

PART A

ADMINISTRATIVE AND FINANCIAL ASPECTS OF SOLID WASTE MANAGEMENT IN K WEST WARD, BOMBAY

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A-1. INTRODUCTION

This part reviews administrative and financial aspects at the ward level (Ward K West - Andheri) and at city level. It also discusses the management of clinical and industrial solid wastes.

The information was obtained by means of interviews with the Ward Officer (WO), officials of K-West Ward and officers of the SWM Department of the MCGB. Information was also collected from the public, from councillors, official records, public- and private hospitals and from the office of the Pollution Control Board (PCB).

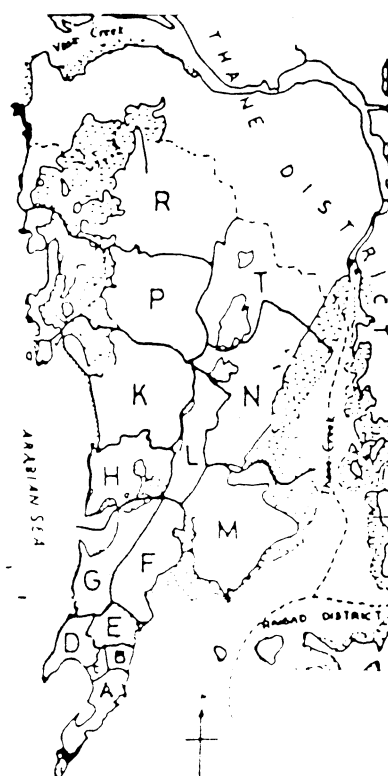
A-2. DESCRIPTION OF THE STUDY AREA

Some general features of the study area are outlined briefly in Section A-2.1 before present solid waste management procedures in K-West Ward are described in A-2.2.

A-2.1 General features of the K-West Ward

K-West is one of 23 wards in the city of Bombay. The total area of this ward is about 23.29 square kilometres with a population of about 580,000 (1991 census, 5.8 lakhs). Middle and high income housing areas consist primarily of high rise buildings; in addition there are 68 declared slums in K-West Ward (7 on municipal land, 15 on Government and 46 on private property). The location of K-West Ward is shown in Figure A-2.1.

Figure A-2.1: Greater Bombay Wards



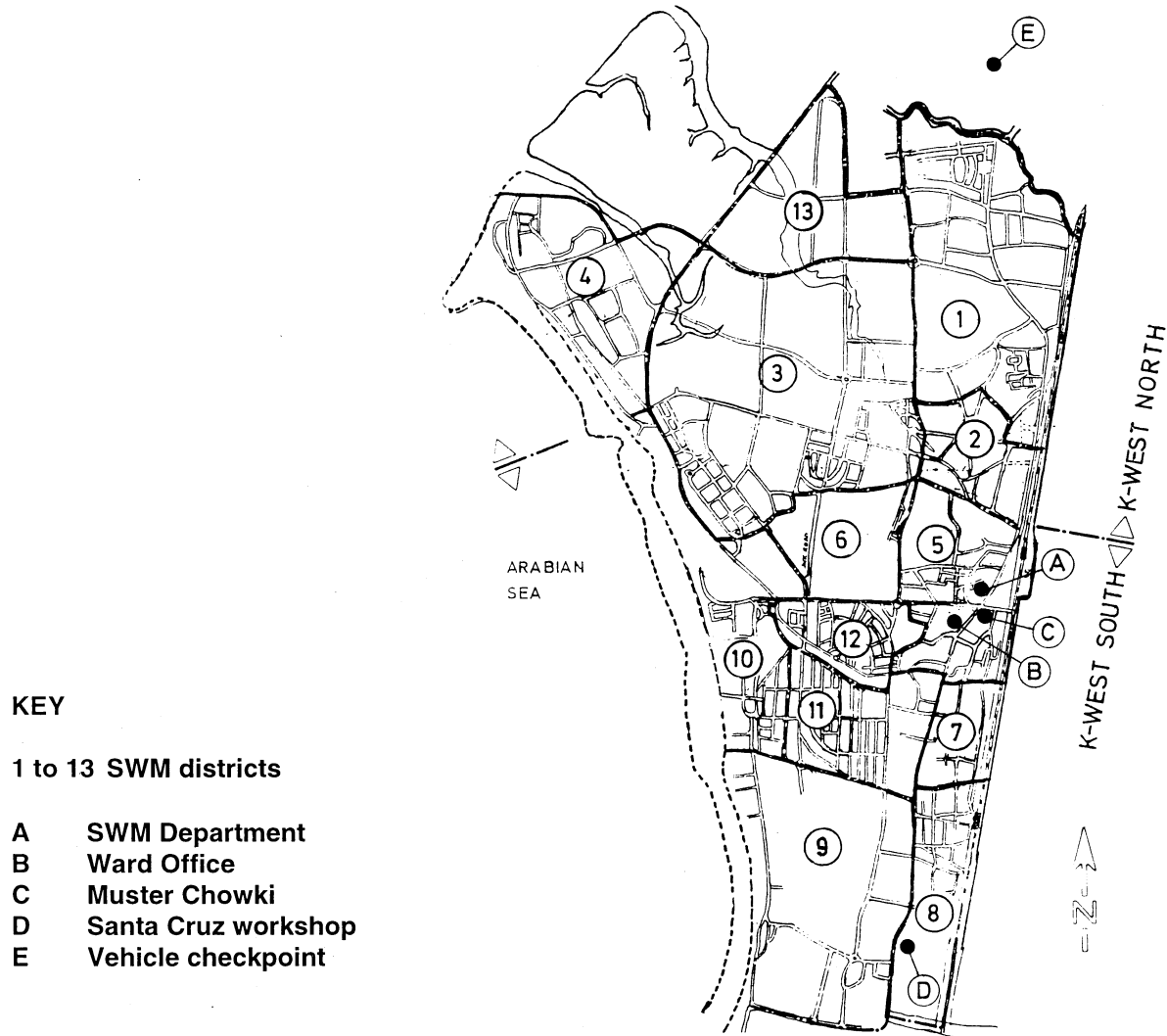
WARD	AREAS
A	Colaba - Fort
B	Mandvi - Chakala Umarchadi - Dongri
C	Kumbharwada - Buleshwar Dhobitalao - Answadi
D	Khetwadi - Girgaon Walkeshwar - Mahalaxmi
E	Tardeo - Mazagon - Nagpada Kamathipura - Byculla
F	Parle - Sewri - Naigaum Matunga - Sion
G	Dadar - Mahim - Prabhadevi Worli - Chinchpokli
H	Bandra - Khar - Pali Santa Cruz
K	Vile Parle - Juhu - Andheri Jogeshwari - Versowa
L	Kurla
M	Chembur - Mahul - Mankhurd Deonar - Trombay
N	Ghatkoper - Vikhroli - Bhandup
P	Goregon - Aerey - Malad - Manori
R	Kandivli - Borivali - Akurli - Eksar - Dahisar
T	Mulund

The ward is represented by eight Councillors, two Members of Legislative Assembly (MLA) and one Member of Parliament (MP).

A-2.2 Solid waste management system in K-West Ward

For the purposes of solid waste management [SWM] the ward is divided in two administrative zones (northern and southern zones). These zones are further divided in 13 SWM districts as shown in Figure A-2.2.

Figure A-2.2: SWM facilities and SWM districts in K-West Ward



Street sweeping and drain cleaning activities are organised by Junior Overseers (JO's), who are assigned to the SWM districts (one JO per district). There are eight Muster Chowkies (Junior Overseer Offices) located in K-West Ward. Municipal sweepers, drain cleaners (DC's) and mukadams (foremen) meet in these chowkies and day-to-day duties are assigned to them by JO's.

Street sweeping and drain cleaning activities are carried out seven days per week (single shift operation).

Community bins and containers are used for storage of domestic and commercial refuse as well as for storage of street sweepings. In addition about 925 premises, mainly high rise flats and hotels, are served by house to house collection.

Figure A-2.2 further shows the location of the Ward Office, the Solid Waste Management Department (SWMD) and of Santacruz Workshop.

Refuse collection and transport is carried out by vehicles of the SWMD (16 vehicles) as well as by vehicles and drivers of private contractors (25 vehicles including drivers). Personnel of the SWMD (motor loaders and mukadams) are assigned to all vehicles at the Motor Loader Chowki (see Figure A-2.2). Vehicle loads are recorded at a Check Point (see Figure A-2.2) before the trucks leave to the disposal site.

Collection and transport is carried out in two shifts, seven days per week (with reduced crews on Sundays).

According to information obtained from the Ward Officer (WO) the total amount of refuse collected in K-West is about 170 tons per day.

In addition, removal of debris (mainly construction waste) is entirely carried out by a private contractor (using 8 vehicles and providing labourers).

Collection, transport and disposal aspects are analysed by Groups B, C and D respectively. Organisational aspects are discussed in section A-3 below.

A-3 ORGANISATION AND MANPOWER

This section is subdivided in five subsections as follows:

The existing organisation structure is discussed in A-3.1 before procedures for data collection and monitoring are set out in A-3.2. Section A-3.3 deals with personnel management and workers' health, and A-3.4 with qualifications and training aspects. Finally, public relation functions are analysed in Section A-3.5.

A-3.1 ORGANISATION STRUCTURE

Based on information obtained from the Chief Engineer/SWM (CE/SWM) the organisational chart of the Solid Waste Management Department (SWMD) of Municipal Corporation of Greater Bombay (MCGB) is shown in Appendix AA-I.1.

The CE/SWM at central level is assisted by a Research and Development wing (R&D wing) consisting of one Executive Engineer, three Assistant Engineers and Sub-Engineers. Finalisation of annual contracts and purchase of sanitary equipment is the responsibility of the R&D wing.

According to information obtained in the SWMD the number of supervisory and administrative staff provided at each level is considered sufficient.

Appendix AA-I.2 shows the organisational chart of the SWMD in K-West Ward.

It is shown in the figure that there is a well structured organisational set-up in SWM with sweepers at the lowest level and AHS heading the department.

The supervising cadre at K-West Ward level consists of 17 Junior Overseas (JO's), two Supervisors and one Assistant Head Supervisor (AHS). Out of the 17 JO's 13 are assigned

to SWM districts, 2 are responsible for transport arrangements and 2 are based at the vehicle checkpoint (one per shift).

The AHS is in charge of conservancy staff in the ward and is responsible for all activities of the SWMD in the ward, under the direction and control of the WO. For technical guidance and control the AHS reports to the DHS (at central level), who in turn is guided by HS, DCE and CE/SWM.

The total number of labourers who are permanently employed in K-West Ward for SWM is 876. This includes 77 mukadams, 498 sweepers, 19 drain cleaners, 135 halalkhores and 147 motor loaders. In addition there are about 340 labourers who are employed on a daily wage basis.

Relating the number of labourers to the inhabitants of K-West Ward, the staffing ratio is about 2.1 labourers per 1,000 inhabitants (876+340 labourers x 1,000 / 580,000 inhabitants).

A-3.2 DATA COLLECTION AND MONITORING

This section will provide some information regarding solid waste transport records. The record system employed in Muster Chowkies (sweepers, DC's and halalkhore) is described in Part B.

(i) Monitoring of refuse collection vehicles

The JO at the Motor Loader Chowki keeps an entry register of MCGB and contractors vehicles employed in K-West for refuse collection. Vehicle loads are recorded at a check point before they leave to the dumping ground. At the dumping ground the log slips are checked and stamped and an entry is made in a register. At the ward level and at the Central Office this data is collected and maintained. This provides a counter check for monitoring the shortfalls of vehicles between the requirements of the field staff and the supply by the contractor and municipal transport staff. The information is compiled at the Central Office by the CE/SWM and submitted by the DMC to the Commissioner. In case of a shortfall of vehicles in K-West Ward during the day vehicles are requisitioned at night and the backlog is cleared. Standing instructions exist to cover this eventuality.

SUGGESTION: The record keeping system described appears to be functioning well and be proper and adequate. However, it has been observed that, even in the Central Office all records and files are kept manually without using modern data processing equipment. Therefore the capabilities of processing the data are limited. Considering the very large number of data collected it may be advisable to introduce computer technology and software for data processing. The use of computerised data recording and processing systems should probably start at the central level before being extended to the ward level.

(ii) Exchange of information and data

At present there is no institutional arrangement for regular exchange of information between MCGB and other bodies in the country. AILSG through its publications disseminates reports on the adoption of new technology but not on the longer-term results and operational aspects.

SUGGESTION: It may be advantageous to introduce a SWM data exchange system between municipal corporations of major cities in India. The MCGB could, for instance distribute an annual review of main activities, innovations and experiences in the SWM sector and encourage other municipal corporations to provide similar information.

A-3.3 PERSONNEL MANAGEMENT AND WORKERS' HEALTH

Aspects of personnel management are divided into supervision and control [paragraph (i)], recruitment and promotion [paragraph (ii)], motivation [paragraph (iii)] and finally workers health in paragraph (iv).

(i) Supervision and control

The supervisory cadre at the ward level consists of JO to AHS as shown in Appendix AA-I.1. Inspection rounds of JO's and supervisors are considered adequate but they seem to be demoralised on account of the Union's militancy and politicisation of strikes. There are no incentives provided for good performance from JO's to HS level and there is no input of technical know how at this level. This was admitted and confirmed by a JO off the record.

The AHS is controlled twice, i.e. he reports to WO for operation control and DHS at the central level for technical matters. According to discussions held with the DCE and AHS the system is working smoothly without any contradiction.

Due to different technical backgrounds the interaction between the Research and Development (R&D) and the Operational wing is non-existent. The R&D wing does not seem to have surveyed the ward to assess the generation of refuse in the areas in order to provide an adequate number of community bins and containers to the localities. As a result it has been reported that many of the bins are overflowing. This was confirmed by an inspection when refuse was found outside all of the 35 community bins inspected.

Regarding supervision of workers it has been reported that only a small percentage of sweepers, mukadams and motor loaders wear the uniforms provided by the SWMD. Reasons may include that they prefer to remain inconspicuous in order to be able to work in private premises during official working hours. It has been mentioned that enforcement of wearing uniforms is difficult because there is only one uniform provided per person. Therefore washing and repair is always an excuse for not wearing the uniform.

SUGGESTIONS:

- There was some indication that municipal engineers are not happy to be posted to solid waste management, and so they do not show much interest in their work and try to get transferred to a different responsibility as soon as possible. Consideration should be given to finding ways of making solid waste management more attractive to engineers. This might be done by encouraging engineers to make a career in solid waste management by making the posts non-transferable. Other measures would also be needed to improve the status and working conditions of solid waste management engineers. The same argument applies to the post of Public Health Engineer in the wards.
- It is further considered necessary to re-examine the duties and functions of DHS and HS and to define their duties properly in respect of supervisory control (e.g. JO's through AHS should give information in respect of overflowing bins). This may include the introduction of formatted records to cross check the actual supervision done which seems to be quite relaxed at the moment. Appendix AA-II suggests the layout of a proforma which could be employed for this purpose.
- To ease supervision and to reduce the time spent during official working hours by sweepers working unofficially on private premises for individual gain, the wearing of uniforms should be strictly enforced. Therefore sweepers, DC's and halalkhores should each be provided with two sets of uniforms and identification badges and instructed to

wear them during official working hours. This could further include the introduction of a master-roll card system for labour (i.e. cards are filled in by the JO's in the morning and held by the workers).

- For indirect control at the ward level a 'Safai Watch Committee', headed by the Local Councillors and consisting of 5 or 7 prominent citizens, may be formed to assist the AHS and to achieve stricter supervision. The Public Health Engineer may be involved in this activity.
- Another suggestion to improve supervision may be the introduction of an Inter-Ward Competition for the entire supervisory staff (from JO to AHS). A cash award may be given along with a citation as an incentive (For example, a cash award of Rs 500 for JO's, Rs 700 for Supervisors and Rs 1000 for the AHS would amount to an additional annual expenditure of about Rs 70,000, but it is likely that the savings from higher productivity would be many times this figure.)

(ii) Recruitment and promotion

Recruitment and promotion policies are well defined for the entire staff. A deserving and ambitious sweeper can rise up to the level of HS. Based on seniority and subject to suitability, sweepers, halalkhores and DC's may be promoted to mukadam. Labourers and mukadams doing especially good work are rewarded in kind every year on the recommendations of AHS.

The provisions of punishment for delinquent staff exist under the BMC Act. Measures for the punishment of sweepers, halalkhores, DC's and mukadams include rotation in the ward. All other posts are transferable throughout the Greater Bombay area after a normal tenure of 3 years. The engineering staff of SWM is transferable within the MCGB but the staff from JO to AHS are non-transferable outside the SWMD. Therefore it can be concluded that there is an adequate provision for disciplinary action for delinquencies as well as for rewards for good work.

According to information obtained, about 2/3 of the vacancies at JO level are filled by direct recruitment and 1/3 by promotion from eligible staff within the department. It has been reported that the majority of sweepers and mukadams are employed for many years with the MCGB and that there is no shortage of labour. In fact, most of the workers, who are actually employed on a daily wage basis, would prefer to become permanent employees of the SWMD. Reasons include that the pay scales and salary of SWM staff (see Appendix AA-IV.1) are quite comparable and even rather better than those of equivalent employees in the private sector and other parts of the public sector.

SUGGESTIONS:

- Due to the high job satisfaction of labour there seems to be little or no need to provide additional incentives. This situation may allow some freedom to increase the work load of these personnel (see (iii) below). However, for providing social security, the three categories - sweepers, DC's and halalkhores - should be offered an insurance under a group insurance scheme, covering disablement and death (e.g. for cover of up to Rs 50,000/-, fees of about Rs 50/- per month may be deducted from each worker's salary).
- There may be benefit in using names with less of a social stigma than *halalkhores*, *sweepers* and *drain cleaner*. Job titles such as 'Safai Kamgar', 'Safai Karamchara', or any other respectable name might improve the public perception of the work. Improving the prospects and working conditions of workers by training and improved medical health care are discussed in (iii) and (iv) below.

(iii) Motivation

The general level of efficiency and workmanship is fairly low amongst mukadams, sweepers and loaders. According to information provided by one of the supervisors, only about 70% of the staff are available for actual work on any particular day. Records of one section in K-West North (on 1-12-92) indicate that out of 91 sweepers only 64 had presented themselves for work - 11 were absent, 5 on casual leave and 11 were taking their normal weekly day off). It has been further alleged that for seven days after receiving their wages 30% of the staff do not report for duty for almost a week because they are drunk.

Finally, it has been reported that sweepers and motor loaders do not work more than 3 1/2 hours in a shift of 7 hours (see Parts B and C). The remaining time is used to work on private premises for individual gain. The Union's militancy and loose supervision by mukadams and JO's contribute towards indiscipline and absenteeism.

Measures to increase the efficiency of mukadams, sweepers and loaders seem to be very difficult to implement because of the Union's militancy and politicisation of strikes. However, considering that about 73% of the total expenditure of SWM is spent on wages and salaries it is considered crucial to achieve an adequate performance of labour.

SUGGESTION: Possible routes for achieving increases in productivity may include a ban on fresh recruitment for vacancies arising out of promotions, retirements etc. for a period of at least 5 years. Other possible measures for increasing the efficiency of labour are discussed in Parts B and C. This may further include the involvement of the private sector in solid waste collection services as outlined in section A-4 below.

(iv) Workers' health

Sweepers, halalkhores and motor loaders are not provided with any kind of protective equipment. This results in health hazards to SWM staff. Appendix AA-VI shows that the total cost of equipping the workforce with protective equipment would be about Rs 10 lakhs. In addition there are no medical check ups for labour provided by the MCGB.

SUGGESTIONS

- All motor loaders, DC's and halalkhore as well as staff at the landfill site should be provided with protective gum boots, hand gloves and uniforms. The type of boots and gloves should be decided in consultation with the work-force, and they should be required to wear them. It has been further suggested to provide protective glasses to the motor loaders working with conventional trucks. To make sweepers more visible on vehicular roads it may be considered to provide them with shirts that have reflective bands.
- A thorough medical check-up should be provided at no charge to all manual personnel employed by the SWMD. This would allow the monitoring of health hazards faced by the staff and improvement of the working conditions.

A-3.4 QUALIFICATION AND TRAINING

Education and training qualifications of SWM personnel and training of manpower are discussed in (i) and (ii) respectively.

(i) Qualifications

The basic qualification for JO is SSLC pass and one year Sanitary Inspector (SI) course at AILSG. From JO to AHS level there are compulsory training courses run by CTIRC.

The minimum educational qualification for sweepers, halalkhores and DC's is first level standard education.

It has been mentioned that the appointment of engineering staff to the SWMD is treated as a kind of unwanted posting outside the mainstream of engineering and that engineers of the SWMD would therefore work without much interest in their jobs.

SUGGESTIONS

- Since the qualifications for JO onwards are SSLC it is felt that the exposure of such staff in the academic and technological field is limited. To improve the qualifications from supervisor onwards, completion of the Sanitary Inspector Course 1 may be considered as a requirement. In addition managerial and technical training inputs should be provided to this level.
- It is considered that, at ward level, being in charge of SWM should be a technical and senior post (e.g. a public health engineer 2). This would probably allow for better communication with other levels of the administration and would also provide better knowledge regarding the use of SWM data. The drawback is that engineers do not like postings in SWM. Therefore the SWM posting of engineers should be non transferable to other departments and the posts of DCE and CE could become a promotion post for departmental candidates.

(ii) Training

Sweepers, mukadams and motor loaders are the cutting edge functionaries in SWM department. It is unfortunate that no formal or informal training is provided to these personnel. In addition no efforts are made to impress upon them the importance of the work they carry out.

SUGGESTION: To ensure that the major workforce of the MCGB becomes more qualified some training should be provided at the lower levels. This may involve the trainers and facilities of the CTIRC, where training courses for more senior level personnel of the MCGB are held. It has been suggested that a three-day training course at CTIRC should be prepared for mukadams, sweepers, DC's and halalkhores (see Appendix AA-III). However, considering the large number of potential trainees (about 6,000) it is considered doubtful whether the capacity of the training institute is sufficient to conduct courses with a duration of several days. It is therefore suggested to further evaluate training needs and capabilities and to conduct some pilot sessions to establish the most suitable procedure. In any case audio visual media may be used and the workforce should be made aware of the importance of the work they are doing for society. The programme may aim at training the entire staff over a period of about 3 years, starting from junior-most employee. Refresher courses should be run after 5 years. The cost for introducing a three days training course may be about Rs 12 lakhs per year.

A-3.5 PUBLIC RELATIONS FUNCTIONS

Public relation functions of the SWMD are discussed in this section and include procedures for handling complaints [paragraph (i)] and publicity and awareness campaigns [paragraph (ii)].

(i) Handling complaints

At ward level replies to complaints are provided in writing to the complainant after the complaints have been attended to, and there is a well-defined procedure for receiving and handling complaints.

It has been observed that the records of the Complaints Officer in the Ward Office are quite up-to-date. However, record maintenance at the Central Office of MCGB is considered inadequate for monitoring purposes. At present the CE Office does not have any records of complaints.

SUGGESTION: To improve the co-operation between ward and central level it is suggested that the Complaint Officer sends a copy of every complaint, after action has been taken on it, to the CE Office (SWM). This would allow the Research and Development cell to analyse recurring complaints and take corrective measures. A modified procedure for better monitoring is suggested in Appendix AA-V. This procedure would allow the Central Office to research the data and to react more adequately.

(ii) Publicity and awareness campaigns

According to information obtained from the Public Relations Office (PRO) it was revealed that no special campaigns for educating children and the general public had ever been undertaken in respect of solid waste. However, special campaigns on conservation of water and planting more trees have been conducted by this office.

With regard to solid waste management and education of public in respect of the BMC Act, the Environmental Protection Act and other related laws, the contribution of PRO is negligible.

It was further observed that, during the last year, not even on a single occasion had any mass communication media been used to educate the public.

The group has also visited one municipal secondary school at the Tata Compound and met the Education Supervisor. She explained that there are chapters on personal and social hygiene in the curriculum of classes V to VII and VIII to X respectively. However, it was mentioned that there had been no interaction between the school, the Health Department and the SWMD.

Although the theoretical inputs in the school curriculum may be sufficient to impart an idea of solid waste hazards to the students they may not make a sufficient impact in absence of any audio-visual aids. School children and teachers have never been associated in any kind of cleanliness campaign in and around the area. As a result the students are not practising what they learn during the lessons and practical situations cannot be visualised by the students.

This information suggests that the lack of publicity and public awareness campaigns may be one of the most significant shortcomings in respect of solid waste management in Bombay. Some suggestions on how to improve the situation are outlined below.

SUGGESTIONS

- It is recommended that the Public Relations Office should be exhorted to take up community projects in all the wards regarding the involvement of the public in keeping Bombay clean.
- The use of mass media such as All India Radio, Bombay, Bombay Doordarshan and newspapers is suggested for disseminating information to the public, and an advertisement campaign through radio and newspapers may be considered.

- Cleanliness campaigns could be organised, in which MLA's, MP's, schools and colleges become involved practically. It is further suggested that personnel of the SWMD of K-West Ward visit various schools and colleges and interact with the staff and students to encourage them to keep their schools and surroundings clean.
- Audio visual films regarding cleanliness and proper refuse disposal could be developed and used for education campaigns in schools and communities. Hand bills and posters, giving slogans and directions, may be developed and distributed through newspapers. In addition hoardings could be designed and displayed at prominent places, community centres, schools and colleges. Activities may further include the organisation of marches by school children for a clean city, involving the general public.
- Another idea for conducting publicity campaigns would involve practical co-operation and interaction between schools and solid waste management personnel. School children and SWM staff could be practically involved in cleaning an area around their school. In addition, groups of children, led by a mukadam or Junior Overseer, could visit people in their homes and educate them regarding littering, proper use of community bins and the need of keeping the surroundings clean. As an incentive the MCGB may provide some refreshments to schoolchildren and others from voluntary organisations participating in the campaigns. It is expected that the expenditures involved in these activities would be minimal and can be met from the normal contingency allocation.
- Another suggestion to promote cleanliness would involve the Ward Officer as a pivotal officer for all departments, including education. This will probably allow for involvement of local councillors who may be amenable to suggestions made by Ward Officers. Cleanliness marches could be organised in different wards and placards and banners, depicting cleanliness slogans, may be carried by people to educate the public. It may further prove effective to sponsor popular personalities to canvass for cleanliness awareness.

Without co-operation from the public, keeping the streets clean is an immense task, but when the public take care of their environment the workload on the municipal labour force becomes manageable. The measures described here may help to make cleanliness the people's programme and therefore lead to a more healthy and clean environment and significant cost savings.

A-4 INVOLVEMENT OF THE PRIVATE SECTOR

The involvement of private contractors in refuse and debris removal is discussed in Section A-4.1. Some potential options for privatisation of refuse collection services, based on the experience gained from a recent project for beach cleaning by the private sector, are outlined in Section A-4.2.

A-4.1 REFUSE AND DEBRIS COLLECTION BY PRIVATE CONTRACTORS

Separate contracts for the hire of refuse- and debris collection vehicles are awarded in individual wards. In the case of refuse collection, motor loaders and mukadams of the SWMD are assigned to the contractor's vehicles, whereas the debris collection contract includes the provision of labour.

The terms of both contracts are detailed and safeguard the interest of MCGB and private contractors. The contracts are too long to be reproduced here, but copies are available from MCGB or WEDC.

Both contracts are generally allotted on the basis of open competitive tendering for the period of two years. According to information obtained in the SWMD the period of two years has been chosen to allow for economic viability and the fluctuation of market rates of various components. Contracts are approved by the Standing Committee.

(i) Refuse transport by private contractors

As already mentioned in section A-2.2, private contractors are commonly employed for solid waste transport. The ratio of municipal vehicles to contractors vehicles for refuse collection is about 1 : 1,5 in K-West Ward and 1 : 2,5 in the MCGB as a whole.

According to the CE (SWM) the cost for refuse collection by contractors' vehicles is about Rs 400 per shift whereas the cost of municipal vehicles is around Rs 765 per shift. (Further comparisons of costs are presented in Part C.)

Reasons for the considerably lower cost per shift of contractors' vehicles include that these vehicles are standard trucks, usually very aged and without tipping devices. Municipal trucks are mainly special purpose vehicles, such as compactor trucks and dumper placers, equipped with a mechanically operated container handling devices. Therefore contractors' vehicles involve manual loading and unloading whereas municipal trucks can be used in conjunction with refuse containers and bins. Loading of municipal vehicles is therefore more hygienic for the loading crew and far less labour intensive. In addition the municipal vehicles allow the transport of refuse in an enclosed vehicle body with provision for rapid unloading at the disposal site. However, all vehicles, municipal (mechanical loading of containers) and private (manual loading and unloading) are operated by a crew of six loaders and one mukadam.

It is recommended that unit costs (that is, the cost per ton or the cost per cubic metre of refuse transported) are a better measure of economic efficiency than the cost per shift because compactor trucks are able to carry considerably more refuse per shift than open trucks.

A more detailed analysis of vehicles is provided in Part C.

SUGGESTIONS

- One of the main reasons for private contractors not to provide special purpose vehicles is the shortness of the contract period - 2 years. To achieve a more competitive situation between municipal and private vehicles an increase in the contract period to say five years should be considered, with an extension of the contract for another five years

possible under certain conditions. This longer period might encourage the contractor to buy more suitable vehicles.

- In an effort to reduce costs for the operation of special purpose refuse collection vehicles it is suggested that the inclusion of the provision of labour and even the provision of containers and their maintenance into contracts with the private sector be considered.
- Comparing the work involved in manual loading and unloading of a standard truck with the work involved in handling containerised systems it is hardly justifiable to assign the same crew size to both types of vehicle. Hence, adjusting the crew size to the requirements of the different vehicles offers a very significant potential for a reduction in labour costs for solid waste collection and transport. However, due to the militancy of the Unions this is considered virtually impossible within the public sector. Therefore privatisation of refuse collection and transport, introduced on a pilot scale and probably gradually extended, may be the only option to reduce the costs involved in refuse collection and transport.

Following the strategy that adequate refuse storage facilities should be introduced in Bombay and that manual loading and unloading of refuse is not acceptable, the bidding procedure for contracts should give preference to contractors who provide closed vehicles with mechanical container handling and unloading arrangements.

(ii) Debris collection and transport by private contractors

Collection of debris (mainly construction waste) is carried out entirely by private contractors and arranged by the AHS within his area of jurisdiction.

A 'debris removal register' is kept in the SWMD and JO's fill in the requirements for debris removal in their districts. JO's at the motor loader chowki (one per shift) use this register to assign the duties to debris collection crews of the private contractor. In addition one mukadam of the SWMD is assigned to each debris truck at the motor loader chowki.

In Ward K-West a private contractor has recently been engaged for debris removal on a regular basis. The contract includes the provision of one conventional truck with 4 loaders per truck. The vehicles report at the motor loader chowki in the morning and tasks are assigned to the crews by the JO. Payment is based on measurements of the loading capacity (Rs 35/- per m³) which is recorded at the check point before the trucks leave to the disposal site where the load is again recorded. According to the contract arrangements debris is usually disposed of at landfill sites. Discussions with the contractor indicated that between two and three truckloads of debris are collected per day. The system seemed to be operating smoothly but the contractor said he wished that double checking of vehicle loads could be avoided.

The Building Department normally requires a security deposit from anyone applying for a building permit; the value of the deposit is Rs 250/-. The purpose of this deposit is to ensure that the builder takes responsibility for the removal of debris. Unfortunately, the Building Department normally does not inform SWMD when the builder requests the return of his deposit and so the security deposit is released, resulting in free removal of debris by the private contractor on behalf of the SWMD.

SUGGESTION: Manual loading of debris is hard work but does not pose special health risks on the labourers, apart from the risks associated with handling heavy and dusty materials. Therefore the present practice of using standard trucks (manual loading and unloading) seems acceptable as long as it is more economical than using special purpose vehicles. The involvement of private contractors seems appropriate and satisfactory in

operation. It is suggested that appropriate procedures for making the generator of the debris pay should be developed. The present system of charging a security deposit for building applications could provide a solution if this system were enforced and if adequate co-operation between the Building Department and the SWMD could be achieved.

A-4.2 INVOLVEMENT OF THE PRIVATE SECTOR IN SWM

A project which involves the private sector in solid waste collection has been introduced at Juhu Beach recently. (Juhu Beach is a very popular recreational area which attracts large numbers of visitors every evening, and there are a number of luxury hotels in that area.) Interviews with the public indicated that this programme was very successful and that the cleanliness of the beach had improved considerably since the private sector took over.

Based on information obtained from the SWMD, the private contractor employs 36 sweepers to clean the strip of beach, which is about 3,5 kilometres long. Cleaning is carried out in two shifts (23 sweepers in the morning shift from 6.30 am to 1.30 pm and 13 sweepers in the evening shift from 1.30 pm to 8.30 pm). The contractor is responsible for the collection of litter and its transport to community bins or collection spots from where loading and transport is carried out by the public sector, using two tractors with trailers of the SWMD or open trucks.

According to information obtained by the SWMD the contractor's costs are lower than the previous expenditure of the SWMD for carrying out the same service. To avoid problems with the Unions the contract has been arranged by a private association of hoteliers and citizens.

SUGGESTION: As with refuse transport it is suggested that the private sector should become more and more involved in primary collection of refuse, including street sweeping and drain cleaning activities. This may be the most promising approach to reduce the costs involved in this sector and to extend and improve services at affordable cost. A citizen who knows Bombay well suggested that an area surrounding the Cooper Hospital may be suitable to try out the privatisation of primary collection, street sweeping and drain cleaning services. It has been proposed to use this area for the project on a trial basis and to redeploy the existing staff in adjoining areas.

A-5 LEGAL PROVISIONS, ENVIRONMENTAL ISSUES AND ENFORCEMENT

Legal provisions, environmental issues and enforcement aspects are divided into three sections, namely (5.1) municipal waste and littering, (5.2) hazardous waste and (5.3) solid waste disposal.

A-5.1 MUNICIPAL WASTE AND LITTERING

Sanitation and solid waste are covered in Chapter 15 of the BMC Act (1888). This act was formulated in 1888 and since then the provisions relating to SWM have not been amended. Sections 365 to 378 of Chapter 15 are concerned with sanitary provisions relating to solid waste management (unauthorised littering, nuisance etc. - sections 313(A), 313(B), 313(AA), 368, 372(c) and 373) and include the penalty for violation under section 471. However, following discussions with HO Dr. Dalal, DCE Shri Panjwani and Deputy Law Officer Shri Mathai, it was revealed that not in a single case had a prosecution under this chapter been launched in the court.

Three nuisance detectors (ND's) are employed in K-West Ward and empowered under the Bombay Police Act (BP Act) to apprehend nuisance creators and take them to the nearest police station for prosecution by the police. Apart from these ND's no other staff in the Health Department or SWMD of the Ward Office are taking any action against offenders of the BMC Act. Every one seems to take for granted that the ND's, who are hardly educated regarding this issue, are sufficient to prosecute offenders for creating nuisance in the streets, but this may well not be the case.

SUGGESTIONS

- The BMC Act, formulated in 1888, is an antiquated act and should be updated as soon as possible. Penalties and fines for violating the provisions of the Act are considered far too low to be effective. What is needed is a revision of the fine for infringement of Sections 368, 370, 371, 372, 377. Fines of Rs 20/- and Rs 50/- should be increased to between Rs 200/- and Rs 500/- (for severe cases such as tipping of debris on public ground). The provision of a further fine of, say, Rs 500/- per day for continuing offences should be included.
- The present system of enforcement of the regulations by ND's is considered totally inadequate. It is suggested that consideration be given as to whether AHS, supervisors and JO's should be given the power to challenge nuisance creators under the BMC Act (amended). It may be further considered to provide officers at the level of WO with legal powers to compound persons found violating provisions of the BMC Act. The Bombay High Court could be requested to confer the powers of Presidency Judicial Magistrate on DMC's to try offences under the BMC Act. The effects of such changes could be monitored by the High Court and Municipal Commissioner.
- Another alternative may be to provide power to supervisory staff of SWMD to challenge offenders under the BMC Act and prosecute them in the court of the Presidency Magistrate. However, judicial magistrates are very busy with civil and criminal work and probably do not have enough time to cope with municipal work. Being a municipal official, the DMC would probably appreciate sanitary and environmental hazards in a better way. In addition he/she may be able to devote more time to this work.

A-5.2 HAZARDOUS WASTE

The BMC Act (1888) does not recognise hazardous waste as a separate category. Specific obligations for disposal of solid waste by industries and hospitals are mentioned in general terms in the Act. However, as already mentioned in (i) above, the BMC Act is antiquated and enforcement of the panel sections is almost non-existent. In addition the level of fine for the infringement of the law is far too meagre to be a deterrent to prospective offenders, and enforcement by lower functionaries (i.e. JO's to AHS) is almost non-existent.

The Environmental Protection Act (EP Act) 1986 defines hazardous waste and provides rules for the handling of hazardous wastes (management and handling rules, 1989). These include rules for disposal sites, including licensing and monitoring, of disposal sites by the State Pollution Control Board. However, these rules are not strictly enforced. Industrial premises are inspected by officials of the Pollution Control Board (PCB) once in a year. It was mentioned that the officials are well qualified and adequately trained to do their job.

According to the BMC Act industrial premises are supposed to deposit their waste in the community containers provided to the public, on a payment basis. Charges are fixed at Rs 8/- per 15 kg and JO's are responsible for assessing the weight arising from each industry. However, enforcement of payment is virtually impossible and most industries deposit their waste in the public containers, located outside their premises, without any payment. According to information obtained at the main landfill site, some industries deliver their waste directly to the site; about 50 truckloads per month were said to consist of industrial waste.

A similar situation exists in respect of clinical wastes. The BMC Act does not provide regulations regarding clinical waste and its handling, storage, and treatment.

In K-West Ward only one private hospital (Nanavati Hospital) was operating an incinerator; it was being used to incinerate about ½ ton of clinical waste daily. (This waste did not include plastic and glass bottles, which were recycled).

It has been observed that removal of solid waste from municipal hospitals is under the responsibility of the matron. Unfortunately, she may not have much of the say in decision making so solid waste collection and disposal have the lowest priority in hospital management. Although some training had been provided to the cleaning personnel and the matron, no protective clothing or equipment had been provided to any of the waste handlers, and the disposal facilities at or near the hospital were far from satisfactory.

Small nursing homes seem to be ignorant of the dangers of clinical waste. It has been observed that wastes from these premises are disposed of along with general domestic refuse.

Extracts of the laws pertaining to clinical and industrial waste are presented in Appendix AA-VII

SUGGESTIONS

- Based on the EP Act 1986, appropriate provision in the BMC Act should be made regarding the handling, storage, treatment and disposal of industrial and clinical waste. This should further include regulations for the transport of hazardous waste and appropriate amendments to the motor vehicle rules regarding the type of vehicle used, warning of any hazards and training of the drivers. Close co-operation between the SWMD and personnel of the PCB is considered crucial for enforcement of the regulations.

- Regarding handling of clinical waste it is suggested that control and enforcement should become the responsibility of the Ward Office. A more adequate system for clinical waste may be achieved by using of different coloured and labelled bags for different waste categories (e.g. red bags for infectious clinical waste and yellow bags for non infectious clinical waste). In addition, fully-enclosed storage facilities should be introduced for storage of clinical waste. Finally, the personnel of the SWMD who are handling clinical waste, should be provided with adequate protective clothing and equipment.
- It is necessary to develop an adequate incineration capacity for clinical waste arising in all hospitals and clinics (private and municipal). Also required are adequate standards for transport of clinical waste to one or probably several central hospital waste incinerators, and a licensing system for transport contractors.
- Adequate training of hospital personnel in respect of clinical waste handling is considered crucial. Such training should be mandatory for responsible personnel from all medical establishments, including private hospitals and clinics). The CTIRC could probably become involved in the training of these personnel.

A-5.3 DISPOSAL OF SOLID WASTE

Pollution control is covered in the EP Act 1986 and rules are made thereunder (i.e. the Water Act 1974 and the Air Act 1981). However, there is no regular monitoring of disposal sites with regard to these laws, neither by the PCB nor by MCGB. The question of pollution by landfill leachate did not seem to have arisen at all, and the pollution of land seems to have very low priority.

There was an opinion within the PCB that enforcement by the State PCB had been quite inadequate and the procedure for prosecution was quite laborious. For example, infringement of the Air Act was caused by a fire at Deonar Dumping Ground and this pollution was the subject of a recent letter to CE (SWM). This letter did not include any advice on what ought to be done to avoid violation of the Act.

SUGGESTIONS

- Regarding municipal waste disposal facilities, it is suggested that the MCGB should be obliged to obtain licences from the PCB for operation of landfill sites. Within this procedure the PCB may become responsible for monitoring the pollution caused by the sites (e.g. groundwater and air monitoring).
- Adequate treatment and disposal standards should be developed for industrial waste according to different waste categories (which need to be defined). Licensing of facilities is considered a pre-requisite to the achievement of acceptable standards. Adequate disposal charges for the different categories of industrial waste should be introduced.

A-6 FINANCES

According to information from the Central Office the total annual expenditure on SWM in Bombay was Rs 126.67 crores (Rs 1266.7 millions) in the year 1991. This is about 14% of the total expenditure of the MCGB. Out of this about Rs 78 crores was spent on establishment (wages and salaries) and Rs 26 crores on solid waste transportation (contractors' and municipal vehicles). In addition about Rs 1.93 crores was spent for new works and equipment.

In addition, each ward receives Rs 10 lakhs which is spent at the behest of the elected councillors. It was mentioned in the Ward Office, however, that most of this money was spent on public paths, water supply, street lighting and the provision of parks. In K-West Ward not even a single item pertaining to SWM has been taken up by the councillors. This indicates that solid waste management is given quite low priority in the eyes of the decision-makers.

An estimate of the cost of removing Bombay's refuse each day, and other relevant data are shown in Appendix AA-IV.2.

About 73% of the total expenditure for SWM is spent on wages and salaries of staff. As already mentioned in section A-3.3-(iii), the performance of municipal labour is poor and considerable cost savings may be possible in this sector. On the other hand the expenditure on new works and stores (equipment) is just 1.1 % of the total SWM budget. As the establishment charges are fixed throughout the year and cannot be reduced, budget constraints generally lead to a cut in new works and vehicles, proportionately across the board.

Capital expenditure on machinery is usually based on a cost benefit analysis, carried out in the Central Office. However, it appeared that there had been no detailed study and analysis before an order for 70 new compactor vehicles of the 'Multipack' System had been placed. Regarding the need of funds for capital expenditure, it is shown in Part B that the storage capacity of community containers is totally insufficient and that additional funds are needed to cope with this deficiency.

The income realised from charges for the collection of trade waste were about Rs 3.6 crores in 1991 - less than 3% of the total expenditure on SWM. According to the DCE/SWM there are no arrears because outstanding charges are paid at the time of renewal of licences.

It has been suggested that the public who live in the areas where house to house collection services are provided would be willing to pay service charges .

SUGGESTIONS

Considering that about 73% of the total expenditure on SWM is spent on wages and salaries, it is considered crucial to improve the performance of labour (see section A-3.3). This would allow a substantial reduction in establishment costs. Savings could be used for upgrading the solid waste collection, transport and disposal system. Possibilities for achieving such a reduction may include a ban on fresh recruitment for vacancies arising out of promotions, retirements etc. for a period of at least five years (see Section A-3) and an increase in the involvement of the private sector in solid waste collection services (see section A-4). This would probably enable the reduction of the establishment costs to about 50% of the total expenditure gradually over a period of 5 years and unlock about Rs 3 crores annually).

- To increase the income generation of the SWMD, charges for house to house collection services could be introduced. In addition, improvements of collection and disposal standards for industrial waste could be achieved by charging for the services and by proper enforcement of regulations (see section A-6 above). Another potential area for cost savings may be the field of construction debris removal. It is considered possible to achieve cost recovery by introducing adequate charges for debris collection (see section A-4) in conjunction with an amendment of the BMC Act regarding fines and the introduction of adequate enforcement measures.
- As discussed in section A-3.5 the lack of publicity and public awareness campaigns is one of the most significant shortcomings in respect of solid waste management in Bombay. The activities described in section A-3.5 may help to make cleanliness the people's programme and therefore lead to a more healthy and clean environment at a comparatively low cost.
- Finally, it is suggested that SWM officers should interact with and lobby Municipal Councillors, MLA's and MP's to urge them to give a higher priority to solid waste management. Together with the activities of the PRO this may result in a higher allocation of resources due to an increasing public interest in the SWM sector.

A-7 CONCLUSION

Urban migration is beyond the control of MCGB and the civil amenities are already stretched to a maximum. The municipal authorities are trying their best to cope with the SWM problem. In K-West Ward the population has increased by 50% during the last decade, while the infrastructure provided for solid waste management has remained at basically the same level and the service quality has not improved in line with public expectations.

It is hoped that the suggestions outlined in this document may help to provide better solid waste collection services to the citizens of Bombay and to reduce environmental pollution caused by inadequate handling and disposal of waste.