

CHAPTER 1

PUBLIC BODY

Provisional Urban Council

GOVERNMENT DEPARTMENT

Urban Services Department

**The refuse collection service of
the Urban Services Department**

**Audit Commission
Hong Kong
11 October 1999**

THE REFUSE COLLECTION SERVICE OF THE URBAN SERVICES DEPARTMENT

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THE REFUSE COLLECTION SERVICE OF THE URBAN SERVICES DEPARTMENT

Summary and key findings

A. **Introduction.** As at 1 April 1998, the Urban Services Department (USD) employed 388 loaders, 330 drivers and 275 refuse collection vehicles (RCVs) to provide refuse collection service for 247 refuse collection routes in the Urban Council area (para. 1).

B. **Long history of task and finish habit and significant non-productive time.** The habit that the USD's refuse collection teams (RCTs) left their places of work as soon as they had finished their scheduled tasks ("task and finish habit") dates back to the early 1980s. Audit found that in 1997 and 1998, the weighted average non-productive time was about two hours per shift for the RCTs working in the day shift and about three hours per shift for the RCTs working in the evening shift. The fact that the USD's RCTs persistently finished their work earlier than their official finishing time indicated that they had excess capacity (paras. 9, 10 and 11).

C. **Excess capacity of RCTs.** Audit analysed the operation of 50 randomly selected RCTs working on refuse collection routes, each of which was operated with a single RCV. Audit found that the number of RCTs could be reduced by about 26% and about 18% of the RCVs were surplus to requirement. Audit also analysed the operation of 12 randomly selected RCTs working on refuse collection routes, each of which was operated with a tractor and one or more trailers. Audit found that the number of RCTs could be reduced by about 28% and about 25% of the tractors were surplus to requirement (paras. 12 and 15).

D. **Causes for the significant amount of non-productive time.** Audit found that the significant amount of non-productive time of the RCTs was due to: (a) outdated and inconsistent work values of refuse collection tasks; (b) over-estimation of workload in planning refuse collection routes; (c) lack of monitoring of the performance of RCTs; (d) long balance time of many RCTs; and (e) low travelling speed of RCVs used in planning refuse collection routes (para. 19).

E. **Contracting out of refuse collection service.** Contracting out of refuse collection service is a common practice in advanced countries. Large savings can usually be achieved by contracting out the service. As early as 1986, the USD recognised the benefits of contracting out. However, up to the completion of this audit in October 1998, the USD had not contracted out any of its refuse collection service (para. 37).

F. **Overloading of RCVs.** Audit observed that the USD's RCVs were frequently overloaded. For December 1997 and March 1998, Audit found that about 20% of the loads of refuse exceeded the maximum capacity of the RCVs. Furthermore, for more than 15% of the overloading cases, the weight of the refuse exceeded the maximum capacity of the RCVs by more than 20% (paras. 38 and 39).

G. **Excessive relief RCVs.** Audit observed that in 1998, for each category of RCVs, the overall downtime rate for Hong Kong Region was considerably higher than that for Kowloon Region. Furthermore, the downtime rate for different categories of RCVs varied considerably. Audit also found that the USD did not adhere to the 25% agreed relief ratio (ARR) for the provision of relief

RCVs. Based on the USD's current ARR of 25%, Audit has estimated that the USD had eight surplus relief RCVs as at 1 April 1998 with a total replacement cost of \$8.9 million. Audit also noted that in August 1986, the USD considered that it was reasonable to reduce the ARR to 20%. Had the ARR been reduced to 20%, as at 1 April 1998, the USD would have had 15 surplus relief RCVs with a total replacement cost of \$17 million (paras. 43, 44, 45 and 46).

H. Audit recommendations. Audit has recommended to the Director of Urban Services that the USD should:

- (a) promptly and critically review the excess capacity of its RCTs so as to minimise the number of RCTs (sub-para. (a) of para. 48);
- (b) freeze the procurement of RCVs until the existing RCVs are fully utilised (sub-para. (b) of para. 48);
- (c) promptly and critically re-examine the work values for planning refuse collection routes (sub-para. (c) of para. 48);
- (d) promptly review the planning of workload for its RCTs so as to rectify the situation of over-estimating their workload (sub-para. (d) of para. 48);
- (e) regularly revise its refuse collection route schedules based on the actual weight of refuse collected (sub-para. (e) of para. 48);
- (f) study the latest technology available for the management of its RCVs and consider using modern equipment to effectively monitor the operation of its RCVs (sub-para. (f) of para. 48);
- (g) rearrange the refuse collection routes to minimise the balance time of the RCTs (sub-para. (g) of para. 48);
- (h) take expeditious action to establish a target and draw up a timetable for contracting out its refuse collection service (sub-para. (h) of para. 48);
- (i) closely monitor the work of the RCTs to ensure that the RCVs are not overloaded (sub-para. (j) of para. 48);
- (j) establish two ARRs for each category of RCVs, one for Hong Kong Region and one for Kowloon Region, so that the prevailing downtime rates are fully reflected (sub-para. (k) of para. 48); and
- (k) adhere to the ARRs for providing relief RCVs (sub-para. (m) of para. 48).

I. Response from the Director of Urban Services. The Director of Urban Services agrees with most of the audit recommendations (paras. 49 and 50).

J. Response from the Provisional Urban Council. The Provisional Urban Council generally agrees with the audit recommendations. The Council will continue to monitor the USD's utilisation of resources in the provision of refuse collection service with a view to achieving the most cost-effective mode of operation (paras. 51 and 52).

INTRODUCTION

Background

1. The Urban Services Department (USD), being the executive arm of the Provisional Urban Council (UC — see Note 1), is responsible for the provision of refuse collection service in the UC area, which is divided into eleven districts. Refuse collection teams (RCTs) of the USD collect refuse from refuse collection points and transport it to the disposal site. A number of refuse collection points form a refuse collection route. As at 1 April 1998, the USD employed 388 loaders (who were staff of the Workman grade), 330 drivers and a fleet of 275 refuse collection vehicles (RCVs — see Note 2) to provide refuse collection service for 247 refuse collection routes. These 247 refuse collection routes comprised:

- 223 routes, each of which was operated with a single RCV (hereinafter referred to as single RCV refuse collection routes);
- 18 routes, each of which was operated with a tractor and one or more trailers (hereinafter referred to as TT refuse collection routes);
- four routes for collecting refuse dumped at litter containers; and
- two routes for collecting animal waste.

The total staff cost incurred in operating these 247 refuse collection routes in 1997-98 was \$147 million. The replacement cost of the fleet of RCVs as at 1 April 1998 was \$342 million.

Daily operation of RCTs

2. Each single RCV refuse collection route is operated by an RCT consisting of one driver and one to two loaders. Every day each RCT collects refuse from the refuse collection points according to the refuse collection route, and dumps the refuse at the scheduled disposal site of the Environmental Protection Department (EPD). Each TT refuse collection route is operated by a driver who drives a tractor to a refuse collection point to tow a trailer to the scheduled disposal site, and tows the emptied trailer back to the same refuse collection point. The tractor then goes to another refuse collection point to tow another trailer. Normally each RCT has to carry two to three loads of refuse each day. The registration number, the time of arrival and the time of departure of the RCV and the weight of refuse disposed are recorded by the staff at the disposal sites. After dumping the last load of refuse at the disposal sites, the RCVs return to one of the three vehicle depots.

Note 1: *On 1 July 1997, the Urban Council was replaced by the Provisional Urban Council.*

Note 2: *The fleet of RCVs comprised 211 compaction-type RCVs, 22 tractors, 39 trailers and three lorries. A tractor is a powerful motor vehicle used for pulling a trailer, which is a wheeled container used for transporting refuse to the disposal site.*

3. For each shift of the RCTs, the working time is 7.5 hours, excluding one hour for meal break. The normal working hours of the RCTs are as follows:

| | |
|---------------|---|
| Day shift | 6:00 a.m. to 2:30 p.m. or 6:30 a.m. to 3:00 p.m. |
| Evening shift | 3:00 p.m. to 11:30 p.m. or 3:30 p.m. to midnight |

4. Audit analysed the route schedules of 50 randomly selected RCTs working on single RCV refuse collection routes for March 1998. Audit found that, of the time available for work:

- 36% was planned for travelling;
- 41.2% was planned for loading refuse onto the RCV;
- 9.7% was planned for the site allowance and for tipping refuse at the disposal site;
- 4.3% was planned for daily checking and refuelling of the RCV; and
- 8.8% was balance time during which the RCT was not deployed to collect refuse.

AUDIT OBJECTIVES AND SCOPE

5. An audit was conducted:

- to examine the efficiency of the refuse collection service provided by the USD;
- to ascertain whether the RCTs have any excess capacity;
- to review the action taken by the USD in contracting out the refuse collection service; and
- to examine the provision of relief RCVs.

Because the number of routes for collecting animal waste and refuse dumped at litter containers was about 2% of the 247 refuse collection routes, Audit did not review these refuse collection routes. The conclusions of this audit are given in paragraph 47 below.

LONG HISTORY OF TASK AND FINISH HABIT AND SIGNIFICANT NON-PRODUCTIVE TIME

6. In 1981, the management of the USD decided that the RCTs should be allowed to leave their places of duty after they had finished their scheduled tasks. This is referred to as the “task and finish habit”.

7. In 1986, the USD’s Transport Section reviewed the operation of the RCVs for the period 27 January to 27 February 1986. The review found that for an eight-hour shift (Note 3), the average non-productive time was 1.67 hours (20.9%) for the day shift and 3.37 hours (42.1%) for the evening shift.

8. At that time, the USD’s Transport Manager (Hong Kong) considered that the non-productive time was unacceptably high. He concluded that:

- many RCVs had substantial excess capacity;
- the actual quantities of refuse generated might be lower than the forecasted quantities and hence were handled more quickly; and
- the RCTs lacked supervision.

9. In 1997, the USD’s Environmental Hygiene Section (EHS) (Kowloon Region) reviewed the operation of 144 RCTs in Kowloon Region. The EHS recorded the time when the RCTs left the last refuse collection point for the week from 15 to 21 December 1997. **Based on these time records, Audit found that the weighted average non-productive time of the RCTs was 1.64 hours for the day shift and 2.89 hours for the evening shift.**

10. In 1998, the USD’s Transport Section (Kowloon Region) recorded the time taken by the RCVs of 100 day-shift refuse collection routes to return to the depot for the week from 23 February to 1 March 1998 and for the week from 2 to 8 March 1998. **Based on these time records, Audit found that the weighted average non-productive time of the RCTs was 2.3 hours per shift for these two weeks.**

11. The task and finish habit of the USD’s RCTs dates back to the early 1980s (see paragraph 6 above). As indicated in paragraphs 7 to 10 above, the fact that the USD’s RCTs persistently finished their daily work earlier than their official finishing time indicated that they had excess capacity.

Note 3: *The scheduled working time was reduced to 7.5 hours with effect from 1 March 1988.*

EXCESS CAPACITY OF RCTs

12. To determine the extent of excess capacity of the RCTs and to ascertain whether these RCTs were fully engaged in collecting refuse during the available working hours in each shift, Audit analysed the operation of 50 randomly selected RCTs working on single RCV refuse collection routes and 12 randomly selected RCTs working on TT refuse collection routes for three weeks: 24 to 30 August 1997, 23 to 29 November 1997, and 9 to 15 March 1998 (Note 4).

Non-productive time of RCTs in 1997 and 1998

13. Tables 1 and 2 below show the non-productive time of the RCTs.

Table 1

**Non-productive time of the RCTs
working on single RCV refuse collection routes**

| Period | Average non-productive time of the 50 RCTs per shift | |
|------------------------|--|--------------------------------------|
| | Hours | Percentage |
| | (a) | (b) = $\frac{(a) \times 100\%}{7.5}$ |
| 24 to 30 August 1997 | 2.48 | 33.1% |
| 23 to 29 November 1997 | 2.14 | 28.5% |
| 9 to 15 March 1998 | 2.22 | 29.6% |

Source: Audit's analysis of the records of the EPD and the USD

Note 4: *The audit sample covered all the eleven districts for both day shift and evening shift. The sample represented 22.4% of the 223 RCTs working on single RCV refuse collection routes and 66.7% of the 18 RCTs working on TT refuse collection routes. The time of arrival and the time of departure of an RCV at a disposal site were recorded by the staff at the disposal site. Audit analysed the time records for the three weeks with reference to the refuse collection route schedules.*

Table 2

**Non-productive time of the RCTs
working on TT refuse collection routes**

| Period | Average non-productive time of the 12 RCTs per shift | |
|------------------------|--|--------------------------------------|
| | Hours | Percentage |
| | (a) | (b) = $\frac{(a) \times 100\%}{7.5}$ |
| 24 to 30 August 1997 | 2.72 | 36.3 % |
| 23 to 29 November 1997 | 2.72 | 36.3 % |
| 9 to 15 March 1998 | 2.88 | 38.4 % |

Source: *Audit's analysis of the records of the EPD and the USD*

RCTs had excess capacity

14. Audit found that if the RCTs were fully engaged in collecting refuse during the available working hours in each shift, the number of refuse collection routes could be reduced. Based on the records of the EPD and the USD for the week from 9 to 15 March 1998, Audit rearranged the refuse collection routes with a view to minimising the number of routes. The results of Audit's rearrangement exercise are summarised in Appendices A and B.

15. Audit considers that only 166 single RCV refuse collection routes and 13 TT refuse collection routes were required to provide refuse collection service in March 1998 (see Appendices A and B). **The number of RCTs working on single RCV refuse collection routes could be reduced from 223 by 57 to 166 (i.e. a reduction of about 26%) and the number of RCTs working on TT refuse collection routes could be reduced from 18 by five to 13 (i.e. a reduction of about 28%).** Because the USD intended to use the same fleet of RCVs for both the day shift and the evening shift, Audit estimated that about 18% (Note 5) of the RCVs used for the single RCV refuse collection routes and about 25% (Note 6) of the tractors used for the TT refuse collection routes were surplus to requirement.

Note 5: *Surplus capacity of the RCVs used for single RCV refuse collection routes for March 1998 (see Appendix A)*

$$= \frac{(153 - 126)}{153} \times 100\% = \underline{18\%}$$

Note 6: *Surplus capacity of the tractors used for TT refuse collection routes for March 1998 (see Appendix B)*

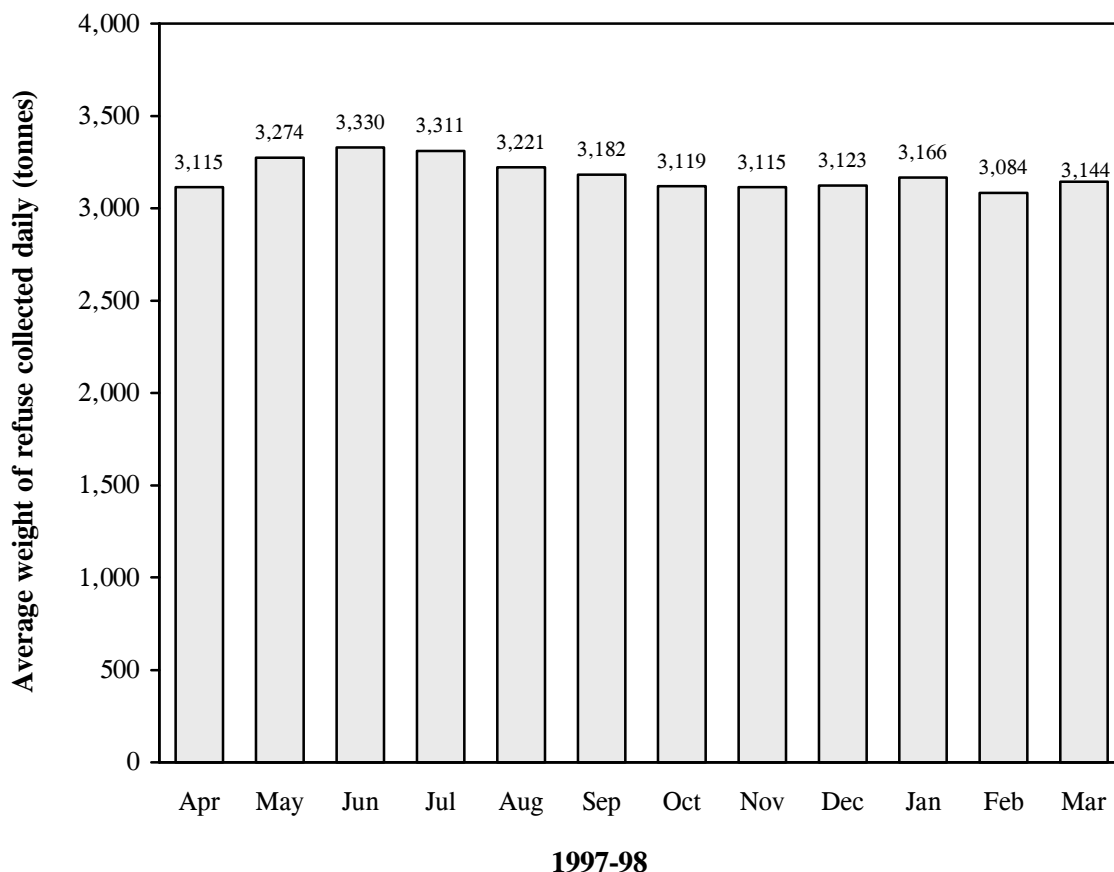
$$= \frac{(12 - 9)}{12} \times 100\% = \underline{25\%}$$

Seasonal fluctuation of the weight of refuse collected daily

16. To ascertain the effect of seasonal fluctuation, Audit also analysed the average weight of refuse collected daily by the USD in each month of 1997-98. As shown in Figure 1 below, for the month of April 1997 and for the period September 1997 to March 1998, the average weight of refuse collected daily by the USD ranged from 3,084 tonnes to 3,182 tonnes. The average weight of refuse collected daily from May to August 1997 was about 5% higher than that in the other eight months. Audit considers that one option of handling this 5% increase in the average weight of refuse collected daily during the peak season could be to ask the RCTs to work overtime, instead of providing a spare capacity in the RCTs. Assuming that the 5% increase in the average weight of refuse collected daily represents 5% increase in the workload of the RCTs, Audit has estimated that the overtime allowance payable to the RCTs was \$2.7 million per annum. However, the annual staff cost of providing a 5% capacity to handle the additional workload would be \$5.4 million, and the cost of additional RCVs required would be \$12.6 million.

Figure 1

Average weight of refuse collected daily by the USD's RCTs in 1997-98



Source: Audit's analysis of USD's records

Financial consequences of the surplus RCTs

17. Based on the audit findings in paragraph 15 above, Audit estimated that the staff cost in 1997-98 attributable to the surplus RCTs was \$38.5 million (see Appendix C). If the overtime allowance payable to the RCTs for handling the additional workload during the peak season was taken into account (see paragraph 16 above), the net financial consequence in 1997-98 attributable to the surplus RCTs would be \$35.8 million (\$38.5 million minus \$2.7 million).

18. Audit also estimated that the replacement cost of the surplus RCVs as at 1 April 1998 was \$57.3 million (see Appendix C). Audit therefore considers that the USD should critically review its replacement programme for RCVs. Meanwhile, the USD should freeze the procurement of RCVs until the surplus capacity of its existing fleet of RCVs is fully utilised.

CAUSES FOR THE SIGNIFICANT AMOUNT OF NON-PRODUCTIVE TIME OF RCTs

19. Audit found that the significant amount of non-productive time of the RCTs was due to:
- outdated and inconsistent work values of refuse collection tasks (see paragraphs 20 to 21 below);
 - over-estimation of workload in planning refuse collection routes (see paragraphs 22 to 23 below);
 - lack of monitoring of the performance of RCTs (see paragraphs 24 to 25 below);
 - long balance time of many RCTs (see paragraphs 26 to 28 below); and
 - low travelling speed of RCVs used in planning refuse collection routes (see paragraph 29 below).

Outdated and inconsistent work values of refuse collection tasks

20. In order to plan refuse collection routes and draw up refuse collection route schedules, the planner needs to know the time required to carry out each refuse collection task. In 1985, the Management Services Unit (MSU) of the USD laid down a set of work values for the refuse collection tasks. The work value of a task is the time required for a qualified worker to carry out the task at a standard level of performance. It is the rate of output which a qualified workman will naturally achieve without over-exertion over a working day, provided that he adheres to the correct working method and is motivated to apply himself to the work.

21. Since 1985, many changes in the refuse collection operation have occurred including changes in design of rubbish bins, RCV types, locations of disposal sites and traffic condition. As a result of these changes, most of the work values determined in 1985 are no longer applicable and staff of the USD's EHS in districts determined their work values arbitrarily when planning the

refuse collection routes. Audit analysed a sample of 25 refuse collection route schedules and found that, for the same task, the work values used for different refuse collection routes varied significantly. The results of Audit's analysis are shown in Appendix D. The USD's MSU had been repeatedly requested to revise the work values in 1995 and 1997. However, up to the time of completion of this audit in October 1998, the work values had not been revised.

Over-estimation of workload in planning refuse collection routes

22. In order to ascertain the extent of the over-estimation of the workload of the USD's RCTs, Audit compared the weight of refuse collected daily with the weight of refuse planned to be collected daily in the week from 1 to 7 December 1997 and in the week from 9 to 15 March 1998. The results indicated that the weight of refuse collected daily fell short of the weight of refuse planned to be collected daily by about 11%. **However, the USD did not regularly revise the refuse collection routes based on changes in the actual weight of refuse collected. As at 31 March 1998, 56 (23.2%) out of the 241 refuse collection routes had not been revised for more than one year.**

23. Furthermore, because the actual quantity of refuse collected was less than the quantity of refuse planned to be collected, the RCTs could carry a smaller number of loads of refuse than planned. For example, of the 4,197 loads of refuse planned to be carried for the week from 9 to 15 March 1998, only 4,038 loads (96.2%) were in fact carried by the RCTs. By carrying a smaller number of loads of refuse than planned, the RCTs could finish their work earlier. Based on the refuse collection route schedules in operation in March 1998, Audit estimated that, on average, about 0.92 hour could be saved for each load of refuse not carried to the disposal site.

Lack of monitoring of the performance of RCTs

24. For every refuse collection route, the USD prepares a route schedule prescribing in detail, for each trip, the time of arrival and the time of departure at all the scheduled refuse collection points and the disposal sites (see paragraph 2 above). The USD maintains a Transport Management Information System (TMIS) which provides general information on the operation of the RCVs including, for example, distance travelled, fuel consumption, number of days available, downtime rate, number of days in use, number of loads carried and actual daily overtime. However, the USD does not collect information to find out how closely the actual operation of the RCTs follows the time planned in the refuse collection route schedules. For instance, the USD does not capture the following information in the TMIS:

- the time taken by the RCV for the operation at each refuse collection point and in travelling;
- the period of time during which the RCV is stationary;
- the quantity of refuse collected (in terms of the number of bins, baskets or cubic metres);
- the actual time which the RCTs have taken to finish their work; and
- the speed of the RCV.

The above information is very useful in reviewing whether the actual operation of the RCTs follows the time planned in the refuse collection route schedules.

25. **The USD did not have sufficient management information on the operation of RCVs to effectively monitor the performance of its RCTs.** In Audit's view, the USD should carry out an in-depth study of the latest technology available for the management of its fleet of RCVs and consider using the most suitable equipment available to monitor the operation of its RCVs.

Long balance time of many RCTs

26. The time when the RCTs are not planned to perform any work is referred to as balance time. Audit observed that, for many RCTs, the time planned for finishing their scheduled tasks was much earlier than the official finishing time of their shifts. Audit analysed 240 refuse collection route schedules of August 1997 and 241 refuse collection route schedules of November 1997 and found that about 18% of the refuse collection routes had a balance time of at least one hour per shift. This was particularly so in the evening shift of Kowloon Region where 40.9% of the refuse collection routes reviewed had a balance time of at least one hour per shift.

27. Long balance time persisted in March 1998. Audit analysed 241 refuse collection route schedules of March 1998 and found that 46 refuse collection routes (about 19%) had a balance time of at least one hour per shift. This was particularly so in the evening shift of Kowloon Region where 43.2% of the refuse collection routes reviewed had a balance time of at least one hour per shift.

28. **Based on the audit findings in paragraphs 26 to 27 above, Audit estimated that about 18% of the RCTs had a balance time of at least one hour per shift in 1997 and 1998. In March 1998, the total balance time of all the 241 routes was 137.6 hours every day. Audit estimated that in 1997-98, the annual staff cost attributable to balance time was \$6.4 million. In Audit's view, the USD should rearrange the refuse collection routes to minimise the balance time of the RCTs. As a result, the USD can reduce the number of refuse collection routes and hence the number of RCTs.**

Low travelling speed of RCVs used in planning refuse collection routes

29. If the travelling speed of the RCVs used for planning refuse collection routes is lower than the actual travelling speed, the planned time for finishing the daily refuse collection work will be more than the actual time required. **Audit found that most of the RCVs were in fact travelling at a higher average speed than the average travelling speed used for planning refuse collection routes (Note 7).** Consequently, the non-productive time of the RCTs had increased. Audit's analysis are summarised in Table 3 below. In Audit's view, the USD should review the travelling speeds used for planning refuse collection routes.

Note 7: *Audit analysed the log books of 27 randomly selected refuse collection routes in three periods: the week from 24 to 30 August 1997, the week from 23 to 29 November 1997 and the week from 9 to 15 March 1998. The audit sample covered all the eleven districts for both day shift and evening shift. Audit compared the actual average travelling speed (calculated from the log books) of the RCVs with their planned average travelling speed calculated from the refuse collection route schedules.*

Table 3
Analysis of average speed of RCVs

| Shift | Average speed of RCVs | | Actual speed higher than planned speed by | |
|---|-----------------------------|----------------------------|--|--|
| | Planned (km/hour) (a) | Actual (km/hour) (b) | Difference (km/hour) (c) = (b) - (a) | Percentage (d) = $\frac{(c) \times 100\%}{(a)}$ |
| For the week from 24 to 30 August 1997 | | | | |
| Day shift | 17.2 | 20.1 | 2.9 | 16.9% |
| Evening shift | 16.8 | 24.1 | 7.3 | 43.5% |
| For the week from 23 to 29 November 1997 | | | | |
| Day shift | 17.6 | 19.9 | 2.3 | 13.1% |
| Evening shift | 17.9 | 22.1 | 4.2 | 23.5% |
| For the week from 9 to 15 March 1998 | | | | |
| Day shift | 19.1 | 20.5 | 1.4 | 7.3% |
| Evening shift | 19.9 | 22.1 | 2.2 | 11.1% |

Source: Audit's analysis of USD's records

CONTRACTING OUT OF REFUSE COLLECTION SERVICE

Intention to contract out refuse collection service dates back to 1986

30. The USD's primary aim of contracting out its refuse collection service is to achieve cost savings. It has been the UC's policy that in deciding which service may be contracted out, the following guidelines need to be taken into account:

- (a) it is cost-effective to use outside contractors;
- (b) there is adequate private sector capability to undertake the work;
- (c) the USD retains a strategic in-house capability of providing core service as a safeguard against the contractors' default;
- (d) except under very special circumstances, there is no resultant staff redundancy;
- (e) it will increase the flexibility in the deployment of staff resources to cope with changing operational needs and fluctuating demands; and
- (f) for some specialist services, there is no such expertise in-house.

31. In January 1986, a Committee Paper entitled "Privatisation of Refuse Collecting — A Preliminary Paper" was submitted to the UC for consideration. It was stated in the paper that the potential contractors claimed that they would be able to provide refuse collection service of the same standard with possible savings of 30%. The UC endorsed the USD's proposal that the contracting out of the refuse collection service was worth exploring. The proposal was subsequently shelved, following the UC's decision in June 1986 that the privatisation of abattoirs should be accorded top priority, and that only one major privatisation exercise should be dealt with at any one time.

32. In late 1986, with a view to privatising some of its services so as to achieve more cost-effectiveness, the UC approved the establishment of a Privatisation Division to look into the feasibility of contracting out those services of the USD which were labour-intensive.

33. In November 1988, a Committee Paper entitled "Progress Report on Non-abattoir Privatisation Projects" was submitted to the UC for consideration. It was stated in the paper that other than abattoir privatisation, the USD did not intend to privatise services that would give rise to staff redundancy. The USD considered that until the complicated issues of abattoir privatisation were resolved by early 1990, it was prudent to limit privatisation to small schemes which could be achieved through staff redeployment, and not to venture into large-scale privatisation schemes (such as street sweeping and refuse collection) which would lead to staff redundancy.

34. In March 1990, upon the completion of the planning for Phase I of the abattoir privatisation scheme, the Privatisation Division started to consider the feasibility of contracting out some refuse collection routes. However, in the event, no refuse collection route was considered suitable for contracting out.

35. In May 1994, the USD identified 19 refuse collection routes which could be contracted out, with an estimated saving of \$15 million (i.e. 50% of the USD's associated operating costs). However, the plan was shelved pending the results of the Regional Services Department's review on the contracting out of the refuse collection service. In April 1995, the Regional Services Department informed the Regional Council that the contracting out of its refuse collection service had resulted in 35% savings in operating cost and that the service provided by the contractor was satisfactory.

36. In February 1998, the Director of Urban Services informed the Business and Services Promotion Unit of the Financial Secretary's Office that:

- while there was scope for contracting out the refuse collection service, the approval of the UC would be required. Members of the UC were generally opposed to the collection of refuse by contractors because there was a scarcity of cleansing companies operating in the UC area;
- it would be necessary to plan the refuse collection service if surplus refuse collection staff were not to be made redundant. Therefore, the contracting out of the refuse collection service would have to be phased over a number of years; and
- the USD hoped to be able to submit to the UC a proposal for partial contracting out of its refuse collection service by late 1998, upon completion of the final phase of the contracting out of the USD's manual street cleansing.

USD had not contracted out any of its refuse collection service

37. Contracting out of the refuse collection service is a common practice in advanced countries. Also, large savings can be achieved by the contracting out of refuse collection service. As early as 1986, the USD recognised the benefits of contracting out the refuse collection service (see paragraph 31 above). **However, up to the completion of this audit in October 1998, the USD had not contracted out any of its refuse collection service. Audit considers that the USD should establish a target and draw up a timetable for contracting out its refuse collection service. The USD should take expeditious action to contract out its refuse collection service in order to achieve the potential cost savings.** Regarding the concern that contracting out of the refuse collection service may lead to staff redundancy, Audit observed that since January 1997, the USD has conducted six recruitment exercises for Workmen II (loaders of the RCTs are Workmen II). In Audit's view, in order to facilitate the contracting out of the refuse collection service, the USD should not recruit new Workmen II. Instead, the USD should fill Workman II vacancies with temporary staff, pending the redeployment of Workmen II from that part of the refuse collection service which may be contracted out.

OVERLOADING OF RCVs

38. Audit found that the USD's RCVs were frequently overloaded. Based on the EPD's records at the disposal sites, Audit found that for the week from 1 to 7 December 1997, there were 792 (19.8%) overloading cases out of a total of 4,002 loads of refuse carried by the USD's RCTs. **Furthermore, in 120 (15.2%) of the 792 overloading cases, the weight of the refuse exceeded the maximum capacity of the RCVs by more than 20%.**

39. Another audit analysis found that for the week from 9 to 15 March 1998, the number of overloading cases was 810 (i.e. 20.1% of the 4,038 loads of refuse carried in that period). **In 139 (17.2%) of the 810 overloading cases, the weight of the refuse exceeded the maximum capacity of the RCVs by more than 20%.**

40. According to regulation 54 of the Road Traffic (Traffic Control) Regulations (Cap. 374), it is an offence that where a vehicle is driven or used on a road, it is so loaded that its gross vehicle weight exceeds the permitted gross vehicle weight assigned or deemed to have been assigned to the vehicle under the Road Traffic (Registration and Licensing of Vehicles) Regulations (Cap. 374). It is also common knowledge that overloading a vehicle (especially a goods vehicle) may result in:

- a higher probability of traffic accident;
- more frequent repairs and maintenance of the vehicle and hence an increase in repairs and maintenance cost of the vehicle;
- shortening of the useful life of the vehicle and hence an increase in its capital replacement cost; and
- damage to the roads and hence the need for more frequent road repairs and an increase in repair cost of the roads at public expense.

Audit considers that the USD should ensure that its RCVs are not overloaded. To achieve this, the USD should review the distribution of workload for each refuse collection route and monitor the working habit of its RCTs. In Audit's view, the USD should ensure that its RCVs operate in compliance with the Road Traffic (Traffic Control) Regulations.

EXCESSIVE RELIEF RCVs

41. To cater for the breakdown and maintenance of the USD's RCVs, relief RCVs have to be provided. The ratio between the number of the USD's relief RCVs and the size of its RCV fleet is referred to as the agreed relief ratio (ARR). Before 1985, the ARR was set at 25%.

42. In March 1985, a working group on transport matters reviewed the downtime rates of RCVs of Hong Kong Region. The average downtime rate in Hong Kong Region was 18.2% in 1984. Since the average downtime rate of the RCVs was within the ARR of 25%, the working group proposed that the ARR be revised downwards from 25% to 20% with effect from March 1985. However, the working group's proposal was not implemented.

43. In August 1986, the USD agreed that it was reasonable to reduce the ARR from 25% to 20% for both Hong Kong and Kowloon Regions. However, the USD did not reduce the size of its fleet of RCVs accordingly. During this audit, the Transport Managers confirmed that according to their understanding, the ARR remained at 25%.

44. Audit analysed the downtime of the RCVs for Hong Kong and Kowloon Regions for the period January to September 1998. The results of Audit's analysis (as summarised in Appendices E and F) indicated that during this period, the average downtime rates of different categories of RCVs varied considerably. For Hong Kong Region, the average downtime rate ranged from 16.8% (for trailers) to 23.6% (for tractors). For Kowloon Region, the average downtime rate ranged from 0.8% (for trailers) to 10.7% (for 12-tonne RCVs). Moreover, during this period, for each category of RCVs, the overall downtime rate for Hong Kong Region was considerably higher than that for Kowloon Region. Audit is concerned about these large differences. While recognising the fact that the hilly road conditions on Hong Kong Island may contribute partly to the higher downtime rates for Hong Kong Region, Audit considers that the USD should carry out a review to find out the underlying reasons for the large differences in downtime rates between Hong Kong Region and Kowloon Region with a view to minimising the downtime rates of the RCVs.

45. Different categories of RCVs serve different purposes. Therefore, an RCV of one category cannot be substituted for an RCV of another category. Furthermore, in 1998, the downtime rates for different categories of RCVs varied considerably (see paragraph 44 above). Audit considers that it is necessary to establish two ARR's for each category of RCVs, one for Hong Kong Region and one for Kowloon Region. In Audit's view, in establishing the ARR's, the USD should take account of the prevailing downtime rates for different categories of RCVs.

46. **The USD did not adhere to the 25% ARR for the provision of relief RCVs in that the actual relief ratios of different categories of RCVs as at 1 April 1998 in Hong Kong and Kowloon Regions varied considerably (see Appendix G). In addition, the ARR had not been updated to reflect the actual downtime rates of the RCVs. Consequently, the USD had excess relief RCVs. Based on the USD's current ARR of 25%, Audit has estimated that the USD had eight surplus relief RCVs as at 1 April 1998 with a total replacement cost of \$8.9 million (see Appendix H). Had the ARR been reduced to 20% (see paragraph 43 above), as at 1 April 1998, the USD would have had 15 surplus relief RCVs with a total replacement cost of \$17 million (see Appendix I).**

AUDIT CONCLUSIONS

47. **Audit concludes that:**

Excess capacity of the RCTs

- (a) **during the official working hours, the USD's RCTs were not fully engaged in collecting refuse, as evidenced by the significant amount of non-productive time in the months of August 1997, November 1997 and March 1998 (see paragraph 13 above);**

- (b) **about 26% of the RCTs working on single RCV refuse collection routes and about 28% of the RCTs working on TT refuse collection routes were surplus to requirement. Accordingly, about 18% of the RCVs used for single RCV refuse collection routes and about 25% of the tractors used for TT refuse collection routes were surplus to requirement (see paragraph 15 above);**
- (c) **as a result of the excess capacity in (b) above:**
 - (i) **the estimated staff cost in 1997-98 attributable to the USD's surplus RCTs was \$35.8 million (see paragraph 17 above); and**
 - (ii) **the estimated replacement cost of the USD's surplus RCVs as at 1 April 1998 was \$57.3 million (see paragraph 18 above);**

Causes for significant amount of non-productive time

- (d) **outdated and inconsistent work values of refuse collection tasks were used for planning refuse collection routes (see paragraph 21 above);**
- (e) **the daily workload of the USD's RCTs (in terms of the weight of refuse collected) had been over-estimated (see paragraph 22 above);**
- (f) **the USD did not have sufficient management information on the operation of RCVs to effectively monitor the performance of its RCTs (see paragraph 25 above);**
- (g) **about 18% of the USD's RCTs had a balance time of at least one hour during the period August 1997 to March 1998 (see paragraph 28 above);**
- (h) **most of the RCVs were travelling at a higher average speed than the average travelling speed used for planning refuse collection routes (see paragraph 29 above);**

Contracting out of refuse collection service

- (i) **notwithstanding that the USD envisaged that contracting out of the refuse collection service would bring about substantial cost savings, it had not contracted out any of its refuse collection service (see paragraph 37 above);**

Overloading of RCVs

- (j) **the RCVs were frequently overloaded (see paragraphs 38 and 39 above);**

Provision of relief RCVs

- (k) it is necessary to establish two ARR for each category of RCVs, one for Hong Kong Region and one for Kowloon Region, so that the prevailing downtime rates are fully reflected (see paragraph 45 above); and
- (l) the USD did not adhere to the ARR for the provision of relief RCVs. The estimated total replacement cost of the resultant surplus relief RCVs as at 1 April 1998 was at least \$8.9 million (see paragraph 46 above).

AUDIT RECOMMENDATIONS

48. Audit has *recommended* to the Director of Urban Services that the USD should:

Excess capacity of the RCTs

- (a) promptly and critically review the excess capacity of its RCTs so that the number of its RCTs would be reduced to a minimum;
- (b) freeze the procurement of RCVs until the existing RCVs are fully utilised;

Planning of refuse collection workload

- (c) promptly and critically re-examine the work values of refuse collection tasks for planning refuse collection routes;
- (d) promptly review the planning of workload for its RCTs so as to rectify the situation of over-estimating their workload;
- (e) regularly review its refuse collection route schedules. If it is found that, for some refuse collection routes, the actual weight of refuse collected differs significantly from the weight of refuse planned to be collected, the USD should take immediate action to revise these refuse collection route schedules;

Monitoring of the performance of RCTs

- (f) study the latest technology available for the management of its fleet of RCVs and consider using modern equipment to effectively monitor the operation of its RCVs;
- (g) rearrange the refuse collection routes to minimise the balance time of the RCTs;

Contracting out of refuse collection service

- (h) **take expeditious action to establish a target and draw up a timetable for contracting out its refuse collection service;**
- (i) **stop recruiting permanent Workmen II and fill the existing Workman II vacancies with temporary staff, pending the redeployment of Workmen II from that part of the refuse collection service which may be contracted out;**

Overloading of RCVs

- (j) **closely monitor the work of the RCTs to ensure that the RCVs are not overloaded;**

Provision of relief RCVs

- (k) **establish two ARR for each category of RCVs, one for Hong Kong Region and one for Kowloon Region, so that the prevailing downtime rates are fully reflected;**
- (l) **carry out a review to find out the causes for the large discrepancies in RCV downtime rates between Hong Kong Region and Kowloon Region; and**
- (m) **adhere to the ARRs for providing relief RCVs.**

RESPONSE FROM THE DIRECTOR OF URBAN SERVICES

49. The **Director of Urban Services** has said that the USD welcomes the Audit report and regards it as a useful reference. The USD has undertaken reviews in the past on its own initiative. The USD is committed to providing a more efficient and cost-effective refuse collection service in the future. In terms of arithmetic, the USD has no dispute over Audit's findings which are based on the analyses of the USD's records. The Director has also said that:

Constraints in planning refuse collection service

- (a) the primary role of the USD is to protect public health. The collection of refuse is one of the most fundamental tasks to safeguard public health. Hong Kong is one of the world's most congested cities. Its hot and humid summers encourage the rapid decay of organic wastes. It is an international city located in a region of the world where there are many serious endemic diseases which are readily spread by vermin and pests associated with decaying refuse. Against this background, the USD's first priority must be to ensure that refuse is cleared promptly. Cost-effectiveness per tonne of refuse collected can at best only take second place, especially when placed against the cost in terms of loss of human lives or misery caused by such diseases;

- (b) refuse collection is a largely labour-intensive manual service. The high-density urban development of Hong Kong has not permitted and still does not permit the USD to provide a highly automated door-to-door refuse collection service. The nature of development and the increasingly large quantities of refuse per head being produced requires that the USD provides the refuse collection service every day (in many cases several times a day), year round (the only exception being on Lunar New Year day);
- (c) in designing individual refuse collection routes, the USD has to take into account factors such as the amount of refuse yield at each refuse collection point, the capacity of staff in handling the amount of refuse at a given time, the proximity of one refuse collection point to another and the road and traffic conditions. With all these variables which can fluctuate from one day to another, the USD can only come up with **averages** which would serve as planning parameters for the USD's services. These are not performance standards;
- (d) refuse is not a uniform, homogeneous substance, the production of which can be predicted accurately on an individual household basis. Only by averaging total quantities collected over time and on a large population basis, can "planning averages" be produced;
- (e) moreover, refuse collection staff are human beings. Their capacity to perform manual labour is affected by their age, physique, health, fitness and work ethic and, to a considerable extent, by external factors such as weather, humidity and working environment. The USD employs workers aged from their late teens to late 50s and expects them to undertake fairly heavy manual work handling obnoxious materials in all weathers, at temperatures that range from below 10°C in winter to above 30°C in the shade in summer, with humidity levels that rise to above 90% in the summer months, and often alongside roads with very high air-pollution levels. The USD must recognise that daily output, even for the fittest of workers, can vary widely across the year as a whole (Note 8);
- (f) the USD, as a responsible employer, also has a duty to recognise that it should not expect its workers to work more than a reasonable number of hours per day or per week. In simpler terms, overtime should be the exception and not the norm when planning work schedules;
- (g) given all these variables, it is not unusual that individual RCTs may finish their work on some days ahead of schedule but at other times behind schedule. The USD cannot ensure that there is no non-productive time at all times: all the USD can do is to try to put in place administrative measures that will minimise non-productive time;

Note 8: *Audit observed that the weighted average non-productive time was consistently more than two hours per shift, representing more than one quarter of the 7.5 working hours per shift. Incidentally, the non-productive time of the selected RCTs in the summer of 1997 amounted to about 2.5 hours (see paragraph 13 above).*

- (h) in addition to the public health risk, refuse is an obnoxious substance as “it smells”. While the USD’s new refuse collection points are generally fitted with air exhaust scrubber systems, many older refuse collection points and temporary refuse collection points are open to the air. The USD is unable in many areas to find sites to build modern refuse collection points because of shortage of land or local public objections. The USD knows from experience that if the USD does not clear refuse regularly, it will be subject to vociferous public complaints;
- (i) most refuse is deposited at refuse collection points in the late evening and early morning. The USD cannot provide an overnight refuse collection service in most locations as local residents would complain about the noise generated by the RCVs. The USD can usually only start the service at about 6:30 a.m. The public expects the USD’s first morning collection service to clear all the refuse left at the refuse collection points so that none is left behind to create a smell nuisance. Therefore, the number of daily refuse collection routes is largely determined by the number of refuse collection points that the USD needs to clear the first thing in the morning;
- (j) the USD is not a free agent to decide the level of its services. The USD is the executive arm of the UC. The UC decides on the level of resources and the policies that the USD must follow. UC Members normally expect the USD to provide a high quality and prompt refuse collection service that meets the needs of the community. Their judgement is often based on the feedback they receive from their constituents and it is natural that they tend to hear complaints more than praise for the USD’s services;
- (k) it is understandable that in planning the refuse collection service, the USD’s staff have a tendency to be conservative and to apparently over-provide collection capacity, on the basis of simple mathematics whereby the total quantity of refuse to be collected over the whole day is compared with the theoretical capacity of the RCTs. The USD has to provide a level of service that is up to the expectations of the public. The planning of refuse collection routes and the number of RCVs must, to a large extent, be driven by this service consideration, rather than by simple mathematics; and

Review on the refuse collection service

- (l) the USD recognises that there are grounds for making operational improvements. The USD has in fact already started a major review of all of its cleansing services, including the refuse collection service. The review not only covers the recommendations made in the Audit report but it also goes even further, such as the USD’s wish to introduce ISO 9000 Quality Management Systems to its cleansing services.

50. The Director of Urban Services has also made the following comments on specific issues raised in the Audit report:

Excess capacity of the RCTs

- (a) the USD notes the audit conclusion that the RCTs finished their daily work earlier than their official finishing time. Regarding the audit observation on the task and finish habit, the USD has put an end to this habit. In addition, the USD will again look into the operations of the RCTs, with a view to ensuring that the amount of work given to each team will fully occupy their daily working hours;
- (b) the current mode of operations in respect of refuse collection service was derived from a set of standardised work values determined in mid-1980s. With the passage of time and the changing circumstances, the factors which have a bearing on the work values have changed. These factors include the refuse yield, which is affected by demographic changes as well as housing developments, the working environment, the modus operandi of refuse collection, the types of RCV deployed, the design and quality of refuse bins, the refuse contents (e.g. more packaging material), the speed limit, the road network and the traffic condition. With the passage of time, the work values may no longer be applicable to the present day circumstances. The USD is in the process of carrying out a thorough review of its cleansing operations through the appointment of an outside consultant and with the assistance of its MSU (see paragraphs 50(e) to 50(h) below);
- (c) Audit's conclusion of significant non-productive time of the RCTs was based on the result of its analyses of the operation of 50 (out of 247) randomly selected refuse collection routes for the weeks of 24 to 30 August 1997, 23 to 29 November 1997 and 9 to 15 March 1998. While accepting the conclusion, the USD notes that the analyses did not take into account the various factors such as the seasonal fluctuations and the route-by-route fluctuations of refuse yield. As shown in Figure 1 in paragraph 16 above, the refuse yield fluctuates. The difference in refuse yield between the peak (3,330 tonnes) and the trough (3,084 tonnes) was about 8% (Note 9). The daily fluctuation of refuse yield (Note 10) and the fluctuation between one route and another (Note 11) can be similarly significant. However, the audit review did not cover the peak season from June to July;

Note 9: *The weight of refuse collected daily by the USD during the months from May to August 1997 was about 5% higher than that in the remaining eight months of 1997-98. Audit considers that one option of handling this 5% increase in the weight of refuse collected during the peak season could be to ask the RCTs to work overtime, instead of providing a spare capacity in the RCTs (see paragraph 16 above).*

Note 10: *Audit accepts that the time required to collect a load of refuse may vary slightly from day to day. However, this daily variation cannot explain the non-productive time of the RCTs which was as high as about 30% of the 7.5 working hours per shift (see Tables 1 and 2 above). In designing individual refuse collection routes, the USD can come up with averages which would serve as planning parameters for the service (see paragraph 49(c) above).*

Note 11: *In Audit's view, in planning refuse collection routes, the major factor for consideration should be the time required to collect the refuse which is in turn affected by many factors including the refuse yield. The USD should plan the refuse collection routes in such a way that the time required by the RCTs working on different refuse collection routes to collect the refuse does not fluctuate significantly. The fluctuation of refuse yield between one refuse collection route and another does not render any audit conclusions and recommendations invalid.*

- (d) the USD agrees with Audit's recommendations to freeze the procurement of RCVs and to review the excess capacity of RCTs. The USD has already suspended procurement action pending the outcome of the revision of the refuse collection routes based on a set of new work values and other considerations. Also arising from a departmental review in the latter part of 1998, the USD has already reduced the number of refuse collection routes by six. As mentioned earlier, the USD is now in the process of conducting a thorough review of the cleansing services which the USD hopes will allow it to further reduce the number of routes based on the current level of service. Whether the USD will be able to reduce the actual number of RCVs and RCTs, however, is dependent, to some extent, on the USD's proposed public consultation exercise during the review, regarding the community's expectations of the USD's services. Given the public's wish for a cleaner and healthier Hong Kong, the USD may find itself having to redeploy any surplus RCVs and manpower to improve its service in certain areas. The important point to observe is that the USD is a service provider;

Causes for significant amount of non-productive time

- (e) the USD shares Audit's concern over the amount of non-productive time. The crux of the problem is the set of standardised work values currently in use as mentioned in paragraph 50(b) above. In the absence of reliable and accurate work values for the preparation of refuse collection route schedules, it would be difficult to determine how much time the RCTs would need to complete their work in a shift;
- (f) accordingly, the USD's MSU commenced in December 1998 to examine the operations of the RCTs. The MSU will then proceed to conduct the relevant time and motion studies in the next three months. At the same time, the USD has commissioned a consultancy review for six months to assist it to undertake the fundamental and comprehensive review of its cleansing services including refuse collection service. The consultant began work in January 1999 and will work closely with the MSU in this particular exercise;
- (g) it is expected that the MSU studies, scheduled to be completed by April 1999, will derive a revised set of work values essential for rescheduling refuse collection routes and enhancing the efficiency of refuse collection service. Thereafter, the USD would seek the UC's endorsement of the revised work values;
- (h) concurrently, the USD is also approaching local tertiary institutes with a view to developing computer models for its cleansing services including refuse collection service to provide for a more scientific planning system. The planning of refuse collection routes is, to a large extent, a manual exercise undertaken by officers who rely on their field experience to draw up optimal routing for the RCVs. The USD hopes, with the help of computer modelling, to achieve greater efficiency in vehicle and manpower deployment;
- (i) meanwhile, in addition to the reduction of six routes as set out in paragraph 50(d) above, the USD has taken steps to try to ensure that the RCTs work until the end of the shift, has tightened up supervision, and has endeavoured to ensure that the RCTs will not carry smaller number of loads of refuse than planned;

Monitoring of the performance of RCTs

- (j) the USD accepts Audit's recommendation. The USD is studying a number of vehicle electronic devices and systems jointly with the Government Land Transport Agency and the Regional Services Department with a view to introducing the most suitable monitoring system for the Government's vehicle fleet, with priority given to RCVs. A plan is in hand to evaluate an electronic device known as Fleetlogger in some RCVs in March 1999. The USD is also looking at Global Positioning Sky-eye vehicle location systems and Global System Mobile Services communication devices that will enable real-time monitoring of its refuse collection operations. Subject to the outcome of these trials, the USD will seek the UC's agreement to effect the installation on all RCVs;
- (k) pending the outcome of the USD's detailed study, there may be scope for further reduction in the number of RCTs to minimise their balance time;

Overloading of RCVs

- (l) the USD is also concerned about the overloading problem. The USD is conducting a trial scheme on the installation of an on-board weighing device on six RCVs. The device is intended to warn drivers when the RCVs are overloaded. More such devices will be procured if the trial scheme proves to be successful;

Provision of relief RCVs

- (m) the USD agrees with Audit's findings and will take immediate steps to rectify the situation. Indeed, the USD has suspended the purchase of RCVs with a view to reducing the number of relief vehicles to an acceptable minimum. The USD will adhere to the ARR, and will review the ARR from time to time in the light of operational experience;
- (n) the USD notes Audit's findings on the large discrepancies in downtime rates between Hong Kong Region and Kowloon Region. The USD is taking action to determine the reasons for the differences with the aim of rationalising the calculation of the vehicle downtime rates for various categories of RCVs in the two regions; and

Contracting out of refuse collection service

- (o) the USD will be actively examining the scope for contracting out cleansing services including refuse collection service. The scope of contracting out would be subject to conditions such as the satisfactory redeployment of redundant staff, the availability of competent and reliable contractors and the provision of quality services to the public. The consultancy review covers the subject of contracting out and the consultant is tasked

to come up with recommendations on an appropriate plan. Meanwhile, the USD has suspended recruitment to fill Workman II vacancies.

RESPONSE FROM THE UC

51. On 10 May 1999, the **Chairman of the UC** forwarded to Audit the following comments:

Excess capacity of the RCTs and causes for significant amount of non-productive time

- (a) regarding the audit conclusions in paragraphs 47(a) to 47(h) above,
 - (i) the UC's policy has all along been to balance cost-effectiveness with the public's expectations for refuse collection service. The UC will continue to monitor the USD's effort in reducing and re-planning the refuse collection routes with a view to providing the most cost-effective service;
 - (ii) on the planning of refuse collection routes, the UC opines that the USD should estimate as accurately as possible the total amount of refuse to be collected and, based on this information, calculate the average amount of refuse to be collected to facilitate future planning of refuse collection service and to explain the basis of the USD's calculations to the UC. The UC also urges the USD to seek from outside suitable computer software for planning refuse collection routes;
 - (iii) though there are variables in planning refuse collection service as stated by the USD, the UC does not accept the fact that even with all these variables, the USD cannot ensure that there is always no non-productive time. The UC would monitor the USD to minimise and make better use of the non-productive time through administrative measures as far as possible. The USD should also provide concrete plans on how to better utilise the non-productive time;
 - (iv) the UC requests the USD to study the feasibility of providing midnight or overnight refuse collection service (including whether Hong Kong citizens will accept the implications of the proposal, for example, noise produced during the operation) with a view to saving expenditure. The USD will submit a report to the relevant select committee; and
 - (v) the UC disagrees with the USD's statement in paragraph 49(j) above that UC Members' judgement is "often based on the feedback they receive from their constituents and it is natural that they tend to hear complaints more than praise for the USD's services". Members have all along been cautious in monitoring the services provided by the USD and giving advice to the USD for improvement;

Contracting out of refuse collection service

- (b) regarding the audit conclusion in paragraph 47(i) above, the UC would instruct the USD to actively examine the contracting out of cleansing services including refuse collection service. In addition, the USD will also study the feasibility of providing late evening or overnight refuse collection service so as to utilise resources effectively. The relevant select committees will examine the report on this study in detail;

Overloading of RCVs

- (c) regarding the audit conclusion in paragraph 47(j) above, the USD is requested to closely monitor the matter and take follow-up action as appropriate; and

Provision of relief RCVs

- (d) regarding the audit conclusions in paragraphs 47(k) and 47(l) above, the UC will urge the USD to establish for each category of RCVs two ARRAs, one for Hong Kong Region and one for Kowloon Region, so that the prevailing downtime rates are fully reflected.

52. The Chairman of the UC has also informed Audit that at the UC's Finance Select Committee meeting held in September 1998, the UC instructed the USD to freeze the procurement of RCVs. As a result, a saving of \$100 million in expenditure was achieved. The UC will continue to monitor the USD's utilisation of resources in the provision of refuse collection service with a view to achieving the most cost-effective mode of operation.

**Required number of single RCV refuse collection routes
for the week from 9 to 15 March 1998**

| District | Number of existing routes | Number of routes required after rearranging the routes | Number of surplus routes (Note) |
|---|------------------------------|--|---------------------------------------|
| | (a) | (b) | (c) = (a) - (b) |
| Day shift | | | |
| Central | 9 | 9 | 0 |
| Eastern | 19 | 15 | 4 |
| Southern | 19 | 17 | 2 |
| Wan Chai | 11 | 11 | 0 |
| Western | 6 | 6 | 0 |
| Kowloon City | 18 | 13 | 5 |
| Kwun Tong | 24 | 15 | 9 |
| Mong Kok | 7 | 6 | 1 |
| Sham Shui Po | 18 | 14 | 4 |
| Wong Tai Sin | 14 | 13 | 1 |
| Yau Tsim | 8 | 7 | 1 |
| Total for day shift | 153 | 126 | 27 |
| Evening shift | | | |
| Central | 5 | 4 | 1 |
| Eastern | 9 | 5 | 4 |
| Southern | 5 | 3 | 2 |
| Wan Chai | 4 | 2 | 2 |
| Western | 5 | 3 | 2 |
| Kowloon City | 8 | 5 | 3 |
| Kwun Tong | 10 | 5 | 5 |
| Mong Kok | 3 | 2 | 1 |
| Sham Shui Po | 6 | 3 | 3 |
| Wong Tai Sin | 10 | 5 | 5 |
| Yau Tsim | 5 | 3 | 2 |
| Total for evening shift | 70 | 40 | 30 |
| Total for both day shift and evening shift | 223 | 166 | 57 |

Source: Audit's analysis of the records of the EPD and the USD

Note: During the week from 9 to 15 March 1998, 30 RCTs working on single RCV refuse collection routes claimed overtime allowance regularly. They actually carried out refuse collection work during the time period for which they claimed overtime allowance. Audit did not rearrange their routes but determined the number of surplus routes on the basis that they would continue to perform the same amount of overtime work.

**Required number of TT refuse collection routes
for the week from 9 to 15 March 1998**

| Region | Number of existing routes | Number of routes required after rearranging the routes | Number of surplus routes (Note) |
|---|----------------------------------|---|--|
| | (a) | (b) | (c) = (a) - (b) |
| Day shift | | | |
| Hong Kong Region | 5 | 3 | 2 |
| Kowloon Region | 7 | 6 | 1 |
| Total for day shift | 12 | 9 | 3 |
| Evening shift | | | |
| Hong Kong Region | 4 | 2 | 2 |
| Kowloon Region | 2 | 2 | 0 |
| Total for evening shift | 6 | 4 | 2 |
| Total for both day shift and evening shift | 18 | 13 | 5 |

Source: Audit's analysis of the records of the EPD and the USD

Note: During the week from 9 to 15 March 1998, three RCTs working on TT refuse collection routes claimed overtime allowance regularly. They actually carried out refuse collection work during the time period for which they claimed overtime allowance. Audit did not rearrange their routes but determined the number of surplus routes on the basis that they would continue to perform the same amount of overtime work.

Financial consequences of surplus RCTs

Estimated staff cost

The staff cost of the RCTs working on single RCV refuse collection routes in 1997-98 was \$141.4 million. The estimated staff cost of the 26% surplus RCTs in 1997-98

$$= \$141.4 \text{ million} \times 26\% = \$36.8 \text{ million}$$

The staff cost of the RCTs working on TT refuse collection routes in 1997-98 was \$6.1 million. The estimated staff cost of the 28% surplus RCTs in 1997-98

$$= \$6.1 \text{ million} \times 28\% = \$1.7 \text{ million}$$

Therefore, the estimated staff cost of the surplus RCTs in 1997-98

$$= \$36.8 \text{ million} + \$1.7 \text{ million} = \underline{\underline{\$38.5 \text{ million}}}$$

Estimated replacement cost of surplus RCVs

The replacement cost of the compaction-type RCVs used for single RCV refuse collection routes as at 1 April 1998 was \$286 million. The estimated cost of the 18% surplus compaction-type RCVs

$$= \$286 \text{ million} \times 18\% = \$51.5 \text{ million}$$

The replacement cost of the tractors used for TT refuse collection routes as at 1 April 1998 was \$23 million. The estimated cost of the 25% surplus tractors

$$= \$23 \text{ million} \times 25\% = \$5.8 \text{ million}$$

Therefore, the estimated replacement cost of the surplus RCVs (compaction-type RCVs and tractors) as at 1 April 1998

$$= \$51.5 \text{ million} + \$5.8 \text{ million} = \underline{\underline{\$57.3 \text{ million}}}$$

Appendix D
(paragraph 21 refers)

Different work values used for tasks in different refuse collection routes

| Type of RCVs | Task | Lowest work value | Highest work value | Highest work value exceeds lowest work value by |
|------------------------|---|-------------------|--------------------|---|
| | | (a) | (b) | (c) = $\frac{(b) - (a)}{(a)} \times 100\%$ |
| | | (minutes) | (minutes) | |
| Haller | Loading one rectangular bin of refuse | 1.00 | 1.43 | 43% |
| | Loading one basket of refuse | 0.25 | 0.40 | 60% |
| | Loading one cubic metre of bulky refuse | 2.00 | 2.33 | 17% |
| Norba (6 tonnes) | Loading one rectangular bin of refuse | 0.50 | 1.50 | 200% |
| | Loading one basket of refuse | 0.19 | 0.33 | 74% |
| | Loading one cubic metre of bulky refuse | 0.40 | 4.80 | 1,100% |
| Norba (12 tonnes) | Loading one rectangular bin of refuse | 1.00 | 1.67 | 67% |
| | Loading one basket of refuse | 0.25 | 0.25 | 0% |
| | Loading one cubic metre of bulky refuse | 2.20 | 2.30 | 5% |
| Phoenix (6 tonnes) | Loading one rectangular bin of refuse | 1.00 | 3.00 | 200% |
| | Loading one basket of refuse | 0.20 | 0.33 | 65% |
| | Loading one cubic metre of bulky refuse | 2.20 | 3.50 | 59% |
| Phoenix (12 tonnes) | Loading one rectangular bin of refuse | 1.00 | 1.10 | 10% |
| | Loading one basket of refuse | 0.20 | 0.30 | 50% |
| | Loading one cubic metre of bulky refuse | 2.20 | 2.40 | 9% |
| Presspack | Loading one basket of refuse | 0.14 | 0.50 | 257% |
| | Loading one cubic metre of bulky refuse | 2.20 | 2.50 | 14% |

Source: Audit's analysis of USD's refuse collection route schedules

Appendix E
(paragraph 44 refers)

**Downtime rates of RCVs in Hong Kong Region
for the period January to September 1998**

| Month | Downtime rates by category of RCVs | | | | |
|----------------|---|----------------|-----------------|----------------|----------------|
| | 4-tonne | 6-tonne | 12-tonne | Tractor | Trailer |
| Jan. 98 | 10.3% | 17.2% | 28.0% | 18.0% | 15.4% |
| Feb. 98 | 31.0% | 21.8% | 6.5% | 22.6% | 12.7% |
| Mar. 98 | 11.0% | 21.4% | 26.9% | 20.3% | 23.3% |
| Apr. 98 | 10.3% | 23.4% | 1.1% | 12.9% | 13.1% |
| May 98 | 23.9% | 20.4% | 31.2% | 38.7% | 15.1% |
| June 98 | 9.3% | 17.2% | 21.1% | 19.1% | 15.1% |
| July 98 | 20.3% | 21.8% | 30.1% | 25.8% | 20.4% |
| Aug. 98 | 19.4% | 20.6% | 0.0% | 34.1% | 21.1% |
| Sept. 98 | 18.7% | 15.1% | 27.8% | 20.5% | 15.1% |
| Average | 17.1% | 19.9% | 19.2% | 23.6% | 16.8% |

Source: Audit's analysis of USD's records

Note: During the period January to September 1998, there were no lorries in Hong Kong Region.

Appendix F
(paragraph 44 refers)

**Downtime rates of RCVs in Kowloon Region
for the period January to September 1998**

| Month | Downtime rates by category of RCVs | | | | | |
|----------------|------------------------------------|-------------|-------------|--------------|-------------|-------------|
| | Lorry | 4-tonne | 6-tonne | 12-tonne | Tractor | Trailer |
| Jan. 98 | 0.0% | 0.0% | 6.0% | 4.7% | 2.8% | 0.4% |
| Feb. 98 | 0.0% | 15.5% | 6.4% | 3.4% | 2.3% | 0.0% |
| Mar. 98 | 0.0% | 0.0% | 8.1% | 11.4% | 2.1% | 1.0% |
| Apr. 98 | 0.0% | 0.0% | 7.3% | 9.0% | 5.0% | 0.7% |
| May 98 | 6.5% | 0.0% | 5.4% | 17.0% | 1.2% | 1.4% |
| Jun. 98 | 6.7% | 10.0% | 6.8% | 17.3% | 1.8% | 0.0% |
| Jul. 98 | 0.0% | 23.7% | 9.7% | 11.8% | 4.1% | 0.1% |
| Aug. 98 | 11.8% | 0.0% | 8.6% | 13.3% | 0.0% | 0.3% |
| Sept. 98 | 20.0% | 0.0% | 9.4% | 8.4% | 6.7% | 3.2% |
| Average | 5.0% | 5.5% | 7.5% | 10.7% | 2.9% | 0.8% |

Source: Audit's analysis of USD's records

Appendix G
(paragraph 46 refers)

Actual relief ratios of RCVs as at 1 April 1998

| Category of RCVs | Hong Kong Region | Kowloon Region | Overall |
|-------------------------|-------------------------|-----------------------|----------------|
| Lorry | Not applicable (Note) | 0.0% | 0.0% |
| 4-tonne | 16.7% | 33.3% | 20.0% |
| 6-tonne | 29.2% | 17.6% | 22.4% |
| 12-tonne | 33.3% | 20.0% | 22.2% |
| Tractor | 37.5% | 27.3% | 31.6% |
| Trailer | 33.3% | 35.0% | 34.3% |

Source: Audit's analysis of USD's records

Note: There were no lorries in Hong Kong Region as at 1 April 1998.

Replacement cost of surplus relief RCVs as at 1 April 1998
based on the current ARR of 25%

| Category of RCVs | Actual number of RCVs | Required number of RCVs according to ARR of 25% | Surplus RCVs (Note 1) | Replacement cost of surplus RCVs (\$ million) |
|--|--------------------------|--|--------------------------|--|
| | (a) | (b) | (c) = (a) - (b) | |
| Hong Kong Region | | | | |
| 4-tonne | 12 | 14 | 0 | 0 |
| 6-tonne | 72 | 68 | 4 | 5.32 |
| 12-tonne | 3 | 3 | 0 | 0 |
| Tractor | 8 | 7 | 1 | 1.05 |
| Trailer | 15 | 14 | 1 | 0.85 |
| Total for Hong Kong Region | | | 6 | 7.22 |
| Kowloon Region | | | | |
| Lorry | 3 | 4 | 0 | 0 |
| 4-tonne | 3 | 3 | 0 | 0 |
| 6-tonne | 102 (Note 2) | 112 | 0 | 0 |
| 12-tonne | 15 | 16 | 0 | 0 |
| Tractor | 11 (Note 3) | 11 | 0 | 0 |
| Trailer | 20 (Note 4) | 18 | 2 | 1.70 |
| Total for Kowloon Region | | | 2 | 1.70 |
| Overall total for Hong Kong and Kowloon Regions | | | 8 | 8.92 |

Source: Audit's analysis of USD's records

Note 1: If (b) is greater than (a), (c) will be taken as zero.

Note 2: The actual number of RCVs excluded four 6-tonne RCVs pending return to the Government Land Transport Agency.

Note 3: The actual number of RCVs excluded three tractors pending return to the Government Land Transport Agency.

Note 4: The actual number of RCVs excluded four trailers pending return to the Government Land Transport Agency.

Appendix I
(paragraph 46 refers)

**Replacement cost of surplus relief RCVs as at 1 April 1998
based on the ARR of 20% as proposed by the USD in 1986**

| Category of RCVs | Actual number of RCVs | Required number of RCVs according to ARR of 20% | Surplus RCVs (Note 1) | Replacement cost of surplus RCVs (\$ million) |
|--|--------------------------|--|--------------------------|--|
| | (a) | (b) | (c) = (a) - (b) | |
| Hong Kong Region | | | | |
| 4-tonne | 12 | 13 | 0 | 0 |
| 6-tonne | 72 | 64 | 8 | 10.64 |
| 12-tonne | 3 | 3 | 0 | 0 |
| Tractor | 8 | 7 | 1 | 1.05 |
| Trailer | 15 | 13 | 2 | 1.70 |
| Total for Hong Kong Region | | | 11 | 13.39 |
| Kowloon Region | | | | |
| Lorry | 3 | 4 | 0 | 0 |
| 4-tonne | 3 | 3 | 0 | 0 |
| 6-tonne | 102 (Note 2) | 105 | 0 | 0 |
| 12-tonne | 15 | 15 | 0 | 0 |
| Tractor | 11 (Note 3) | 10 | 1 | 1.05 |
| Trailer | 20 (Note 4) | 17 | 3 | 2.55 |
| Total for Kowloon Region | | | 4 | 3.60 |
| Overall total for Hong Kong and Kowloon Regions | | | 15 | 16.99 |

Source: Audit's analysis of USD's records

Note 1: If (b) is greater than (a), (c) will be taken as zero.

Note 2: The actual number of RCVs excluded four 6-tonne RCVs pending return to the Government Land Transport Agency.

Note 3: The actual number of RCVs excluded three tractors pending return to the Government Land Transport Agency.

Note 4: The actual number of RCVs excluded four trailers pending return to the Government Land Transport Agency.

Acronyms and abbreviations

| | |
|---------------------------------------|---|
| ARR | Agreed Relief Ratio |
| EHS | Environmental Hygiene Section |
| EPD | Environmental Protection Department |
| MSU | Management Services Unit |
| RCTs | Refuse collection teams |
| RCVs | Refuse collection vehicles |
| Single RCV refuse collection route | Refuse collection route operated with a single RCV |
| TMIS | Transport Management Information System |
| TT refuse collection route | Refuse collection route operated with a tractor and one or more trailers |
| UC | Provisional Urban Council |
| USD | Urban Services Department |