

PROJECT NUMBER: S 2171

## Microbiological survey of Reusable Bins used for Health Care Risk Waste

- Roodepoort Incinerator
- Leratong Hospital

### Prepared for:

Mr Neil Brink  
Enviroserv Holdings Limited  
Brickfield Road  
Rietfontein

Mr Torben Kristiansen  
Rambøll  
P.O. Box 10610  
Fourways East  
2055

### STATEMENT

This survey was conducted on behalf of Margot Saner & Associates (Pty) Ltd (MS&A) - a Department of Labour Approved Inspection Authority - Certificate No CI036OH.

Although every endeavour has been made to ensure the correctness and accuracy of the results and recommendations in this survey, neither MS&A nor its officials will be responsible in any way for any incorrectness or inaccuracy of results or the interpretation thereof.

This report, if published or reproduced by the client, must be in full, unless prior approval for the publication or reproduction in the abridged form is granted by Margot Saner & Associates (Pty) Ltd.

**Signed:** ..... **Date:** .....

**M.D.V. Saner**  
**(Managing Director – Reg. OH)**

## CONTENTS

	Page No
1. PURPOSE	3
2. PREMISES	3
3. INTRODUCTION	3
4. STATUTORY REQUIREMENTS	4
5. METHODS	5
6. RESULTS	8
7. EVALUATION OF RESULTS	12
8. CONCLUSION	14
9. REFERENCES	19

- Graph 1 - Microbial Growth Roodepoort Incinerator using Sterigent (S) or Sodium Hypochlorite (SH)
- Graph 2 - Microbial Growth - arrival at Leratong Hospital using Sterigent (S) or Sodium Hypochlorite (SH)
- Graph 3 - Roodepoort Inc (RI) and Leratong (L) using Sterigent
- Graph 4 - Roodepoort Inc (RI) and Leratong (L) using Sodium Hypochlorite

## 1. PURPOSE

The purpose of these surveys was to determine the extent of pathogenic microorganism contamination of medical waste bins at the Roodepoort Medical Waste Incinerator Facility and at the Leratong Hospital. This was done in order to assess the risk to employee and patient health posed by such contamination and to determine which cleaning agent presented the most effective degree of disinfection

## 2. PREMISES

The surveys were conducted at the Sanumed Medical Waste Incinerator, off Main Reef Road, Roodepoort, and Leratong Hospital, Krugersdorp, on 24 March, 31 March, 7 April and 15 April 2003.

## 3. INTRODUCTION

Margot Saner & Associates (Pty) Ltd was requested to conduct appropriate sampling of pathogenic micro-organism of washed medical waste bins at the Roodepoort medical waste incinerator. Additional sampling on these same bins was then to be conducted following their arrival at the Leratong Hospital to ascertain if contamination of the bins occurred during transport in the Health Care Risk Waste Trucks.

The health care waste pilot project at Leratong Hospital consists of two parallel containerisation systems, each introduced in on half of the hospital. System A is based on a 770 litre *wheelie bin* manufactured by Omnium Plastic containing several thick red sealed plastic bags containing health care risk waste. System B is based on two sizes of stackable and reusable boxes (*stackable bins*) of 50 and 100 litres each containing one large red thick plastic bag of health care risk waste. Whereas the stackable boxes are placed in the wards over a period of time while being filled the wheelie bin is used for collection of large red bags from metal stands. Hence, the wheelie bin is used once during a collection round only and the stackable boxes are exposed to several consecutive handlings over a period of

some days.

A total of 20 wheelie bins and 395 stackable boxes (160 × 100 litre & 235 × 50 litre) are in circulation for the pilot projects.

For both systems the reusable health care risk bins are emptied into the incinerator followed by cleaning, disinfection, drying and placement in a clean store before dispatching to the health facility. The 50 and 100 litre stackable boxes are collected and transferred in galvanised steel cage trolleys with a capacity of any combination of 8 large bins or 16 small bins.

After the contents of the medical waste bins (high density polypropylene) have been emptied into the incinerator units on the Roodepoort site, the bins are currently washed out using “Sterigent” - a commercially available disinfectant soap solution. During the washing operations, the bins are loaded onto a metal frame before an employee uses a high pressure washing system to spray them down. Following this washing procedure, a portable petrol-driven blower is used to blow-dry the bins before they are taken to the storage area. From the storage area the bins are transported to Leratong Hospital.

For the purposes of this survey it was decided to sample the bins for both bacterial and fungal pathogens, as these are the biological agents most likely to cause illness, particularly in hospitals where patient's immune systems may be compromised.

The bin-washing operator was observed to wear the following personal protective equipment during the survey period, which is adequate for the protection of the employees against any chemical, physical or biological hazard that may exist:

- \* Lint free overall
- \* Face-shield (only during blow-drying operations)
- \* Rubber gloves
- \* Rubber boots
- \* Type FFP2 respirator

#### **4. STATUTORY REQUIREMENTS**

The Occupational Health and Safety Act 85, 1993, Hazardous Biological Agents Regulation

The Health Act 63, 1977

## 5. METHODS

For the purposes of this investigation, sampling was spread across four weeks - i.e. sampling was performed on the following days:

- **21 February 2003 – Please find attached separate report – 3 swabs were taken at this initial assessment. It is not included in this report, but was included as an annexure as sampling techniques used were not exactly the same.**

\* **24 March 2003**

\* **31 March 2003**

\* **7 April 2003**

\***15 April 2003**

Twelve (12) swab samples were obtained during each of these survey periods:

- Five (5) or six (6) from medical waste bins stored on the Roodepoort incinerator premises, and
- Five (5) or six (6) from the *same* medical waste bins just after their delivery to Leratong Hospital

2 samples were taken each week of two stackable bins with particular care being taken to swab crevasses and corners near the lid, at both locations, viz. Roodepoort Incinerator and on arrival at Leratong Hospital, i.e. the areas of the bin, that hospital staff would be most likely to contact.

1 or 2 samples were taken each week of two wheelie bins with particular care being taken to swab crevasses and corners near the lid, at both locations, viz. Roodepoort Incinerator and on arrival Leratong Hospital, i.e. the area of the bin, that hospital staff would be most likely to contact.

As requested, attention was given to the wheelie bin **wheels**. **Two ( 2 )** swabs were taken of the wheels of the wheelie bins at each location, viz. Roodepoort Incinerator and on arrival Leratong Hospital.

Thus in a total of 16 swabs were taken from the stackable bins, 14 from the

wheelie bins and 17 from the wheels of the wheelie bins. A total of 47 swabs were taken, inclusive of the three swabs taken during the initial assessment. 20 wheelie bins and 365 stackable bins were in circulation at the time of the survey. At each of the 4 sampling periods, there were a maximum of 10 stackable bins

and a maximum of 5 wheelie bins available for sampling per sampling period. Averaged over the 4 swab sampling periods there were 18 wheelie bins and 22 stackable bins available for sampling.

If you are collecting data on a population, in this case bins, you might want to minimize the impact that the survey will have on the group that you are surveying. It is often not necessary to survey the entire population. Instead, you can select a random sample of bins from the population and assess just them. You can then draw conclusions about how the entire population based on the swab sampling from a randomly selected group bins.

**Error in this study - 10 %** The confidence that the results have an error of no more than 10%.

**Confidence in this study –90 %** The confidence that is assumed concerning the error level. Expressed as a percentage, it is the same as saying that if the survey was conducted multiple times, how often would one expect to get similar results.

Therefore:

22 stackable bins in total over 4 weeks – 16 samples were taken –

Confidence - 90 %, confidence that if the survey was conducted again there would be a 10 % error.

18 wheelie bins in total over 4 weeks - 14 samples were taken –

Confidence – 90 %, confidence that if the survey was conducted again there would be a 10 % error.

18 wheels of wheelie bins in total over 4 weeks - 17 samples were taken –

Confidence – 99 % confidence that if the survey was conducted again there would be a 10 % error.

More samples of the wheels of the wheelie bins were taken, as the hospital staff expressed concern about contamination carried on the wheels of the wheelie bins. They considered the wheels of the wheelie bin, the area on the bin that would most likely to become contaminated.

In each case, surface sampling was carried out using moistened sterile cotton swabs, one of which was drawn across the surfaces, 25 cm<sup>2</sup> in area and 10 strokes in one direction and 10 strokes in the other direction on each bin (Neely, A. N. et al. 2003), before being returned to a sterile plastic tube containing transport media. When the sampling was completed, the swabs were promptly transported to Lancet Laboratory at the Mayo Clinic, Florida, from where they were sent to the central Lancet

Laboratory in Johannesburg for analysis according to Test method 5447/E148A - testing of swab samples.

- No growth or not detected indicates that there 0 microbial units on the culture media.
- Scanty Growth indicates that there was growth, but only in the primary streak.
- Moderate Growth indicates that there was growth, but only in the primary and secondary streak.
- Profuse Growth indicates that there was growth in all areas of the culture media.

Neely, A. N. et al. (2003), considered bacteria and fungal culture in their study. The same was done in this assessment and therefore all bacterial and fungal growth possibilities were considered.

## 6. RESULTS

### 6.1 Sampling date: 24 March 2003

Sample Number	Sampling source	E.coli	Bacillus species	Staphylococcus species	Pseudomonas species	Fungal culture
WB-16-01B	Roodepoort - wheelie bin No WB16	ND	ND	ND	ND	Not detected
WB-20-02B	Roodepoort - wheelie bin No WB20	ND	<i>Scanty growth</i>	ND	ND	Not detected
WB-19-03B	Roodepoort - wheelie bin No WB19- wheels	ND	<i>Profuse growth</i>	ND	ND	Not detected
WB-19-04B	Roodepoort - wheelie bin No WB19 - wheels	ND	<i>Scanty growth</i>	ND	ND	Not detected
SO-11-05B	Roodepoort - stackable bin No S011	ND	ND	ND	ND	Not detected
SO-31-06B	Roodepoort - stackable bin No S031	ND	<i>Profuse growth</i>	ND	ND	Not detected
WB-16-01F	Leratong - wheelie bin No WB16	ND	ND	ND	ND	Not detected
WB-20-02F	Leratong - wheelie bin No WB20	ND	<i>Profuse growth</i>	ND	ND	Not detected
WB-19-03F	Leratong - wheelie bin No WB19 - wheels	ND	<i>Profuse growth</i>	ND	ND	Not detected
WB-19-04F	Leratong - wheelie bin No WB19 - wheels	ND	<i>Scanty growth</i>	ND	ND	Not detected
SO-11-05F	Leratong - stackable bin No S011	ND	<i>Scanty growth</i>	ND	ND	Not detected
SO-31-06F	Leratong - stackable bin No S031	ND	<i>Profuse growth</i>	ND	ND	Not detected



6.2 Sampling date: 31 March 2003

Sample Number	Sampling source	E.coli	Bacillus species	Staphylococcus species	Pseudomonas species	Fungal culture
S188-13B	Roodepoort - stackable bin No S188	ND	ND	<i>scanty growth</i>	ND	Not detected
S179-14B	Roodepoort - stackable bin No S179	ND	ND	ND	ND	Not detected
WB-11-15B	Roodepoort - wheelie bin No WB11	ND	<i>moderate growth</i>	ND	ND	Not detected
WB-10-16B	Roodepoort - wheelie bin No WB10 - wheels	ND	<i>moderate growth</i>	ND	ND	Not detected
WB-10-17B	Roodepoort - wheelie bin No WB10 - wheels	ND	<i>scanty growth</i>	ND	ND	Not detected
S188-13F	Leratong - stackable bin No S188	ND	<i>profuse growth</i>	ND	ND	Not detected
S179-14F	Leratong - stackable bin No S179	ND	<i>profuse growth</i>	ND	ND	Not detected
WB-11-15F	Leratong - wheelie bin No WB11	ND	<i>moderate growth</i>	ND	ND	Not detected
WB-10-16F	Leratong - wheelie bin No WB10 - wheels	ND	<i>profuse growth</i>	ND	ND	Not detected
WB-10-17F	Leratong - wheelie bin No WB10 - wheels	ND	<i>scanty growth</i>	ND	ND	Not detected

ND=notdetected

6.3 Sampling date: 7 April 2003

Sample Number	Sampling source	E.coli	Bacillus species	Staphylococcus species	Pseudomonas species	Fungal culture
WB-06-17B	Roodepoort - wheelie bin No WB06	ND	<i>scanty growth</i>	ND	ND	Not detected
WB-05-18B	Roodepoort - wheelie bin No WB05 - wheels	ND	<i>scanty growth</i>	ND	ND	Not detected
WB-05-19B	Roodepoort - wheelie bin No WB05 – wheels	ND	<i>scanty growth</i>	ND	ND	Not detected
L008-20B	Roodepoort - stackable bin No L008	ND	ND	ND	ND	Not detected
L120-21B	Roodepoort - stackable bin No L120	ND	<i>scanty growth</i>	ND	ND	Not detected
WB-06-17F	Leratong - wheelie bin No WB06	ND	<i>scanty growth</i>	ND	ND	Not detected
WB-05-18F	Leratong - wheelie bin No WB05 - wheels	ND	<i>scanty growth</i>	ND	ND	Not detected
WB-05-19F	Leratong - wheelie bin No WB05 - wheels	ND	<i>scanty growth</i>	ND	ND	Not detected
L008-20F	Leratong stackable bin No L008	ND	ND	ND	ND	Not detected
L120-21F	Leratong stackable bin No L120	ND	<i>scanty growth</i>	ND	ND	Not detected

ND = not detected

6.4 Sampling date: 15 April 2003

Sample Number	Sampling source	E.coli	Bacillus species	Staphylococcus species	Pseudomonas species	Fungal culture
WB-19-22B	Roodepoort - wheelie bin No WB19	ND	ND	ND	ND	Not detected
WB-19-23B	Roodepoort - wheelie bin No WB19 - wheels	ND	ND	ND	ND	Not detected
WB-05-24B	Roodepoort - wheelie bin No WB05 - wheels	ND	ND	ND	ND	Not detected
S042-25B	Roodepoort - stackable bin No S042	ND	ND	ND	ND	Not detected
S133-26B	Roodepoort - stackable bin No S133	ND	ND	ND	ND	Not detected
WB18-27B	Roodepoort - wheelie bin No WB17	ND	ND	ND	ND	Not detected
WB-19-22F	Leratong - wheelie bin No WB19	ND	<i>scanty growth</i>	ND	ND	Not detected
WB-19-23F	Leratong - wheelie bin No WB19 - wheels	ND	ND	ND	ND	Not detected
WB-05-24F	Leratong - wheelie bin No WB05 - wheels	ND	<i>scanty growth</i>	ND	ND	Not detected
S042-25F	Leratong - stackable bin No S042	ND	ND	ND	ND	Not detected
S133-26F	Leratong - stackable bin No S133	ND	<i>scanty growth</i>	ND	ND	Not detected
WB18-27B	Leratong - wheelie bin No WB17	ND	ND	ND	ND	Not detected

## 7. EVALUATION OF RESULTS

### 7.1 Sampling Date: 24 March 2003

\* **Micro and culture:** Samples obtained from Roodepoort wheelie bin Nos WB19 and WB20 yielded scanty to profuse growth of Bacillus species and Coliform (Ecoli) bacillus. The sample obtained from Roodepoort stackable bin No S-031 yielded profuse growth of Bacillus species and Coliform bacillus.

\* **Fungal culture:** No fungal growth was detected on any of the samples obtained from bins at Roodepoort Incinerator or on arrival at Leratong.

\* The bins were all last cleaned on the 21 March 2003 - i.e. had spent the weekend in storage area on the Roodepoort incinerator premises.

\* The cleaning agent used during last cleaning regimen was: "Sterigent". Unfortunately we have not been able to get a Material Safety Data Sheet for the Sterigent and we await further correspondence from the supplier.

### 7.2 Sampling Date: 31 March 2003

\* **Micro and culture:** Samples obtained from Roodepoort wheelie bin No? s WB10 and WB11 yielded scanty to moderate growth of Bacillus species. The sample obtained from Roodepoort stackable bin No S188 yielded scanty growth of coagulase negative Staphylococcus. The samples obtained from the wheelie / stackable bins upon arrival at the Leratong Hospital *all yielded* scanty to profuse growth of Bacillus species. This indicates that additional contamination of the bins occurred during transport and that vehicle and personnel hygiene must be addressed.

\* **Fungal culture:** No fungal growth was detected on any of the samples obtained from bins at Roodepoort Incinerator or on arrival at Leratong.

\* The cleaning agent used during the cleaning regimen was: "Sterigent"

### 7.3 Sampling Date: 7 April 2003

\* **Micro and culture:** Samples obtained from Roodepoort wheelie bin Nø s WB05 and WB06 yielded scanty growth of Bacillus species. The sample obtained from Roodepoort stackable bin No L120 also yielded scanty growth of Bacillus species.

Scanty growth of bacillus species was detected on the same bins on arrival at Leratong, indicating that personnel and vehicle hygiene was adequate.

\* **Fungal culture:** No fungal growth was detected on any of the samples obtained from bins.

\* All of the bins had just been cleaned on the Roodepoort incinerator premises prior to the sampling period - i.e. following cleaning were immediately transported to Leratong Hospital.

\* The cleaning agent used during the cleaning regimen was a 3.5 % sodium hypochlorite solution (please find attached MSDS).

### 7.4 Sampling Date: 15 April 2003

\* **Micro and culture:** Samples obtained from all of the Roodepoort wheelie / stackable bins yielded no trace of any bacterial contamination at the Roodepoort Incinerator. On arrival at Leratong Hospital three bins yielded a scanty growth of bacillus species. Once again indicating that personnel and vehicle hygiene should be addressed.

\* **Fungal culture:** No fungal growth was detected on any of the samples obtained from bins.

\* All of the bins were last cleaned on the Roodepoort incinerator premises on 14 April - i.e. spent a day in the storage area on site before being transported to the Leratong Hospital.

- The cleaning agent used during the cleaning regimen was again, a 3.5 % sodium hypochlorite solution – the washing operator was however instructed to make more liberal use of this solution and this appeared to eliminate any incidence of bacterial growth.

## 8. CONCLUSION AND RECOMMENDATIONS

Margot Saner & Associates (Pty) Ltd conducted surface swab sampling of medical waste bins on the Roodepoort Medical Waste Incinerator premises. Additional surface samples were then obtained from these same bins upon their arrival at the Leratong Hospital. The purpose of the sampling was to determine the extent of biological contamination of these bins following completion of the cleaning regimens on the Roodepoort incinerator premises and their subsequent transfer to the Leratong Hospital.

The sampling was conducted over four consecutive weeks - i.e. samples were collected on the Monday of each week. The results of this sampling revealed that following cleaning of the bins with "Sterigent" solution (during the first two weeks of sampling) *scanty to profuse growth of Bacillus species* was detected on 17 of the 22 (77.3% were contaminated) swab samples, with scanty growth of staphylococcus species in one of the 22 (4.5% were contaminated) samples. Following cleaning with a 3.5% sodium hypochlorite solution (second two weeks of sampling), 10 of the 22 (45.5 % were contaminated) samples yielded only scanty growth of Bacillus species whilst the remaining samples revealed no trace of any bacterial contamination. 3 of the bins disinfected with sodium hypochlorite were contaminated during transport, therefore a more realistic percentage of contaminated bins after disinfection with sodium hypochlorite is 7 of 22 bins (31.8% were contaminated).

None of the samples obtained from any of the bins yielded any traces of fungal growth / contamination during disinfection with both "Sterigent" and Sodium Hypochloride.

From these results it would appear that the 3.5% sodium hypochlorite solution is more effective in disinfecting the surfaces of the bins than the commercial soap solution. Some concern was however expressed about the use of sodium hypochlorite causing an increase in free chlorine in the run-off water from the washing bay area. In order to assess this risk, a bulk water sample was obtained and submitted to a laboratory for free chlorine analysis. The result obtained indicates *no detection of free chlorine* in the content of the run-off water as a result of using dilute sodium hypochlorite solution.

In the Hazardous Biological Regulations, OHASA 85, 1993 biological agents are

categorized according to Hazard Groups (Please find attached):

**Group 1** - A biological agent that is unlikely to cause human disease.

**Group 2** - A biological agent that can cause human disease and may be a hazard to employees; it is unlikely to spread to the community and there is usually effective prophylaxis or treatment available.

**Group 3** - A biological agent that can cause severe human disease and may be a serious hazard to employees; it may spread to the community, but there is usually an effective prophylaxis or treatment available.

**Group 4** - A biological agent that causes severe human disease and is a serious hazard to employees; it is likely to spread to the community and there is usually no effective prophylaxis or treatment available.

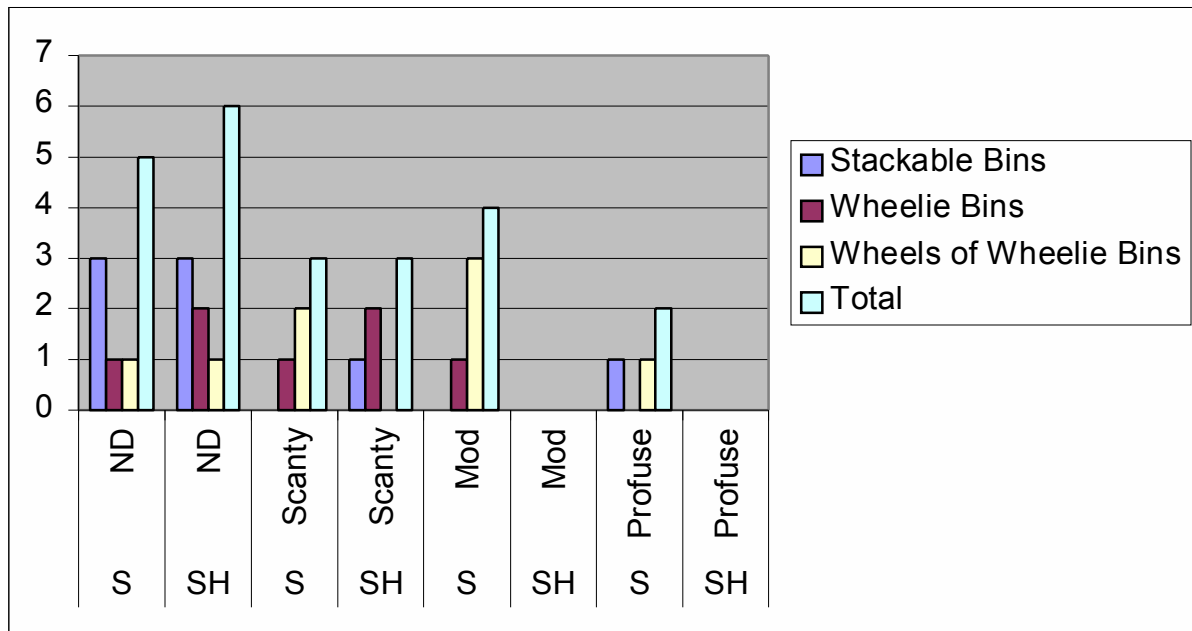
Discussions held with the laboratory indicate that *Bacillus Subtilis* was identified as the *Bacillus* species isolated. *Bacillus subtilis* is a Group 1 microorganism and therefore is unlikely to cause human disease unless found as a profuse growth on culture. "Sterigent" disinfection yielded profuse growth, whereas sodium hypochlorite disinfection yielded only scanty growth of *Bacillus* species. Therefore sodium hypochlorite should be considered as the disinfectant of choice. "Sterigent" is approximately 10 times more expensive than sodium hypochlorite. *Staphylococcus*, *Pseudomonas*, *E. coli* (coliform) bacteria are all Group 2 or 3 microorganisms. Therefore it would be preferable in a hospital setting that these were not evident. When sodium hypochlorite was used there was no growth of any of the aforementioned microorganisms.

The limitations of this study are listed below:

1. Resources only allowed for a limited number of swab samples to be taken. Therefore the swabs were taken after disinfection at the Roodepoort Incinerator Facility and then again after transport and on arrival at Leratong Hospital. No sampling was conducted in storage at Leratong or in the wards or on departure from Leratong.
2. Samples were taken from the wheels of the wheelie bins, but not from the base of the stackable bins, so that a comparison of disinfection levels of the outside of the bins could be not assessed.
3. Time constraints only allowed for four weeks of sampling. A longer period of sampling would have been more representative and a higher confidence could have been achieved in this study.

**Graph 1- Microbial Growth Roodepoort Incinerator using Sterigent (S) or Sodium Hypochlorite (SH)**

Disinfectant	S	SH	S	SH	S	SH	S	SH
Microbial Growth	ND	ND	Scanty	Scanty	Mod	Mod	Profuse	Profuse
Stackable Bins	3	3	0	1	0	0	1	0
Wheelie Bins	1	2	1	2	1	0	0	0
Wheels of Wheelie Bins	1	1	2	0	3		1	0
Total	5	6	3	3	4	0	2	0



ND - Not Detected - no growth  
S - Sterigent  
SH - Sodium Hypochlorite

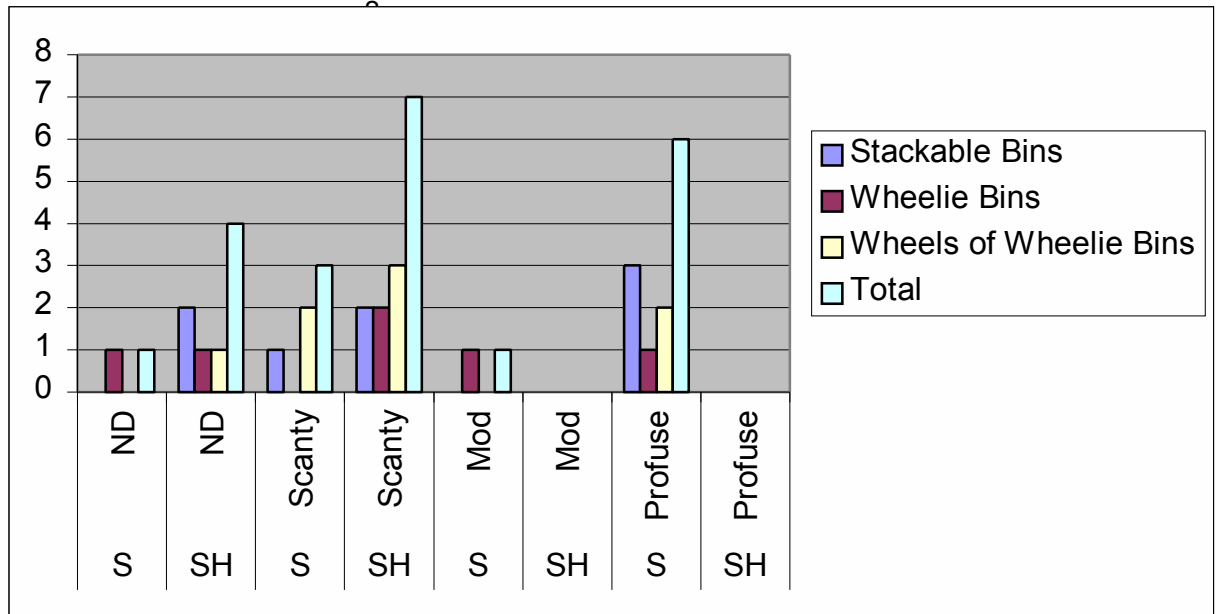
**Observations from Swab Sampling at Roodepoort Incinerator Facility:**

1. Moderate and profuse growth of bacterial organisms were only found when using Sterigent and not when using 3.5 % Sodium Hypochlorite. No growth and scanty growth of bacillus species from swab sampling was yielded when using sodium hypochlorite. Therefore the effectiveness of disinfection when using sodium hypochlorite was better than when using Sterigent.



**Graph 2: Microbial Growth - arrival at Leratong Hospital using Sterigent (S) or Sodium Hypochlorite (SH)**

Disinfectant	S	SH	S	SH	S	SH	S	SH
Microbial Growth	ND	ND	Scanty	Scanty	Mod	Mod	Profuse	Profuse
Stackable Bins	0	2	1	2	0	0	3	0
Wheelie Bins	1	1	0	2	1	0	1	0
Wheels of Wheelie Bins	0	1	2	3	0	0	2	0
Total	1	4	3	7	1	0	6	0



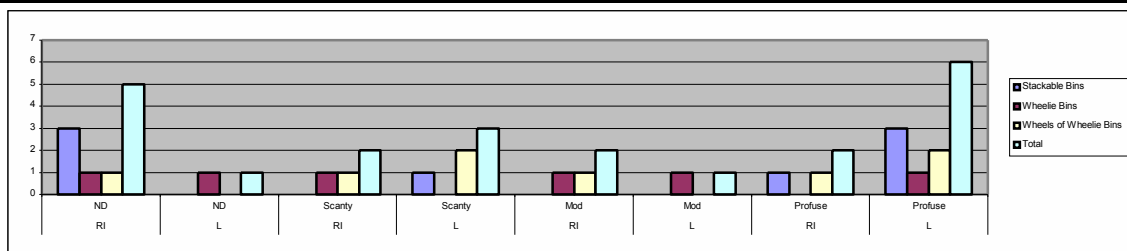
ND - Not Detected - no growth  
S - Sterigent  
SH - Sodium Hypochlorite

Observations on arrival at Leratong Hospital:

1. Once again moderate to profuse Growth of bacterial microorganisms was yielded from swab sampling of the bins on arrival at the Leratong Hospital when using Sterigent Disinfectant. Sodium Hypochlorite disinfection yielded no growth or scanty growth of bacillus species. Therefore the effectiveness of disinfection when using sodium hypochlorite was better than when using Sterigent.

**Graph 3 - Roodepoort Inc (RI) and Leratong (L) using Sterigent**

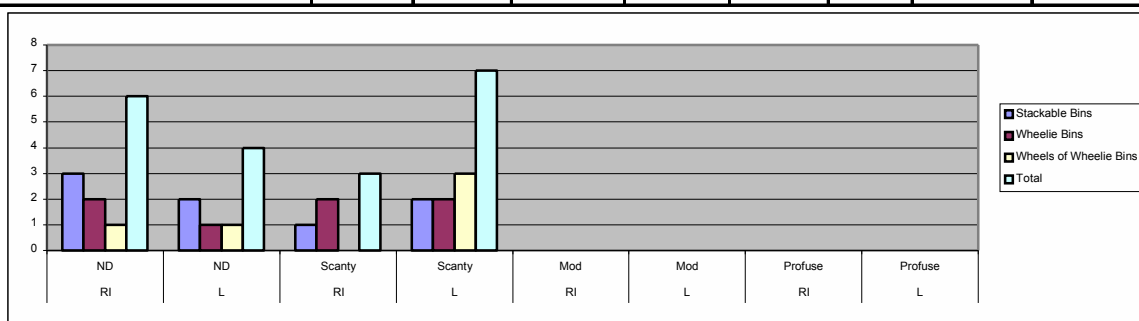
Location	RI	L	RI	L	RI	L	RI	L
Microbial Growth	ND	ND	Scanty	Scanty	Mod	Mod	Profuse	Profuse
Stackable Bins	3	0	0	1	0	0	1	3
Wheelie Bins	1	1	1	0	1	1	0	1
Wheels of Wheelie Bins	1	0	1	2	1	0	1	2
Total	5	1	2	3	2	1	2	6



ND - Not Detected - no growth      RI - Roodepoort Incinerator      L - Leratong

**Graph 4 - Roodepoort Inc (RI) and Leratong (L) using Sodium Hypochlorite**

Location	RI	L	RI	L	RI	L	RI	L
Microbial Growth	ND	ND	Scanty	Scanty	Mod	Mod	Profuse	Profuse
Stackable Bins	3	2	1	2	0	0	0	0
Wheelie Bins	2	1	2	2	0	0	0	0
Wheels of Wheelie Bins	1	1	0	3	0	0	0	0
Total	6	4	3	7	0	0	0	0



ND - Not Detected - no growth      RI - Roodepoort Incinerator      L - Leratong

**Observations:**

1. No moderate or profuse growth of bacterial organisms were found when sodium hypochlorite was used. However, moderate and profuse growth was found when using Sterigent.
2. There does not seem to be greater contamination of stackable bins than of wheelie bins. The wheels of the bins, if disinfected with 3.5 % sodium hypochlorite do not seem to pose an unnecessary “contamination risk”, as only scanty growth of bacillus species was detected.

## **RECOMMENDATIONS**

1. 3.5 % Sodium Hypochlorite should be used instead of Sterigent, as more effective disinfection was achieved when using Sodium Hypochlorite.
2. More attention should be paid to better personal hygiene practices of drivers and driver's assistance and better disinfection of trucks used for the transport of the disinfected bins to the hospital.
3. There seems to be little or no difference in microbial contamination when considering the use of wheelie bins or stackable bins and if appropriately disinfected, either of these bins seems suitable for use. The wheels of the wheelie bin do not increase the risk of contamination at Roodepoort Incinerator or on arrival at Leratong. However, consideration was not given to "contamination risk" when being used in the wards.
4. Initially, a Sampling Programme could be implemented over a 3month period to ensure that "contamination risk" is low and disinfection is effective.

Margot Saner & Associates (Pty) Ltd would like to thank the management and staff of both the Roodepoort incinerator and Leratong Hospital for their help and co-operation during the course of these surveys.

## **9. REFERENCES**

1. Ashton, I. ; Gill F. 1992. Monitoring for Health Hazards at Work. 2nd Edition. Blackwell Scientific Publications. London.
2. Crickshank R. et al. 1973. Medical Microbiology. 12th Edition. Churchill Livingstone. London.
3. Neely, A. N. et al. 2003. Investigation of single use versus reusable infectious waste containers as potential sources of microbial contamination. Shriners Burns Hospital: Cincinnati
4. Occupational Health and Safety Act 85, 1993, Hazardous Biological Agent Regulations