Place all disposable sharps in sharps containers immediately after use. The containers should be placed out of reach of children as near as practicable to sites of use and be puncture resistant. Sharps containers must never be overfilled and disposed of as clinical waste after closing securely and be replaced promptly.
- Disposable syringes and needles, should, where possible, be disposed of as a single unit into the appropriated sharps containers.
- If the needle needs to be disposed of separately e.g. transferring blood to a container, use the needle remover on the lid of the sharps container, or if this is not available, a pair of forceps.

[1] UK Health Departments: Guidance for clinical workers ; Protection against infection with Blood borne viruses - Recommendations of the expert advisory group on AIDS and the advisory Group on Hepatitis
[2] As 1.

- Avoid resheathing needles manually. If unavoidable use the single handed scoop method. When the needle tip is covered clip the sheath into position using the same hand.
- Intravascular guide wires and glass slides must be disposed of as sharps.
- During surgery use receivers to transfer sharp instruments between members of the operating team. Consideration should be given to wearing double gloves for prolonged procedures, as there is an increase on perforations, which may not be noticed, and latex gloves become porous over time due to the hydration of the latex. Double gloving does not "prevent" sharps injury, but has been shown to effect up to a six-fold decrease in inner glove puncture.
- HCW's should be encouraged to follow good practice methods. HCW's and their employers should keep themselves informed of safer methods of working. Employers should consider the benefits of introducing new safety devices such as needleless intravenous systems or safety syringes.

.

(iv) Other measures to prevent Blood borne Virus transmission:

- Hepatitis B vaccination - All Health Care Workers, who have direct contact with patient's blood and other potentially infectious body fluids or tissues should be immunised against Hepatitis B.
- Statistics on the number and possible causes of exposures must be collected and analysed to facilitate updating of policies to reduce the risk of future exposure. Policies must be regularly reviewed.

a) Measures to take after an exposure has occurred

(i) First Aid.

Immediately after any exposure, the site of exposure i.e. wound or non intact skin, should be liberally washed with soap and water. Free bleeding should be gently encouraged but the wound should not be sucked. Exposed mucous membranes including conjunctivae should be irrigated copiously with water, after first removing contact lenses.

(ii) Reporting.

HCW's who sustain an occupational exposure should report the exposure promptly and seek urgent advice on further management.

- Baseline testing. The Health Care worker should be tested for Hep BsAg, HCV and HIV to establish their status at the time incident or within a few days of the incident. Testing must always follow proper pre-test counselling.
- If possible a history of the source patient should be available, including risk factors and results of previous tests for HIV, HBV and HCV. Consent should be obtained from the source patient for these tests to be taken.

(iii) Baseline testing:

Baseline tests are taken on the HCW as soon after injury as possible. Full pre-test counselling must be given before drawing blood for HIV. Bloods taken include HIV, Hep BsAb, Hep C and syphilis. The HCW must be given an appointment to get the results from a named person so that there is follow-up.

(iv) Risk assessment.

The risk of Occupational transmission of HIV to HCW's after a percutaneous exposure to HIV infected blood is approximately 0.3% and after a mucous membrane exposure is 0.09%.
Although episodes of transmission after skin exposure have been documented the risk of transmission by this route has not been precisely quantified because no HCW's enrolled in prospective studies have sero-converted after an isolated skin exposure. The risk of transmission has been estimated to be less than the risk for mucous membrane exposure. The

risk for transmission after exposure to fluids or tissues other than HIV infected blood has also not been quantified.[3]
The risk of HIV transmission following human bites is not clear. Epidemiological studies of non sexual household contacts of HIV - infected patients, including several small series in which HIV transmission failed to occur after bites or after percutaneous inoculation or contamination of cuts and open wounds with saliva from HIV infected patients, suggests that the transmission for salivary transmission of HIV is remote[4]
The risk of transmission to a HCW has been shown to be around 1 in 3 when the source patient is infected with Hepatitis B Virus (HBV) and is "e" antigen positive[5]
The risk of infection with Hepatitis C (HCV) is estimated to be 1 in 30 when the patient is infected with HCV.

Other HBA's such as Malaria may be transmitted through exposure to Blood and it is important to establish the diagnosis of the source patient in order to take these risks into consideration.

(iv) Medical examination.

A baseline medical examination should be conducted and the exposure documented. The injury should be reported before the end of the shift in order to comply with the Occupational Health and Safety Act. Baseline tests should include HIV, Hepatitis BsAg, WR and HCV

(v) Post Exposure Prophylaxis (PEP).

1. HIV PEP is recommended for any high-risk exposure. See table.

PERCTANEOUS INJURY	RISK OF EXPOSURE	RECOMMENDATIONS FOR PEP
Superficial injury, solid needle	Some risk	Consider basic regimen
Skin puncture, visible blood on the needle, hollow needle	High risk	Recommend basic regimen
Needle used in vein or artery	Highest risk	Recommend basic regimen, Consider expanded regimen
Deep intra-muscular injury or injection into the body	Highest risk	Recommend basic regimen, Consider expanded regimen
MUCOSAL AND SKIN CONTACT	**RISK OF EXPOSURE**	**RECOMMENDATION FOR PEP**
Unbroken healthy skin	Low risk	Not recommended
Compromised skin, large volume and/or prolonged contact	Low risk	Consider basic regimen
Compromised skin, large volume and/or prolonged contact	Increased risk	Recommend basic regimen
HIV STATUS OF SOURCE	**RISK OF EXPOSURE**	**RECOMMENDATION FOR PEP**
Negative	Very low	Not recommended
Positive, Clinical AIDS and/or low	Low for small volumes of	Consider basic regimen

[3] MMWR May 15, 1998/ 47(RR-7);1-28
[4] Guidelines for Prevention of transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Health Care and Public Safety Workers. U.S. Department of Health and Human Services.
[5]

CD4 cell count and/or high viral load	blood or short duration or intact skin	
HIV Positive, Clinical AIDS and/or a low CD4 count and/or a high viral load	High risk for percutaneous injuries	Recommend basic or expanded regimen depending on the severity of the injury.
Unknown		Consider PEP on a case by case basis

Recommended PEP Drug Regimens

Drug	Dose	Frequency
Zidovudine(AZT) Lamivudine(3TC)	200mg 150mg	8 hourly 12hourly
For very high risk exposures add Indinivir	800mg	8 hourly

Hepatitis B

	Significant exposure			Non- significant exposure	
HBV status of person exposed	HbsAg Positive source	Unknown source	HbsAg Negative source	Continued risk	No further risk
≤ 1 dose HB vaccine pre exposure	Accelerated course of HB vaccine* HBIGx1	Accelerated course of HB vaccine HBIGx1	Initiate course of HB vaccine	Initiate course of HB vaccine	No HBV prophylaxis Reassure
? 2 doses HB vaccine pre-exposure (anti HBs not known)	One dose HB vaccine followed by 2nd dose one month later	One dose HB vaccine	Finnish course of HB vaccine	Finnish course of HB vaccine	No HBV prophylaxis Reassure
Known responder to HB vaccine (anti HBs ? 10 miU/ml)	Consider booster dose of HB vaccine	Consider booster dose of HB vaccine	Consider booster dose of HB vaccine	Consider booster dose of HB vaccine	No HBV prophylaxis Reassure
Known non responder to HB vaccine (anti HBs< 10miu/ml 2-4 months post vaccination	HBIG x 1Consider booster dose of HB vaccine	HBIG x 1Consider booster dose of HB vaccine	No HBIG Consider booster dose of HB vaccine	No HBIG Consider booster dose of HB vaccine	No HBV prophylaxis Reassure

Note: An accelerated course of Hepatitis B (HBV) vaccine consists of 3 doses spaced at 0,1 and 2 months. A booster dose may be given at 12 months to those at continuing risk of exposure to HBV[6]

Hepatitis C
There is no post- exposure prophylaxis at present for Hepatitis C.

(vii) Follow up testing.

- HIV test is repeated at 6 weeks 12 weeks and 6 months. In rare instances sero-conversion can take place over a period longer than 6 months.
- If serious side effects to HIV prophylaxis are noted the baseline tests will need to be repeated.

[6] Source PHLS Hepatitis Subcommittee. CDR Review 1992:2 R97-r101.

- If Hepatitis B Immunisation is undertaken Hepatitis BsAb should be done after the course has been completed to determine the immune status of the staff member.

(viii) Post injury education.

- A full investigation into the cause of the exposure should be undertaken as laid down in the occupational health and safety act.
- Education should be given to the staff involved in order to prevent further exposures.
- Adherence to standard precautions should limit the number of exposures in a Health Care Setting.

c) Management of sero-conversion.

(i) HIV.

- The HCW *must* be referred to a practitioner experienced in treating HIV positive patients.
- Occupationally acquired HIV from an injury in the workplace is a compensatable injury.
- It is the duty of the employer to provide for the necessary procedures and costs for the management of occupationally acquired HIV exposure in the pre sero-conversion phase. This may include the HIV tests, the medical consultations, other laboratory tests, post exposure prophylaxis, and counselling.
- The Compensation Commissioner (CC) will consider compensation only from the time of sero-conversion. (this may include the test which documented the sero-conversion)
- For compensation purposes the employee must prove a link between the injury on duty and the HIV infection. For this reason it is important to document the HIV status of the employee and the source patient. Knowledge of the source patient's status will strengthen the claim. To support an application for compensation for an occupationally acquired HIV infection the employee must demonstrate an HIV negative status at the time of the injury and the source patient should have a documented HIV positive test result.
- In the absence of the source patient's HIV status, the employer must be able to demonstrate that every effort was taken to assess the HIV status of the source patient and that this was refused by the source patient. Other relevant clinical information on the source patient must also be documented for the claim. A sero-conversion within 3 months is considered reasonable evidence that the sero-conversion was the result of the injury, provided all other necessary information is provided. If the source patient or the employee is considered to be in the window period then PCR testing should be considered.
- Each claim will be assessed on it's merits. Employees and employers must ensure that documentation of occupational exposures are kept on record and that claims are submitted within 11 months from the time of the injury. The CC will provide compensation for reasonable care at reasonable cost for a successful claimant, and any claims for disability will be assessed in the usual manner.
- The CC will not provide compensation for treatment to reduce mother to child transmission in cases of occupationally acquired HIV infection in the mother.

(ii) Hepatitis B & C

Exposures and resultant sero-conversions must be documented in the same way as HIV sero-conversion.

(iii) Other.

Other pathogens may be spread through occupational exposures to blood or body fluids. These include:

- Malaria and
- Viral Haemorrhagic Fevers.

It is important to have information on the possible source patient. For Malaria the HCW should be educated on the signs and symptoms of Malaria and encouraged to report any flu- like symptoms promptly so that these may be investigated. Any contact with a patient with Viral Haemorrhagic Fever will be followed up closely with BD temperatures being taken and recorded.

4. Discussion.

Standard Precautions - are applied at all times to all patients irrespective of their diagnosis. All body fluid (except sweat) are regarded as potentially infectious.

- Wash hands before and after contact with each patient, and before putting on and after removing gloves;
- Change gloves between patients;
- Cover existing wounds, skin lesions and breaks in exposed skin with waterproof dressings. Wear gloves if hands are extensively affected;
- Wear gloves where contact with blood can be anticipated; Wear gloves when cleaning equipment prior to sterilisation or disinfection, and when cleaning up spillages
- Avoid sharps usage wherever possible, and where sharps usage is essential, exercise particular care in handling and disposal;
- Avoid wearing open footwear in situations where blood may be spilt, or where sharp instruments or needles are handled;
- Clear up spillage of blood promptly and disinfect surfaces;
- Follow safe procedures for disposal of contaminated waste. All waste contaminated with blood or body fluids are considered contaminated. The same protective clothing used for contact with fluids is used.

Post Exposure Prophylaxis (PEP)

Zidovudine AZT, Retonivir in combination with Lamivudine (3TC) is recommended for high-risk exposures.
Single therapy with ZVD may be effective and is preferable to no therapy but is likely to be less effective than therapy with more than one drug. Single ZVD therapy is not recommended by any recognised international authority.
Indinavir can be added for very high-risk exposures. Very high-risk exposures include 1) Large volume of blood; 2) deep injury and 3) if the patient has been on ZVD for more than 6 months.

PEP should be initiated promptly, preferably within 1 -2 hours after the exposure. The interval after which there is no benefit from using PEP is not yet defined, however most experts recommend PEP within 24 hours after exposure. Some experts may still consider PEP 7-14 days after exposure in cases where there is highest risk exposure. To avoid delays in starting PEP, starter packs of recommended drugs should be available in all health care settings.
PEP should be continued for 4 weeks. PEP should be discontinued if there are serious toxicities and should be continued even in the presence of mild side effects.

PEP is recommended if:

1) The source patient is HIV positive,
2) the rapid HIV test is positive ; or,
3) or if there is a high index of suspicion that the source patient is HIV positive.

Supportive counselling should be available to the HCW.
The HCW should consider using a barrier method for safer sex and pregnancy should be avoided until sero-conversion is excluded. Pregnancy in HCW's should not preclude the use of PEP.

Toxicity of Antiretroviral drugs The toxicity of antiretroviral drugs (other than ZVD) in persons not infected with HIV has not been well documented.
In HIV positive persons the following side effects of ante retroviral drugs have been noted:

- ZVD: Headache, gastro-intestinal symptoms (nausea, vomiting, diarrhoea, indigestion). More serious side effects such as marrow suppression with resultant anaemia or pancytopaenia are extremely rare in a healthy individual.
- Lamivudine: Gastro-intestinal symptoms and rarely pancreatitis
- Indinavir: Gastro-intestinal symptoms and rarely may cause renal stones.

Monitoring for side effects:

- If PEP is initiated, the HCW should be monitored for toxic drug side effects by a clinician that ideally has experience in HIV care.
- Baseline studies should include an FBC, Platelets, Renal and Hepatic function tests, urea, electrolytes, creatinine and liver function tests.
- These studies should be repeated if there are any side effects.
- Muscle enzymes and a serum amylase should also be considered.
- If toxicity is noted, dose reduction or drug substitution with other appropriate agents should be considered.
- Mild side effects such as headache, and nausea, are often experienced in the first few days after commencing PEP. Serious side effects usually occur after prolonged use and rarely occur within the first 4 weeks of therapy.[7]

5. Acknowledgements.

CDC Guidelines
Guidance for Clinical Health Care Workers Protection against infection with blood borne viruses – UK Health Departments

6. References

a. MMWR May 15 1998/47 Public Health Service Guidelines for the management of Health Care Worker Exposures to HIV and Recommendations for Post Exposure Prophylaxis.
b. Guidelines for Prevention of Transmission of Human Immuno deficiecy Virus and Hepatitis B Virus to Health Care and Public Safety workers U.S. Department of Health and Human Services.
c. UK Health Departments: Guidelines for Clinical Workers: Protection against infection with Blood borne viruses - Recommendations of the expert advisory group on AIDS and the advisory group on Hepatitis
d. Management of occupational exposure to HIV: HIV/AIDS Policy guideline: Department of Health

[7] HIV AIDS Policy Guideline – Dept Health

Q: Total Health Care Waste Generation During Selected Periods

Note: *The mass of the containers is to be recorded separately. Although disposable containers forms part of the HCRW stream to be treated, it may impact on strategies aimed at reducing the HCRW stream. Should reusable containers for instance be used for infectious waste, the container mass will no longer be considered to be part of the HCRW stream to be treated.*

Waste sorted from receptacles for general infectious waste (50 litre and 142 litre boxes or 240 litre wheelie bins)

Sorting procedures:

- **All waste will be sorted and each category will be weighed;**
- **Supermix and fines will be recorded as infectious waste;**
- **Liquids will be recorded with the mass of the container included.**
- **PVC contents to be separated and recorded by mass (if possible) after various categories are all weighed;**
- **With 50 litre and 142 litre boxes or 240 litre wheelie bins, sealed sharps containers and "specicans"/containers for pathological/anatomical waste are to be removed from the larger containers for separate analysis in the particular categories.**

Waste Category - Segregated as:	Examples (Important during training)	Recording Unit & Accuracy	No. and volume of units sampled	Note
Infectious waste	Bandages, gloves, drip bags, urine bags, containers with blood products, used vacutainers, non-glass test tubes, petri dishes etc.	Mass (kg) 3rd decimal.		
Pathological waste	Body Tissue including its packaging	Mass (kg) 3rd decimal.		Excluding blood, hair, and teeth. Weight including containers
Sharps	Needles + Syringes, Scalpels, Broken or unbroken glass (test tubes, petri dishes, vials, ampoules) etc.	Mass (kg) 3rd decimal.		Weight including sharps containers
Chemical waste	Pharmaceutical Waste, Chemical waste, e.g. from Labs. Thermometers, batteries and other heavy metal containing waste	Mass (kg) 3rd decimal.		Solid or Liquid + container.
HCGW	Packaging materials, flowers, and magazines, including packaging material from disposable syringes, drips etc.	Mass (kg) 3rd decimal.		
Food waste	Any putrecible materials of food origin	Mass (kg) 3rd decimal.		
Radioactive Waste		No mass recording, but only reporting of presence.	No. of occurrences	Removal from stream by specialist once reported.
Total mass of container contents		Mass (kg) 3rd decimal.		

Waste sorted from sharps containers (e.g. 5 litre, 10 litre and 20 litre)				
Sorting procedures: • **Non-sharps are to be removed from stream and weighed;** • **Supermix and fines will be recorded as infectious waste;** • **The balance of the stream is then recorded as sharps;** • **PVC contents are expected to be relatively small and can be neglected.**				
Waste Category - Segregated as:	**Examples (Important during training)**	**Recording Unit & Accuracy**	**No. and volume of samples processed**	**Note**
Sharps	Needles + Syringes, Scalpels, Broken or unbroken glass.	Mass (kg) 3rd decimal.		The balance of the sample once the non-sharps were removed.
Infectious waste	Bandages, gloves, drip bags, urine bags.	Mass (kg) 3rd decimal.		
Chemical waste	Pharmaceutical Waste, Chemical waste, e.g. from Labs. Thermometers, batteries and other heavy metal containing waste	Mass (kg) 3rd decimal.		Solid or Liquid + container.
HCGW	Packaging materials, flowers, and magazines, including packaging material from disposable syringes, drips etc.	Mass (kg) 3rd decimal.		
Pathological waste	Body Tissue	Mass (kg) 3rd decimal.		Unlikely to be present.
Radioactive Waste		No mass recording, but only reporting of presence.		Unlikely to be present.
Total mass of container contents		Mass (kg) 3rd decimal.		

Waste sorted from specican containers (buckets 5 litre, 10 litre and 20 litre)				
Sorting procedures: • **Container is to be visually inspected to determine whether contents are liquid;** • **If contents are liquid, container must remain closed and an attempt made to determine type of liquid based on viscosity;** • **For solids, container to be opened briefly to do overall classification.** • **PVC contents are expected to be relatively small and can be neglected.**				
Waste Category - Segregated as:	**Examples (Important during training)**	**Recording Unit & Accuracy**	**No. and volume of samples processed**	**Note**
Pathological waste	Body Tissue	Mass (kg) 3rd decimal.		Total contents less typical container mass.
Stool specimens	Stools	Mass (kg) 3rd decimal.		Total contents less typical container mass.
Liquids	Blood, urine	Mass (kg) 3rd decimal.		Total contents less typical container mass.
Infectious waste	Bandages, gloves, drip bags, urine bags.	No mass recording - only report presence if observed.		

Waste sorted from specican containers (buckets 5 litre, 10 litre and 20 litre)				
Sorting procedures: • **Container is to be visually inspected to determine whether contents are liquid;** • **If contents are liquid, container must remain closed and an attempt made to determine type of liquid based on viscosity;** • **For solids, container to be opened briefly to do overall classification.** • **PVC contents are expected to be relatively small and can be neglected.**				
Waste Category - Segregated as:	**Examples (Important during training)**	**Recording Unit & Accuracy**	**No. and volume of samples processed**	**Note**
Chemical waste	Expired Pharmaceutical Waste, Chemical waste from Labs.	No mass recording - only report presence if observed.		
HCGW	Packaging materials, flowers, and magazines.	No mass recording - only report presence if observed.		
Radioactive Waste		No mass recording - only report presence if observed.		Unlikely to be present.
Total mass of container contents		Mass (kg) 3rd decimal.		

General Waste sorted (e.g. from plastic bags or 240 wheelie bins, but excluding separately sorted food stuff)			
Sorting procedures: • **All waste will be sorted and each category will be weighed;** • **Supermix and fines will be recorded as such;** • **Liquids will be recorded with the mass of the container included.** • **PVC contents do not need to be separated and recorded as the waste is not to be incinerated.**			
Waste Category - Segregated as:	**Examples (Important during training)**	**Recording Unit & Accuracy**	**Note**
HCGW	Packaging materials, flowers, magazines, food waste, etc. as well as uncontaminated bandages, plaster of Paris, packaging for disposable syringes etc. etc..	Mass (kg) 3rd decimal.	
Infectious waste	Bandages, gloves, drip bags, urine bags.	Mass (kg) 3rd decimal + number of items.	
Pathological waste	Body Tissue	Mass (kg) 3rd decimal + number of items.	
Sharps	Needles + Syringes, Scalpels, Broken glass.	Mass (kg) 3rd decimal + number of items.	
Chemical waste	Expired Pharmaceutical Waste, Chemical waste from Labs.	Mass (kg) 3rd decimal + number of items.	Solid or Liquid + container.
Radioactive Waste		No mass recording, but only reporting of presence.	Removal from stream by specialist once reported.
Total mass of container contents		Mass (kg) 3rd decimal.	

Food Waste Sorted (if applicable)			
Sorting procedures: • **No sorting at all. Only weighing of daily quantity generated.**			
Waste Category - Segregated as:	**Examples (Important during training)**	**Recording Unit & Accuracy**	**Note**
Food waste.	Anything in pigswill containers (no sorting)	Mass (kg) 3rd decimal. Note occurrences of clearly and visible mis-segregated items.	Weighing only, no sorting, note occurrences of mis-segregation.
Total mass of container contents		Mass (kg) 3rd decimal.	

It should be noted that at Leratong Hospital the Blood Bank and the Lab is outsourced activities being served by other waste contractors. The quantities must be weighed and recorded.

R: Sample Size Determination and Sample Design for Health Care Waste Study

SAMPLE SIZE DETERMINATION AND SAMPLE DESIGN FOR HEALTH CARE WASTE STUDY

Draft Proposal
Prepared by DMSA
March 2002

Preamble

This document proposes a sampling procedure and corresponding sample sizes for conducting a study of the compositions of the different components of the Health Care Waste (HCW) generated at the two pilot institutions: Itereleng Clinic and Leratong Hospital. The study is aimed at estimating the proportions and mean compositions by weight of the various components of HCW over a period of two weeks. The HCW consists of the following two major components:

1. **Health Care General Waste (HCGW)** – the non-hazardous component of HCW generated at health care institutions. HCGW includes substances such as: packing material, kitchen waste, patient care waste unrelated to medical care, etc.

2. **Health Care Risk Waste (HCRW)** which is the hazardous component of the HCW. This component has the potential for environmental, health and safety risk. It includes sub-components such as infectious waste, sharps, pathology laboratory waste, etc.

The main concern of the study is to estimate the amount (as a proportion and as an average weight) of waste material that is misclassified in the waste containers of these institutions; namely, risk waste that ends up in general waste containers and general waste that ends up in risk waste containers. The former constitutes an environmental, health and safety risk, whereas the latter results in a waste of money because of the very much higher cost of processing HCRW.

The ultimate purpose of the study is to estimate the effect of an intervention programme that is being planned to improve the processing of waste at hospitals and clinics. The sampling study will therefore be conducted both before and after the intervention programme. Comparison of the results of these two studies should provide a concrete estimate of the improvement in the management of HCW that will.hopefully result from the intervention programme.

The third part of the study is a corresponding sampling exercise on the input material at an HCRW treatment facility.

PROPOSED SAMPLING DESIGN

In what follows we outline the sample design for the HCW pilot study to be conducted at the three facilities: Itereleng Clinic, Leratong Hospital and the Treatment Facility. The sample designs and the procedure described in this document should be applied to both pre and post intervention studies.

a) Itereleng Clinic

Due to the relatively small amount of waste generated by the clinic, all the waste generated by it should be taken on a daily basis for the 2 weeks (10 days). All waste containers should be removed every day and analysed both in terms of what they contain and their corresponding weights. The waste in containers of various types and sizes should be manually sorted into their individual components (Medical waste, sharps, general waste etc.) and each weighed.

b) Leratong Hospital

Leratong hospital is a fairly large hospital that generates a large amount of HCW daily. It is therefore not practical to examine all the waste containers every day. Instead, samples of all the different types of health care risk waste containers, as well as of the general waste containers (black bags) should be taken from the storage facility where they are picked up by the waste removal company.

Sorting Samples

The following table gives the proposed sample sizes for the different containers.

Container	Daily Sample	Total Sample (e.g. 10 days)
5 L Sharps	10	100
10 L Sharps:	10	100
25 L Sharps	10	100
10 L Specican	10	100
50 L Cardboard box	10	100
140 L Cardboard box	10	100
General waste bags	10	100

That is, a sample of 10 containers of each type should be taken every weekday for 2 weeks (10 days). If less than 10 containers of any type is available, then take all of them. The sampling must be performed each day shortly before the waste removal company arrives, when the total number of waste containers generated on that day is available. As well as drawing the sample, the total number of containers in each type/size category in the storage facility should be recorded.

It may be too much work to sample each of the different sizes of containers of the same type. In that case it is suggested that a combined sample of 10 should be taken from the different sizes, in proportion to their relative numbers at the waste storage facility.

Separate samples of the same size, if possible, should be taken from waste containers generated by the **Blood Bank** and the **Pathology Laboratory.**

Roughly speaking, a total sample size of 100 containers will yield a ten-fold precision over that of a single container. In order to yield a twenty-fold precision, a further 300 containers would be required.

SAMPLING, SORTING AND WEIGHING

a) To ensure a representative selection, samples should be taken randomly from all the containers of the same type/size category in the storage facility. If necessary, the containers could all be numbered and a random sample of 10 of these numbers selected (A small program could be provided to generate random numbers for any number of containers).

b) For each sampled container:
   - record the gross weight of it contents by subtracting its full weight from its empty weight;
   - then separate the contents into its various components and weigh each component.

c) Treatment Facility
   The sampling, sorting and weighing procedure at the treatment facility should be the same as for Leratong Hospital. That is, 10 containers of each type sampled randomly from all sides of the stock.

DATA RECORDING SHEET

It is assumed that the various components of the medical waste composition will broadly be classified into **Health Care General Waste (HCGW**) and **Health Care Risk Waste (HCRW)** and the latter into **Sharps** and **Other.** A suggested layout for recording the data is given below. Separate, pre-printed sheets should be available for each type/size of container.

Facility (Itireleng, Leratong or Treatment Facility)				
Container Type (5 L Sharps, 10 L sharps, ….., General waste bags)				
Date:	**Waste Components Mass (Kg)**			
Total Number of Containers:	**Total Mass**	**HCGW**	**HCRW**	
Sample Number			**Sharps**	**Other**
1				
2				

3				
4				
5				
6				
7				
8				
9				
10				