3. Current Solid Waste Management

3 Current Solid Waste Management

3.1 Current Waste Stream

The waste stream of Ulaanbaatar in 2006 is elaborated in this Section based on the following survey results (see Chapter 2 of this report):

- WACS in 2005
- Survey on medical waste management in 2005
- Survey on industrial waste management in 2005
- Study on construction waste in 2005 (estimation of generation amount is made for 2004)
- Survey on final disposal amount in 2005 and 2006

3.1.1 Generation of Household Waste

Based on the results of the waste amount and composition survey (WACS) in 2005, the generation rate and number of generation source (population) are estimated as described in the Section 4.1. The average generation rate (GR) in 2006 in the table below is calculated as follows:

Average GR in 2006 = ((Apart area GR in 2006 x Apart area population in 2006) + (Ger area GR in 2006 x Ger area population in 2006))/Population of MUB in 2006

The table below presents household generation of Ulaanbaatar in 2006.

-		Number of		Winter	season	Summer	r season
Generation So	Source	Generation Source	Unit	Generation Rate (g//day)	Daily Generation Amount (ton/day)	Generation Rate (g//day)	Daily Generation Amount (ton/day)
Household	Apart	481,037	g/person/day	264	127.0	235	113.0
Housenoid -	Ger	409,772	109,772 g/person/day		391.8	208	85.2
VVASIC	Average	890,809	g/person/day	582	518.8	222	198.2

Table 3-1: Household Waste Generation (2006)

3.1.2 Generation of Business Waste

Business wastes consist of those from commercial, office, market, school, hotel and public area cleaning. Based on the results of the waste amount and composition survey (WACS) in 2005, the generation rate and number of generation source (commercial, office, etc.) are estimated as described in the Section 4.1. The total waste generation amounts of categories (generation sources) other than household waste were calculated by multiplying the discharge ratio of each category by the number of units of that category. All results of these amounts were then summed to get the total waste discharge amounts as shown in the following table.

	Number of		Winter	season	Summer season		
Generation Source	Generation Source	Unit	Generation Ratio (g/day)	Daily Generation Amount (ton/day)	Generation Ratio (g/day)	Daily Generation Amount (ton/day)	
Commercial Waste (Restaurant)	44,112	g/chair/day	258	11.4	278	12.3	
Commercial Waste (Other Shop)	3,174	g/shop/day	1,236	3.9	1,689	5.4	
Office Waste	111,172	g/employee/day	134	14.9	185	20.6	
Market Waste	4,593	g/stall/day	876	4.0	1,772	8.1	
School Waste	278,977	g/student/day	3.1	0.9	1.5	0.4	
Hotel Waste	12,139	g/room/day	134	1.6	113	1.4	
Public Area Cleaning Waste	3,430,451	g/m²/day	3	10.3	5.1	17.5	

Table 3-2: Business Waste Generation (2006)

3.1.3 Generation of Medical and General Waste from Medical Institutions

The table below presents medical and general waste generated in medical institutions in the study area in 2005 which is obtained by the survey on medical waste management.

Category of Waste	Generation Rate (kg/bed/day)	Number of Bed	Generation Amount (ton/day)
Medical waste (Hazardous/Infectious)	0.207	7,721	1.6
General waste	1.917	7,721	14.8

Table 3-3: Generation of General and Medical Waste in 2005

Based on the above results the Study Team forecasts medical and general waste generated from medical institutions in the study area in 2006. In this forecast the Team sets the following conditions:

- Generation rate will not change.
- But the number of generation source (beds) will increase according to the population growth.

Consequently, the amount of medical and general waste generated in 2006 is shown in the table below.

Category of Waste	Generation Rate (kg/bed/day)	Number of Bed	Generation Amount (ton/day)
Medical waste (Hazardous/Infectious)	0.207	7,937	1.6
General waste	1.917	7,937	15.2

Table 3-4: Generation of General and Medical Waste in 2006

3.1.4 Generation of Industrial Waste

The table below presents non-hazardous industrial waste (non-HIW) and hazardous industrial waste (HIW) generation in 2005 which is obtained by the survey on industrial waste management.

		No of	No of	Non-	HIW	HIW		
Type of Factory	Code	Factory*1	Employees	Generation Rate	Generation Amount	Generation Rate	Generation Amount	
		(no)	(persons)	(kg/employee/ day)	(ton/day)	(kg/employee/ day)	(ton/day)	
Food, Dairy product	G01	2,878	39,200	0.40	15.7	-	-	
Leather	G02	130	1,150	2.29	2.6	-	-	
Textile	G03	122	8,650	0.36	3.1	-	-	
Chemical	G04	74	1,650	1.88	3.1	0.03	0.1	
Cement & Brick	G05	77	4,700	0.86	4.0	-	-	
Metal processing	G06	16	200	0.65	0.1	-	-	
Furniture	G07	157	2,350	0.86	2.0	-	-	
Paper Processing	G08	153	1,700	0.86	1.5	-	-	
Mining industry	G09	251	16,100	0.86	13.8	-	-	
Others	G10	663	21,400	0.86	18.4	-	_	
Total		4,521	97,100		64.3		0.1	

Table 3-5: Industrial Waste Generation (2005)

Based on the above results the Study Team forecasts IW generated from Factories in study area in 2006. In this forecast the Team the following conditions:

- Generation rate will not change
- But the number of generation source (employees) will increase according to the economic growth.

Consequently, the amount of IW generation in 2006 is as follows:

- Non-HIW: 67.9 tons/day
- HIW: 0.1 tons/day (This figure is very doubtful as described in the Section 2.6.)

3.1.5 Generation of Construction Waste

The table below presents construction waste generation in 2004 which is obtained by the study on construction waste.

	Apartment	Commercial	Hospital, School, Cultural	Office, Storage Facilities	Energy	Communication	Road Works	Dams, Drainage	Others	Renovation Works	Total
Project Scale (million Tg)	36,333	7,152	4,510	3,743	6,896	412	1,853	3,387	3,456	3,635	71,377
Unit waste generation (tons/1,000 Tg)	1.4859 x 10 ⁻⁴	1.4859 x 10 ⁻⁴	1.4859 x 10 ⁻⁴	1.4859 x 10 ⁻⁴	14.0664 x 10 ⁻⁴	14.0664 x 10 ⁻⁴	4.13997 x 10 ⁻⁵	14.0664 x 10 ⁻⁴	13.3849 x 10 ⁻⁴	13.0805 x 10 ⁻⁴	
Waste generation (tons/year)	5,398.7	1,062.7	670.1	556.2	9,700.2	579.5	76.7	4,764.3	4,625.9	2,667.3	30,101.6
Waste generation (tons/day)	14.8	2.9	1.8	1.5	26.6	1.6	0.2	13.1	12.7	7.3	82.5

Table 3-6: Construction Waste Generation Amount in 2004

According to the observation of the weighbridge installed at the UCDS and disposal operation in the other municipal landfills, the disposal amount of the construction waste differs in summer and winter significantly. Based on the observation and the above table, the Study Team sets the following assumptions for the estimation of seasonable fluctuation on its waste generation:

- The winter season starts in October and ends in March while the summer season from April to September.
- Generation in summer is assumed to be two times more than in winter because of severe working conditions in winter. This ratio was obtained from market waste survey results since generation pattern shall be almost similar.

Consequently, the daily generation amount in 2004 is set as follows:

- Daily average generation amount in all year : 82.5 tons/day
- Daily generation amount in winter season : $(82.5 \times 12 \times 0.33/6) = 54.5 \text{ tons/day}$
- Daily generation amount in summer season : $(82.5 \times 12 \times 0.67/6) = 110.6 \text{ tons/day}$

Assuming yearly generation amount increases in accordance with annual economic growth, the daily generation amount in 2006 is calculated as follows:

- Daily average generation amount in all year : 91.8 tons/day
- Daily generation amount in winter season : $(91.8 \times 12 \times 0.33/6) = 60.6 \text{ tons/day}$
- Daily generation amount in summer season : $(91.8 \times 12 \times 0.67/6) = 123.0 \text{ tons/day}$

3.1.6 Final Disposal Amount

There are four (4) municipal disposal sites in the study area. At first in order to identify the final disposal amount the team conducted the following surveys to the four sites:

Name of the Landfills	Survey Conducted	Date of Data obtained
UCDS	 Number and type of incoming vehicles Loading amount according to the type of collection vehicles at a weighbridge of a private factory 	 From Dec 2003 to Jan 2004 for winter and from Jul 2004 to Aug 2004 for summer January 2005
MDDS	3. Number of incoming vehicles	3. July and August 2004
NDS	4. Number of incoming vehicles	4. December 2003 and July 2004
KH21DS	None	None

Table 3-7: Final Disposal Amount Surveys Conducted at 4 Municipal Landfills

Based on the above-mentioned survey, the Team estimated the final disposal amount portion of respective disposal site as shown in the table below.

Name of the Landfills	Disposal Amount (ton/day)	Portion of each Disposal Site (%)	Revised Portion of each Disposal Site (%)	Adopted Portion of each Disposal Site (%)
UCDS	260.1	91.8	91.1	91
MDDS	16.0	5.6	5.6	5
NDS	7.3	2.6	2.6	3
KH21DS	NA		0.7*1	1
Total	283.4	100.0	100.0	100

 Table 3-8: Final Disposal Amount of Respective Disposal Site in 2004

(Note) *1: The portion is calculated based on the population of the Khoroo.

A weighbridge was installed at UCDS and commenced its operation from December 26, 2005. Since the weighbridge provides very precise final disposal amount at UCDS, the final disposal amount indicated in the Table above is revised as shown in the Table below based on the weighbridge data obtained from December 26, 2005 to June 19, 2006.

Table 3-9: Final Disposal Amount	of Respective	Disposal Site	e in 2006
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Name of the Landfills	Disposal Amount (tons/day)	Disposal Amount (tons/day)		
Name of the Earlands	Winter	Summer		
UCDS	338.4	483.0		
MDDS	18.5	26.1		
NDS	11.3	16.1		
KH21DS	3.8	5.5		
Total	372.0	530.7		

3.1.7 Method and Conditions for Elaboration of Current Waste Flow

Based on the results of the above-mentioned surveys current waste flow in the study area in 2006 is elaborated. The Table below presents method and conditions for elaboration of current waste flow. For better understanding of the method and conditions for elaboration, the Team prepare a sample waste flow as shown in the Figure below.



Figure 3-1: A Sample Waste Flow for Elaboration of Current Waste Flow

	Item	Name of relevant survey	Methods of Calculation. Setting	Amount	in 2006
				Winter	Summer
(1-1) MSW Generation	WACS (Winter season : 2004/12, Summer season : 2005/07)	(Waste generation rate), which was obtained in WACS, x (nonulation number of business entities cleaning area)	Generation : 565.8 ton/day	Generation : 263.9 ton/day
(1-2	 Household Waste (Apartment Area) 			Generation amount (ratio): 127.0 tons/day (264 g/person/day)	Generation amount (ratio): 113.0 tons/day (235 g/person/day)
(1-3	 Household Waste (Ger Area) 			Generation amount (ratio): 391.8 tons/day (general waste 168 g/person/day, Ash 788 g/person/day	Generation amount (ratio): 85.2 tons/day (general waste 208 g/person/day)
(14	() Waste from Business Activities			Generation : 36.7 ton/day	Generation : 48.2 ton/day
(1-5	 Public Area Cleaning Waste 			Generation : 10.3 ton/day	Generation : 17.5 ton/day
(2-1) Self Disposal / Illegal Dumping	POS (2005/02) and Questionnaire survey on WACS (Winter season : 2004/12, Summer season : 2005/07)	It is assumed that All Self Disposal / Illegal Dumping be occurred in ger area. Therefore, the amount is calculated by the formula below. $(2-1) = (1-1)-((2-2)+(3-1))$	306.5 ton/day	20.2 ton/day
(2-2) Discharge 1	-	(2-2) = (2-3)+(3-2)	257.2 ton/day	241.4 ton/day
(2-3	() Discharge 2	-	(2-3) = (8) - ((4-1)-(4-2)+(5)+(6)+(7))	252.3 ton/day	235.9 ton/day
(3-1) Recycling 1	POS (2005/02) and Survey on	Generation rate for each recycling activity was obtained based on	Amount : 2.1 ton/day	Amount : 2.3 ton/day
(3-2) Recycling activity	Recycling market (2005/02, 2005/02)	the POS and Recycling Market survey.	Amount : 4.9 ton/day	Amount: 5.5 ton/day
(3-3	i) Recycling (landfill area)	200002		Amount : 11.1 ton/day	Amount : 11.5 ton/day
(3-4	:) Recycling 2		(3-4) = (3-1) + (3-2) + (3-3)	Total 18.1 ton/day	Total 19.3 ton/day
(4-1) Construction Waste	Study on Construction Waste (2005/08)	Daily generation amount of construction waste is estimated as 30,110 tons/year, i.e. 82.5 ton/day in 2004 based on the construction waste survey. This amount will increase to 91.8 ton/day in 2006 in proportion to the GDP growth.	60.6 ton/day (91.8 x 12 x 0.33 / 6)	123.0 ton/day (91.8 × 12 × 0.67 / 6)
			Generation in summer is assumed to be two times more than in winter because of severe working conditions in winter. (This ratio was obtained form market waste survey results since generation pattern shall be almost similar)		
(4-2	() Illegal dumping amount of Construction waste		Ratio for illegal dumping of construction waste was set to 36 % in year 2004 based on the construction waste survey results. This ratio will decrease to zero in year 2010.	14.5 ton/day	29.5 ton/day
(5)	Industrial waste (IW)	Survey on Industrial Waste Management (2005/02 & 2005/09)	Generation rate per employee x number of employee	Non-Hazardous Industrial waste (No HIW: 0.1 ton/day (excluded from was	n-HIW): 67.8 ton/day ste flow)
(9)	Medical waste	Survey on Medical Waste Management (2005/01)	Generation rate per bed x number of beds	General waste: 15.2 ton/day	d from mosto flam.
Ì				INEULAI WASE. 1.0 WINDAY (EXCIUDED	
6	Collection of Illegal Waste		The waste, which was not collected during writer season, is collected in summer season. The amount is calculated by the following formula. (7) = (8) - ((2-3) + (4-1) - (4-2) + (5) + (6))		128.1 ton/day
(8)	Incoming amount	Survey on final disposal amount, i.e. weighbridge data of UCDS, the number of incoming vehicles, etc. of the other disposal sites	Based on the survey on final disposal amount	383.1 ton/day	542.2 ton/day
6)	Final disposal amount	-	(9) = (8) - (3-3)	372.0 ton/day	530.7 ton/day

Table 3-10: Conditions of Setting

3.1.8 Current Waste Flow

The following figures present the waste flow in Study area.

a. All Study Area



Figure 3-2: Waste Flow of All Study Area in Winter (2006)



Figure 3-3: Waste Flow of All Study Area in Summer (2006)



Figure 3-4: Waste Flow of Planned Area in Winter (2006)



Figure 3-5: Waste Flow of Planned Area in Summer (2006)

c. Unplanned Area 2006 Winter



Figure 3-6: Waste Flow of Unplanned Area in Winter (2006)



Figure 3-7: Waste Flow of Unplanned area in Summer (2006)

3.1.9 Waste Scattering and Illegal Dumping

a. Condition of waste scattering and illegal dumping

a.1 Planned Area

The planned area is generally maintained clean due to high collection service rate and the satisfactory public area cleaning operation; however the problems can be seen in the following places.

- a) Along sidewalks in the commercial area, scattered waste can be seen in the early morning and they are cleaned by street sweepers within the morning.
- b) Around the communal containers which are placed in the planned area especially in Chingeltei duureg, waste is often scattered. This is caused by scavenging recyclables by waste pickers.
- c) Along the main road such as Sun Road, waste piles can be sometimes seen. These waste piles are due to illegal dumping of waste.

a.2 Unplanned Area

The condition of waste scattering greatly varies depending on places. The problematic areas can be classified into two, one is on roads within residential area, and the other is nearby valleys or river beds.

There are many waste heaps generally can be seen on roads at many places but few scattered waste. In other word, there is few little littering but much illegal dumped waste within the residential areas. Because such waste heaps contain a large proportion of ash, the suspected violators are neighborhoods most probably.

The valleys and river beds near residential areas are often used as a communal dumping site by nearby residents.

a.3 Other areas

In the vacant lands in the industrial areas, the river beds and near the cemeteries, waste is often dumped and in some places waste is dumped by dump trucks almost everyday.

b. Removal of illegal dumping

Duureg offices sometimes instruct TUK to remove illegally dumped waste without payment and TUK do in most cases.

TUK sometimes initiate the cleaning of illegal dumping by themselves often in April and September to expect the payment from the duureg office, but don't get it most cases.

People in community initiate the cleaning of illegal dumping in public area within or near their community. This is often carried out in April after snow is melt and in autumn before snow start.

NGO carries out the program to give community people the incentive for cleaning of illegal dumped waste. World Vision carries out this program in some khoroos in the study area.

3.2 Technical System

Following system was observed as of May 2005.

3.2.1 Discharge and Storage

a. Rules governing discharge and storage of waste

The law of waste management enacted in 2003 stipulates only the responsibility of each administrative organization and doesn't stipulate the dischargers' responsibilities. There are any legally bind rule concerning waste discharge and storage.

b. Discharge and Storage

b.1 Planned Area

In planned area, there are following discharge and storage systems used.

- a) Dust chute system
- b) Disposable containers (plastic bags or paper sacks)
- c) Waste storage room system
- d) Waste storage space system
- e) Waste storage house system
- f) Waste store yard system
- g) Communal containers system

These systems currently used are described.

b.1.1. Disposable containers (Plastic sacks or paper sacks) system

Many discharges commonly use plastic shopping bags for carrying and discharging waste whichever they final discharge it to a dust chute, a storage house, a storage room, a communal container, etc. The special plastic bags for discharging waste which people buy at shops aren't used commonly.

b.1.2. Dust chute system

Many buildings, especially rather old buildings, in Ulaanbaatar have the dust chute system for discharging waste. In this system, there is a vertical dust chute pipe from the ground floor to the top floor and there is a lid of the dust chute pipe in every floor. Dischargers can drop off waste into the dust chute by opening the lid. Waste dropped to a waste chamber on the ground floor and stored there until waste is collected.

This system it is very convenient for both dischargers and waste collectors, however it associates with many problems such as unsanitary condition caused by flies generated from waste in the dust chute and also smoke by fire of waste.

b.1.3. Waste storage room

People discharge their waste in a waste storage room which is installed under the stair at the ground floor inside the entrance. Waste collectors scrape waste from a storage room and load them

onto a truck. This system is often used for old apartments and the storage rooms are often very unsanitary condition due to difficulty of cleaning. In addition, the scraping work of





waste is very difficult to do because the door is too narrow and no public cooperation is utilized.

b.1.4. Waste storage house

People discharge their waste at a storage facility installed at the part of land of apartment buildings. Waste collectors collect and load waste from a storage facility onto a truck.

This system is good to keep the apartments sanitary because it keeps a certain distance from it. However, the scraping work of waste is very difficult to do because the door is too narrow and no public cooperation is utilized.

b.1.5. Waste storage yard

People discharge their waste at the part of land of apartments which is specified as waste storage yard. Waste collectors collect and load waste onto a truck. This system terribly deteriorates the view and the environment due to the waste scattering and the loading work is hard due to no public cooperation.

b.1.6. Communal container system

There are 150 communal containers with $1m^3$ volume capacity used for apartment building areas and non-residential waste in Chingeltei duureg. Chingeltei TUK uses two compactor trucks with 20 m³ volume capacity with lifting device to collect waste from these communal containers.

Although this system is convenient for people because they can discharge waste any time, it has created following various problems.

- 1) There is a lot of scattered waste around communal containers. There are two causes for scattered waste.
 - Nobody take care communal containers because no ownership feeling to anybody.
 - Waste pickers scatter waste when they scavenge recyclables from waste in containers.



- 2) During winter, waste is often frozen in containers and stick to container. Waste collectors have to remove frozen waste stuck to containers by iron bars to load waste onto a compactor truck. It is very hard work and time consuming.
- 3) Homeless people often burn waste in containers to warm themselves. There are many containers which have been burned.

Consequently after only two year's uses of 150 containers, most of all have been defected especially cover plates and wheels.

b.1.7. Large containers (5 to 10 m³)

Communal containers measuring 5 - 10 m^3 are placed at some apartment building areas to receive non-residential waste and some containers are provided to the organizations which discharge a large amount of waste.



Containers provided for specific organizations works well because the organization takes care of it, while most containers provided for apartment building areas are not well maintained due to lack of the ownership. The surrounding of communal containers is often very dirty with scattered waste and waste in containers often burn.



b.2 Unplanned Area

b.2.1. Poly sacks

More than 90% of waste discharged from residents in unplanned areas is ash of coal which they used mainly for heating. They keep ash in their land within the fence and put it in poly sacks which used for packing coal and then discharge it. Because poly sacks used for this purpose are most cases disposable and the weight of one bag of ash is about 30kg, it is very suitable as storage goods for waste containing ash.

b.2.2. Empty Drum

An empty 200 liter drum and sometimes half drums are used for discharging ash. The ash in a half drum can be carried, while the ash in a drum is too heavy to load onto a truck. 200 liter drums are unsuitable for loading due to too large capacity.

3.2.2 Collection and Haulage

a. Collection System

a.1 Planned Area

Collection method

In terms of public cooperation for loading waste, the collection types which are used at present can be divided into two.

In some apartment areas the bell collection system is currently used. People discharge their waste in corridors and guards or cleaners employed by owners' union carry them to certain points within the apartment. A waste truck makes horn to inform of its arrival when it comes to the apartment area for waste collection. Then guards, cleaners and also residents carry waste from the apartment building to the truck for loading waste. This system helps to maintain the living environment clean and also helps to collection workers' loading work much easier, although a collection crew has to spend a few minutes for waiting them to come out. People's cooperation condition to this system is very high and the system functions well.

The other way is that a collection crew collects by themselves waste from specified collection points whichever a storage room, a storage house, storage yard, and a dust chute chamber. This system is currently majority. In this system, it is very hard for waste collection workers to load waste onto collection trucks due to no public cooperation and often due to the ill design of storage facilities. Because this system doesn't require any public cooperation, the collection crew sometimes collects waste in the night and even midnight.

A crew consists of a driver and one or two collection workers. Although one collection worker is too few but it is quite common in the study area and it is due to the incentive to minimization of collection workers created by the rental contract currently used.

Collection frequency

Dischargers don't know and don't mind the collection frequency because they can discharge their waste anytime under the present discharge systems.

The supposed collection frequency is three times a week except for the dust chute chamber, while it for the dust chute chamber is once a week. However, the collection of waste from the dust chute chamber is often ignored and sometimes done even once a month. This is due to the dust chute chamber generally has a large capacity; however it causes many unsanitary problems.

Collection system

All waste is collected in mix condition without separation. During the waste collection work, collection workers often separate recyclables for selling, however it is not so active.

Collection schedule

There is no fixed collection schedule used due to poor management, lack of good condition equipment, etc. As for collection route, there is also no fixed collection route and the driver can change it anytime.

Collection and haulage equipment

Although various types of collection equipment are used, the majority of equipment is compactor trucks. Compactor trucks used are mainly classified into three in terms of origin country.

Some compactor trucks made in Russia, M53, which are used, are all very old, more than 20 years old. This truck looks like a compactor, however the compactor doesn't function at all and the device at the rear end of the truck work as only loading waste. Therefore, the waste amount carried per trip is much less than the compactor and only around 1.5 ton per trip.

Two compactor trucks made in Russia, KO-440, have been used. This equipment has 7.0 m^3 of volume capacity, and the compaction rate is 2.4 times. This equipment has a lifting device of a 0.7 m^3 special container equipped with the truck. It is difficult to put waste in this container by collection workers because the container's opening is too narrow and its height is too high.

Two compactor truck made in China donated in 2002 has been working. This equipment has 12.2 ton of payload capacity, 21 m^3 volume capacities and a device to lift a container of 1 m³ capacity for loading waste. These are used in the planned are in Chingeltei and they are too large for these areas.

Some used compactor trucks made in Japan have been used in the study area. These capacities range from 4 m^3 to 8 m^3 and the estimated compaction rate is from 1.5 to 2 times. These compactor trucks are becoming major because most of compaction trucks recently bought can be all fallen in this category.

All collection equipment except two compactors made in China, which use diesel, use gasoline.

Average number of trips per truck per day

Except some trucks in SKH duureg making three trips per day, all TUKs' trucks make two trips per day however late they work.

Haulage system

All collection trucks directly carry waste collected from collection areas to the disposal site without any transferring.

a.2 Unplanned Area

Collection method

Waste collection work in unplanned areas is carried out together with the waste fee collection. A clerk who is in charge of fee collection goes to the collection site together with a collection crew and collection workers collect waste in return for collecting fee.

As for the composition of waste discharged from the unplanned, more than 90% is ash from coal in the winter season, and the majority is garden waste with soil in the summer season. The waste is therefore very heavy throughout a year.

It is conventionally understood that dischargers are responsible for carrying and loading of waste onto the truck and it is done accordingly. In this point, the dischargers' cooperation to the waste collection work is very good.

A collection crew consists of a driver, a fee collector, and one or two waste collection workers. One collection worker is sometimes added depending on the work load.

Collection frequency

The collection frequency is basically once a month. This is because the waste collection work has to be carried out in return for collection waste fee which is monthly collected. However, it often delayed and become even every 45 days. The present collection frequency is understood to be too few for dischargers, because the dischargers have to wait for another month if they miss the waste collection.

Collection system

All waste is collected in mix condition without separation. Waste collection workers seldom sort and recover recyclables from the waste because the waste contains little recyclables.

Collection schedule

There is no fixed collection schedule used due to poor management, lack of good condition equipment, etc. As for collection route, there is also no fixed collection route and the driver can change it anytime.

Collection and haulage equipment

Most of all collection equipment is 6 ton capacity of dump trucks made in Russia which use gasoline. This type of dump truck is very popular in Ulaanbaatar and drivers are very familiar with repairing work of this type of dump trucks.

Because the dump truck has no lifting device of waste, it is very hard to load it onto the carrier. Ordinary, a collection worker stands on the carrier of the truck and receive waste and pile it up on the carrier. Another collector lifts waste onto the dump truck with the cooperation of dischargers. This work is very dusty because the majority of waste is ash or soil. Even though, even female young residents often lift their waste onto the dump truck. In this point, the public cooperation to the waste collection work is considered to be very high.

Average number of trips per truck per day

Except some trucks in SKH duureg making three trips per day, all TUKs' trucks make two trips per day however they work until late.

Haulage system

All collection trucks directly carry waste collected from collection areas to the disposal site without any transferring.

a.3 Collection rate and service area

a.3.1. Executing bodies of waste collection by Khoroo

Table 3-11 shows the present condition of collection service by khoroo. In the winter season, TUK collect waste from 97 khoroos and khoroo government offices collect waste in 18 khoroos and 1 private company collect waste only khoroo No.1 in Songinokhairkhan. There are no khoroo without the waste collection service.

	Khoroo	_			Wir	nter			Sun	nmer	
DISTRICT	No	Туре	Population	тнк	Khoroo	Private	No	тнк	Khoroo	Private	No
	110.			TOR	KIIOIOO	Tilvale	collection	TOR	KIIOIOO	Tilvate	collection
Bayangol	1	Apartment	8,561	•				•			
	2	Apartment	5,437	•				•			
	3	Apartment	8,872	•				•			
	4	Apartment	10,596	•				•			
	5	Apartment	7,390	•				•			
	6	Apartment	9,047	•				•			
	7	Apartment	7,913	•				•			
	8	Apartment	7,447	•				•			
	9	Ger	10,469		•				•		
	10	Ger	9,714	•				•			
	11	Ger	9,807	•				•			
	12	Apartment	10,649	•				•			
	13	Apartment	6,125	٠				•			
	14	Apartment	5,902	•				•			
	15	Apartment	5,735	•				•			
	16	Ger	5.853	•				•			
	17	Apartment	5,581	•				•			
	18	Apartment	8.568	٠				•			
	19	Apartment	7.112	•	1		1	•		1	1
	20	Apartment	2 784	•				•			
	P _T		153 562	19	1	0	0	19	1	0	0
Bayanzurkh	1		5 765			5			<u> </u>		
Dayanzurki	2	Ger	22 062								
	2		4 000					-			
	3 		9 250								
	5	Apartment	3,230	•				•			
	5	Apartment	7 901	•				•			
	7	Apartment	7,001	•				•			
	1	Apartment	0,024	•				•			
	0	Ger	9,740	•				•			
	9	Ger	0,297	•				•			
	10	Ger	10,660	•				•			
	11	Ger	3,459	•				•			
	12	Ger	8,957	•				•			
	13	Ger	7,462	•				•			
	14	Ger	6,657	•				•			
	15	Apartment	5,253	•				•			
	16	Apartment	11,401	•				•			
	1/	Ger	8,260	•				•			
	18	Apartment	7,924	•				•			
	19	Ger	8,954	•				•			
	20	Ger	5,198		٠				•		
	PT		172,824	19	1	0	0	19	1	0	0
Nalaikh	1	Ger	5,807	•				•			
	2	Apartment	6,820	•				•			
	3	Ger	4,120	•				•			
	4	Ger	4,453	•				•			
	5	Ger	2,500	•				•			
	6	Ger	987	•				•			
	PT		24,687	6	0	0	0	6	0	0	0
Songinokhai	1	Ger	12,785			٠				٠	
rkhan	2	Ger	4,649	•				•			
	3	Ger	9,389	•				•			
	4	Ger	8,160	•				•			
	5	Ger	9,629	•				٠			
	6	Ger	13,100	٠				•			
	7	Ger	11,179	٠				٠			
	8	Ger	6,964	٠	İ		İ	٠		İ	1
	9	Ger	11,815	٠				٠			
	10	Ger	10.201	٠	1		1	٠			1
	11	Ger	12.552	•				•			
	12	Apartment	6 305	•				•			
	13	Apartment	6,938	•				•			
	14	Apartment	7 023	•				•			
	15	Apartment	6 864					•			
	16	Anartment	6 694								
	17	Ger	7 204	-		1		•			
	17		1,204	•	I			•			

Table 3-11: Condition of Collection Service

	1/h a rea				Wir	nter			Summer			
DISTRICT	Knoroo	Type	Population	T 111/	10		No		U.		I No	
	INO.			TUK	Khoroo	Private	collection	TUK	Khoroo	Private	collection	
	18	1	9 237	٠				٠				
	19		9 527	•				•				
	20		7 876					•				
	20	Gor	1,070	•				•				
		Gei	4,002	- 20	0	1	0		0	1		
0.111.1	PT		162,155	20	0		0	20	0		0	
Sukhbaatar	1		3,329	•				٠				
	2	Apartment	5,262	•				•				
	3	Apartment	5,419	•				•				
	4	Apartment	3,786	•				•				
	5	Apartment	4,744	•				•				
	6	Apartment	4,624	•				•				
	7	Apartment	7.054	•				•				
	8	Apartment	9.037	•				•				
	9	Apartment	9 360		•				•			
	10	Apartment	7 429	•	-			•				
	11	Ger	9,658		•			-	•			
	12	Ger	5 010									
	12	Gor	6 159									
	10	Ger	5 167		-				•			
	14	Ger	5,107		•							
	15	Ger	9,672		•				•			
	16	Ger	9,258		•				•			
	PT		106,167	9	1	0	0	9	1	0	0	
Chingeltei	1	Apartment	4,561	•				•				
	2	Apartment	3,700	•				•				
	3	Apartment	4,587	•				•				
	4	Apartment	5,005	•				•				
	5	Apartment	4,782	•				•				
	6	Apartment	5.381	•				•				
	7	Ger	8,900		•				•			
	8	Ger	5 588		•				•			
	9	Ger	6,666	•				•				
	10	Ger	6,000					•				
	11	Cor	6 200	•				•				
	12	Ger	0,300	•				•				
	12	Ger	3,107	•				•				
	13	Ger	7,314	•				•				
	14	Ger	7,136	•				•				
	15	Ger	8,065		•				•			
	16	Ger	8,645		•				•			
	17	Ger	8,400		•				•			
	18	Ger	11,882	•				٠				
	19											
	PT		122,483	14	5	0	0	14	5	0	0	
Khan-Uul	1	Apartment	7.605	٠				٠				
	2	Apartment	7.630	٠				٠				
	3	Apartment	6.795	•				•				
	4	Ger	5.803	•				•				
	5	Ger	5 709	•				•				
	6	Ger	6 655									
	7	Ger	5 022									
	8	Gor	7 5/1					-				
	0	Ger	10.041	•				•				
	9 10	Ger Ger	10,231	•				•				
	10	Ger	4,990	•			L	•				
	11	Ger	4,030		•				•			
	12	Ger	4,/19		•				•			
	13	Ger	2,778		•				•			
	14	Ger	1,611		•				•			
	PT		81,140	10	4	0	0	10	4	0	0	
Total	Nos	-	-	97	18	1	0	97	18	1	0	
	%			83.6%	15.5%	0.9%	83.6%	15.5%	0.9%			

Although these data show the collection service rate in terms of area very high, the service rate in terms of population is not so high as that because the waste collection service is provided only for households who pay waste fee. As for the collection rate based on service population, the rate in the planned area has maintained nearly 100%, while it in the unplanned area is around 50%.

TUK deals with the waste collection work in 83.6% of khoroos in the study area and khoroo offices deals with it in 15.5%.

In the khoroo where the khoroo offices deal with the waste collection, the khoroo office collect the waste collection fee from household by kheseg leaders or promoters employed by the khoroo offices, and the khoroo offices employ the a dump truck with a driver and collection workers for the waste collection work. The reason why khoroo office is doing the waste collection work in some khoroos is that TUK don't have enough collection capacity to collect waste. Therefore, TUK don't want to collect waste in khoroos where the waste

collection work is financially difficult. This reason is supported by the fact that all khoroos where waste is collected by khoroo offices are unplanned area where the fee collection rate is much lower than the planned area.

Only one khoroo, No.1 in Songinokhairkhan, the private collector, BTJ, has been collected both waste and fee by themselves since January 2005. However, the performance so far is not satisfactory.

a.3.2. Waste collection by other than TUK

We interviewed 19 khoroo offices where waste is collected by other than TUK about the current condition of waste collection work. The survey results are summarized below.

Items Findings								
1. General information								
Khoroo surveyed	19 khoroos							
Kheseg number	Total: 205 kheseg, Average: 10.8 kheseg per khoroo							
Total household number	Total: 29,113 HH, Average:	Total: 29,113 HH, Average: 1,532 HH per khoroo						
Number of khoroo office staff	3 staff for 15 khoroo, 4 staff No.20 in Bayanzurkh)	for 2 khoroo, 9 staff for 2 khoroo (No.13 in Khan Uul,						
Computer in Office	18 khoroo offices have com	puters. One doesn't.						
2. Waste collection system								
Collection frequency	Once a month: 63% Irregular: 21%							
Number of trips per day	2 to 3 times per day							
Collection equipment	2 khoroo offices use their ov 17 khoroo offices hire a dum	vn dump trucks. 1p truck.						
Disposal site	 Ulaan Chuluut: 14 khoro Ulaan Chuluut disposal site. 	os (But, nobody check if a truck surely carry waste to the)						
	Other than Ulaan Chulut	it: 11, 12, 13, 14 in Khan-Uul, 20 in Bayanzurkh						
Contract system	No contract made: 7 khoroo Contract between khoroo of	s fice and the drivers: 5 khoroos						
3 Fee collection	Other and no answers. 7 km	01005						
Waste coll	ection fee	Person in charge of waste fee collection						
7 80 5 5 5 5 5 5 5 5 5 5 5 5 5		12 10 00 00 12 10 00 10 10 10 10 10 10 10 10						
500 800 700 Tg/m Tg/m Tg/m Waste coll	1000 1500 2000 2500 Tg/m Tg/m Tg/m Tg/m	Driver Fee collection Public Heseg leaders						
		inspector						
Collect	ion fee	Person in charge of waste fee collection						
Actions taken to	No action: / khoroos	_						
Ratio households	25.1%	5						
Pate of fee collection	38 7%							
Rate of fee collection	1) Households don't receive	anything, kheseg leaders have their records: 1 khoroos						
fee collection	2) Households keep copies of	of receipts and khoroo office has no record: 4 khoroos						
	3) Households keep copies of	of receipts and khoroo office keeps a record, as well: 10 khoroos						
 Households keep copies of receipts and record books and khoroo office keeps a record, well: 3 khoroos 								
Waste collection without	 To collect waste even witho 	ut payment: 7 khoroos						
	 Not to collect waste if no particular the interaction officer was the interaction. 	yment: 9 knoroos						
ree collector's salary	trip number.	ive salary system related to either the ree amount collected or the						
	2 khoroo offices use the salary system based on the working days. 30,000 to 40,000 Tg/month.							

Table 3-12: Survey Summary of Waste Collection done by Other Than TUK

Figure 3-8 shows the current waste problems which khoroo offices replied. Concerning waste issues, difficulty of waste fee collection is the most serious problems for khoroo offices and cleaning of illegal dumping is the second. In the survey, all khoroo offices expressed that

they are unwillingly doing the waste collection work due to no waste collection by TUK.



Figure 3-8: Current Waste Problems

a.4 Collection equipment

One of the biggest problems related to collection equipment is too difficult to understand the present condition of equipment used.

The privatization contract made between MUB and TUKs in March 2004 stipulates the following important agreements concerning the equipment.

- TUKs can use all waste collection equipment and garage owned by MUB for 3 years until the expiry of the contract.
- TUK can purchase all waste collection equipment and facilities owned by MUB for 3 years until the expiry of the contract.

Due to the existence of this contract, the asset department of MUB is now too difficult and reluctant to understand the present condition of waste collection equipment. Therefore, in order to understand the condition of waste collection equipment the information has to be collected from all TUKs. However, each TUK keeps the record of equipment differently and it makes very difficult to summarize. In addition, TUK's equipment record includes little equipment which they have bought by themselves since April 2004. It means that nobody in MUB understands the present condition of collection equipment they own or use.

Table 3-13 shows the general situation of collection equipment.

Item	unit	BG	BZ	SKh	SB	KhU	СН	Na	Total
Total number of equipment on list	nos	34	37	38	35	25	28	11	208
Total number of equipment for waste collection on list	nos	27	24	31	25	16	20	10	153
Total number of equipment actually working	nos	22	12	22	17	14	14	4	105
Average age of trucks	Years	10	15	16	8	n.a.	16	19	-
Age of oldest trucks	Years	29	31	32	23	n.a.	22	25	-
Age of the newest trucks	Years	2	4	6	1	n.a.	5	16	-

Table 3-13: List of Collection Equipment by TUK

The main features of collection equipment currently used by TUK are as follows.

1) Most of all trucks are very decrepit. It makes frequent breakdown of equipment and high petrol consumption. Some of trucks have to be pushed by many people to start their engines in the morning due to having no properly functioning batteries. These trucks

have to keep the engines operational until their arrival to the garage and it is very costly. This battery problem is caused by very cold climate.

- 2) Using too many types of collection equipment. It makes both the operation and the maintenance difficult and inefficient.
- 3) Majority of collection equipment use gasoline. Majority of waste collection trucks are made in Russia and use gasoline. There are only two compactor trucks of all waste collection trucks used by TUK use diesel. The reasons are as follows.
 - Engines for gasoline made in Russia are very simple and easy for repair. In other word, TUK doesn't have enough skill and facility to repair engines for diesel.
 - Gasoline is cheaper than diesel. As of January 2005, gasoline is 580Tg/l while diesel is 760Tg/l.

a.5 Manpower

Table 3-14 shows the total number of employees by TUK. Approximately 30% are cleaning workers, and 20% are engaged in the indirect works and 50% works for waste collection.

				-	-	-			
Item	unit	BG	BZ	SKh	SB	KhU	CH	Na	Total
Total number of employees	nos	143	151	142	135	137	145	42	895

Table 3-14: Total Number of Employees by TUK

a.6 General working condition

There are no official working hours for the waste collection work and each waste collection crew decides their working hours by themselves. In general, the departure times of trucks are between 8:30 am and 10 am and the arrival times are between 6 pm and 11 pm, however some starts the early morning and some do the night collection. Generally the last truck come to the Ulaan Chuluut disposal site around 4 am and the first truck comes around 6 am.

There are no fixed waste collection days and the actual waste collection is irregular. Waste dischargers such as residents and business entities, therefore, don't know the waste collection days.

In addition, there are no fixed collection routes and it depends on the drivers. Therefore, many waste collection trucks take the short cut route, even the route without roads.

There are no uniform for both drivers and collection workers. Chingeltei TUK provides workers with soaps, towels and groves periodically.

Many drivers and collection workers don't take lunch during the working hours even though more than 10 hours working due to little money they have. Sometimes they buy snacks such as biscuits instead of lunch by the income from sale of recyclables during the waste collection work.

a.7 Management system of TUK

The current institutional system has affected the current waste collection efficiency greater than the technical system and public participation. Therefore, the institutional system which seriously affects the waste collection operation at present is briefly described.

Six TUK in Ulaanbaatar which deal with most of waste collection services in the study area have been private companies since April 2004. TUKs are now concessionaires but not contractors for the waste collection work because TUKs obtain the all revenue from waste collection fee. Therefore, TUK has extensive freedom in their management.

One of TUKs' management measures which is seriously affecting the waste collection efficiency is the rental contract for drivers and waste collectors. At present, in any TUK the salary system for drivers and collection workers is not based on the basic working hours and overtime hours. Their incomes are the remainder after deducting the petrol expense, spare parts expense, etc. from the certain percentage of the total revenue from customers' payment for fee. This is actually same as the contracting out. Therefore, both of them are not interested in the improvement of the waste collection work efficiency because the cost for TUK has been fixed and the working hours are not related to their income at all. The way to increase the income under this system is only to minimize the petrol consumption amount and number of workers involved. Therefore, what are actually done are 1) minimization of collection workers. This employment system has greatly hindered the improvement of the collection work efficiency and has greatly deteriorated the working condition of drivers and collection workers.

In unplanned area, the waste collection work is greatly influenced by the fee collection efficiency because waste is collected in return for fee payment. The present fee collection system has limited the options of waste collection system.

All TUK strictly control the supply amount of petrol to the waste collection trucks. The petrol amount supplied by Chingeltei TUK seems too little for trucks to haul waste along the official haulage route, and it caused them to take short cut routes.

Each TUK verifies all their trucks' entrance records to the Ulaan Chuluut disposal site with the entrance certificates issued at each entry to the disposal site by Nuuts in order to ensure all trucks to carry waste to the disposal site. However, it was found that some of trucks got the all entrance certificates at one time instead of every entry. Therefore, the present control system somehow has been deteriorated.

3.2.3 Public Area Cleaning

Public areas cleaned in the study area can be divided into two in terms of its responsible organization; one is under the responsibility of MUB and the other is under the responsibility of district offices.

a. Under the Responsibility of MUB

The following 8 roads are under the responsibility of Municipal Road Department.

	Name of road	Length	Location	Contractor
1	Road of Aits Pass	10 km	From the white gate of the airport to the bridge of Turgenii river	"Naranbulag Khan" Co. Ltd
2	Road to "Nairamdal" Children's Camp	13.5 km	From the intersection of "Khuns-Trade" to "Nairamdal" Children's Camp	"San -Od"
3	Road of Zuun Salaa	3.5 km	From the intersection to the last point of bus route	"Samoson"
4	Intersection of "Geser" temple		16m road to the 4 directions of the intersection	"San-Od"
5	Sun road	8.4 km	From the intersection of 10th district to the intersection of Chuluun Ovoo	"City road"
6	Moringiin Davaa	5 km	From the toll gate of the airport to Moringiin Davaa	"Flower road"
7	Peace Avenue		From the railway pass to the station "22"	"Orgon gobi"
8	Peace Avenue		From the intersection of Chuluutiin ovoo to Bayanzurkh toll gate	UBZZK

Table 3-15: Roads under the Municipal Road Department

MUB has contracted out the cleaning work of the above-said roads, which are important for traffic, to private companies other than TUK, because TUKs' capacities of road cleaning are

insufficient. This expenditure is paid from the Municipal Road Fund which is constituted from road fee and vehicle license fee, etc. The Municipal Road Fund is an independent fund from the municipal budget, and Mayor of Ulaanbaatar City holds the right to spend.

Municipal Road Department is obliged to check the contractors' performance 4 times a month. Actually, they examine their cleaning work 3 times weekly by their 2 monitoring staff. Based on the results of the examinations, the Municipal Road Department decides the monthly payments for the companies.

Contractors are obliged to submit the performance reports to Municipal Road Department and Public Service Department.

For the year 2005 (e.g. from Dec. 2004 to Nov. 2005), the budget for cleaning of the roads was decided only Tg.80.0 million. However, Tg.64.3 millions has been already paid to contractors for the work for 5 months from Dec. until Apr. and Municipal Road Department has been suffered from the financial difficulty.

The contract rate is Tg. 30,000 per month per kilometer of road cleaned regardless of the wide of the roads.

Although the roads which are under the responsibility of district office, Municipal Road Department pays the financial assistance from the Municipal Road Fund to TUK for the cleaning work of the following important roads only during the winter in order to supplement the extra expense required.

	Name of roads	Location	Contractor
1	Road of Bayankhoshuu	From Zuun salaa of Tolgoit to the intersection of XMK 10	SKhD TUK
2	Baruun Salaa of Tolgoit	Road in the south of "Mon laa" Co.Ltd and Baruun salaa 2+0.5	SKhD TUK
3	Road of Orbit	From Orbit to "Oil supply" 1	SKhD TUK
4	Road of the MN TV-Bayanhkhoshuu	From the MN TV to the last bus station in Bayankhoshuu	Lunt Sant
5	Road of the northern summer	Road in the north of the bridge of "Sharga Morit"	SBD TUK
	campsite	From the station "7" to the bridge of "Sharga Morit"	ChD TUK
6	Road of Sharkhad	From the University of Defense to the last bus station in Sharkhad	BZD TUK
7	Northern road of Bogd mountain	From the intersection of Zaisan to the east to "Ikh Tenger" complex	KhUD TUK
8	Road of the West intersection	On Peace Avenue	SBD TUK
9	Road of the East intersection	On Peace Avenue	BZD TUK
10	Intersection of the Central Post Office	On Peace Avenue	SBD TUK

Table 3-16 [,] Roads which	h TLIK Get Sunnlementary	Payment from Municin	al Road Fund
	in ron our ouppionionary	a dynnonic nonn municip	

b. Under the Responsibility of Duureg Offices

b.1 Areas cleaned

The total area of public areas including roads, sidewalks, parks, squares, and green areas which are cleaned under the responsibility of Duureg offices is $3,266,374 \text{ m}^2$ as shown in Table 3-17. Duureg offices contract the cleaning works of these areas to TUKs every year.

Duureg	Area
BGD	598,015 m2
BZD	517,346 m2
SKhD	360,529 m2
SBD	808,684 m2
KhUD	439,700 m2
CHD	542,100 m2
Total	3,266,374 m2

Table 3-17: Summary of Public Areas Cleaned by Duureg

The public areas which are cleaned under the responsibility of Duureg offices are listed as follows.

		D		0	T-4-1
#	Names of the streets and squares	RC		Green area	lotal
		Highway	Sidewalk		
		m2	m2	m2	m2
1	intersection	700	3,500	5,110	9,310
2	From the traffic light of Kh. Magsariav street to Cultural		7 000		15.000
-	Palace of the Labor Union	2,000	7,200	6,400	15,600
3	Technique Import - Khukhburd	5,600	15,400	33,600	54,600
	Khukhburd - Pharmacy #25	400	2,200	2,400	5,000
4	Zanabazar street	2,000	2,000	8,900	12,900
5	Seoul street	1,600	5,200	8,960	15,760
6	Amarsanaa street	4,000	11,800	7,000	22,800
7	Revolutionists` street	200			200
	From west intersection to "Geser" temple	700	3,200	2,400	6,300
8	Revolutionists` street	200			200
	Up from "Geser" temple	2,300	1,200	1,200	4,700
9	Jamsranjav street	3,200	900	9,100	13,200
	From the back of Trauma Clinic to Chingunjav intersection		1,650		1,650
10	Damdinbazar street From Chingunjav intersection to White House	2,000	7,000	8,000	17,000
11	Ard Ayush avenue From	2.400	10.500	9.600	22.500
10	The last trelleview station of trolleybuses	7 200	14,400	72,000	02.600
12	Merkers' street or Bridge of triangle	7,200	14,400	72,000	93,600
13	Workers street or Bridge of triangle	3,800	4,750	2,000	11,210
14	Gas station "Petrovis" - "Urgu" cinema	6,800	29,920	27,200	63,920
15	High viewpoint of the district /circle/	0	0	0	0
16	Chinguniay street	1.200	6.000	16,200	23,400
<u> </u>		1.600	4.000	4.800	10,400
17	Continuation of Chingunjav street	400	800	0	1,200
10	Op from "Orgu" cinema	2,600	6 200	22.100	22,000
18	Street of Khasbaatar	2,600	6,300	23,100	32,000
10	Character Magnericu Kh	1,600	0	0	1,600
19	of Railway college to the train station	1,200	3,840	10,200	15,240
	IN THE RAILWAY DISTRICT				
20	1st street of railmen	2,400	4,800	14,400	21,600
21	One street of October /the other side of the road of Sun wav/ From distant bus station	1.800	2.520	0	4.320
	to Magsarjav street intersection	,	,		,
22	One street of October /the other side of the road of Sun				
	way/ From Magsarjav street	1,000	1,400	2,850	5,250
22	Constitution street				
23	Cultural Palace of the Labor Union, Zanabazar 2 - Sun	700	2.800	2.450	5.950
	way		,	,	,
24	Sun way	0	6,000	0	6,000
25	Railmen's 6 streets /in the south of Railway hospital/	1.000	750	4.000	5,750
	Hot shower - intersection of the Peace avenue	.,		.,	-,
26	Southern road of "Narah" supermarket Railmen's street #6 - Ark of the building with October	800	2,400	1,600	4,800
27	Communication department, road between three				
L - '	prefabricated buildings	1,000	2,000	5,500	8,500
	3 streets of railmen - Jon Beis				
28	2 streets of railmen	1,000	2,000	5,000	8,000
- 20		,,	,		.,
29	Road in the south of "Ganzam" hotel and restaurant	1,000	1,500	3,650	6,150
	IN 3RD AND 4TH DISTRICTS	0	0	n	0
30	Relief road going up from "Narlag" department store	400	400	0	800
31	Road between Maternal and Children's Research Center	000	4 000	0.000	F 700
	and Mongolian National Television	600	1,200	3,900	5,700
32	Road next to "Urgu" cinema	300	360	1,200	1,860
33	Relief road located in khoroo #7	600	840	5,400	6,840
34	Relief road located next to "Duuhee" center	600	840	5,400	6,840
35	Relief road next to "Bayangol" department store	600	840	5,400	6,840
36	Relief road in the north of "Shine Dorno"	200	0	650	850
37	Square next to "Od" cinema	280	336	147	763
38	Western side of the secondary school #28, Enkhbayar`s	600	600	0	1,200
39	Ark of the micro district #6	100	0	0	100
		1.00	0	0	1 100

Table 3-18: Public Areas Cleaned in BGD

40	West side of the micro district /boundary of Zuunnaran khoroo #18, 10, 11/	1,000	1,400	0	2,400
41	Mandakh-Urgu	400	400	0	800
42	The last trolleybus station, boundary of khoroo #9 and 13	0	0	0	0
	IN 10TH DISTRICT				
43	Relief road of 10th district	1,800	0	16,200	18,000
44	Vocational training center of counstruction - the relief road of nursing school	500	0	1,000	1,500
	Total size	72,380	175,146	337,577	585,103
				Square	12,912
				Total size	598,015

Table 3-19: Public Areas Cleaned in BZD

#	Names of the streets and squares	Ro	ad	Green area	Total
		Highway	Sidewalk		
	unit	m2	m2	m2	m2
1	Peace Avenue	94,336	18,784	33,612	146,732
2	Northern circular road, 8 salaa	42,648	4,364	10,976	57,988
3	Namiyanju	43,200	2,200	0	45,400
4	Tokyo	21,600	2,680	3,200	27,480
5	Sambuu, Tunnel	43,200	7,200	13,600	64,000
6	Dandarbaatar	19,200	2,800	1,400	23,400
7	Ulaanhuaran	19,200	1,200	0	20,400
8	Sharkhad	19,200	4,800	0	24,000
9	Amgalan-Chuluu Ovoo	20,000	500	0	20,500
10	Tuul Jin Pan, Tsaiz, Khoroo #16	38,400	3,000	0	41,400
11	Monument for Jukov	28,336	14,168	3,542	46,046
	Total	389,320	61,696	66,330	517,346

Table 3-20: Public Areas Cleaned in SKhD

#	Names of the streets and squares	Ro	ad	Green area	Total
		Highway	Sidewalk		
	unit	m2	m2	m2	m2
1	Peace avenue	60,525	32,021	0	92,546
2	Labor Union's street	40,740	1,410	0	42,150
3	Northern road of district #1	19,600	16,300	0	35,900
4	Construction workers` street	3,850	3,300	0	7,150
5	Youngsters` street	3,850	3,300	0	7,150
6	Road to Tolgoit	23,520	0	0	23,520
7	Road of café "Herders"	2,800	3,600	0	6,400
8	Square in front of service center	0	9,500	0	9,500
9	District road	5,000	500	0	5,500
10	Peace avenue	0	0	79,955	79,955
11	Labor Union's street	0	0	630	630
12	Northern road of district #1	0	0	8,000	8,000
13	Construction workers` street	0	0	10,918	10,918
14	Youngsters` street	0	0	12,110	12,110
15	Road of café "Herders"	0	0	12,600	12,600
16	Square in front of service center	0	0	6,500	6,500
	TOTAL	159,885	69,931	130,713	360,529

Table 3-21: Public Areas Cleaned in SBD

#	Names of the streets and squares	Ro	ad	Green area	Total
		Highway	Sidewalk		
	unit	m2	m2	m2	m2
1	Peace Avenue	50,820	12,270	13,700	76,790
2	Olympic street	15,600	7,800	32,000	55,400
3	Soul street	15,800	9,930	13,000	38,730
4	Partizan street	2,413	1,524	1,700	5,637
5	Namnansuren street	2,153	1,722	1,000	4,875
6	Khanddorj street	2,151	1,075	0	3,226
7	Tserendorj street	6,650	3,200	8,200	18,050
8	Water street	3,080	1,760	1,200	6,040
9	Constitution street	1,800	1,800	700	4,300
10	Genden street	600	800	240	1,640
11	Choidog street	1,260	480	400	2,140
12	Chinggis street	12,600	3,600	3,000	19,200
13	Jamiyan gun street	1,800	1,200	2,500	5,500
14	Transport-workers` street	25,000	5,000	11,100	41,100
15	Two bays of bridge	3,080	400	14,000	17,480
16	University street	18,200	12,000	5,200	35,400
17	Sukhbaatar street	9,100	3,000	2,000	14,100
18	United Nation's street	6,000	3,000	3,000	12,000
19	Street of baga toiruu	27,600	8,280	20,000	55,880
20	Amar street	2,100	1,800	2,000	5,900

21	Street of ikh toiruu	43,000	12,900	5,000	60,900
22	Youth avenue	12,000	4,500	4,800	21,300
23	Irkutsk street	4,900	4,200	5,600	14,700
24	Police street	18,800	6,800	0	25,600
25	Sodnom street	2,400	200	0	2,600
26	1st and 2nd streets of hospital	4,900	2,800	0	7,700
27	Southern road of the Wedding Palace	2,100	1,600	1,600	5,300
28	Road of "7 stations"	17,000	6,800	800	24,600
29	Circular road "32"	2,100	124	1,600	3,824
30	Road in between khoroo #9	10,800	12,000	1,200	24,000
31	Road of Denjiin 1000	13,300	5,700	3,800	22,800
32	Road of Dambadarjaa	8,400	0	0	8,400
33	Road of Dari-Ekh	22,400	0	0	22,400
34	Northern road of the embassies	3,000	600	3,000	6,600
35	Students` street	1,309	0	0	1,309
36	Northern road of the central two parks	900	0	0	900
37	Road in between east and middle parks	780	324	0	1,104
38	Road in between middle and west parks	1,116	288	0	1,404
39	Sukhbaatar square	0	44,000	456	44,456
40	Mongol Ekh complex	0	200	12,000	12,200
41	Eastern square of Drama Theatre	0	2,900	900	3,800
42	Four central parks	0	45,300	24,100	69,400
	TOTAL	377,012	231,877	199,796	808,685

|--|

#	Names of the streets	Highway	Sidewalk	Parks	Area laid	Total
		0,		/natural/	down a lawn	
	Unit	m2	m2	m2	m2	m2
1	Chinggis Avenue	96,000	5,600	19,500	12,800	133,900
2	Road to Zaisan	72,000	1,600	2,500	1,200	77,300
3	South of school #75	0	0	800	300	1,100
4	East of school #75	3,600	0	2,400	1,000	7,000
5	Area of Bogd Khan's Palace Museum	0	6,000	3,200	2,800	12,000
6	Northern road of 19th district	12,000	0	1,500	500	14,000
7	Road to tannery	48,000	0	800	200	49,000
8	Road of wool factory	7,200	0	800	500	8,500
9	Park of the factory of leather	4,800	0	1,400	1,000	7,200
10	Engels street	3,600	0	1,500	1,200	6,300
11	TETs 3	0	0	6,000	1,000	7,000
12	Transportation station	0	0	5,700	2,500	8,200
13	Graduates` park	3,600	0	1,200	1,000	5,800
14	Area of Zaisan Memorial	4,800	800	5,400	4,100	15,100
15	Northern part of Zaisan	0	0	2,500	1,400	3,900
16	Park of spinnery	0	0	3,500	2,900	6,400
17	Bays of the bridges of Tuul, Selbe, Yarmag	0	0	10,000	0	10,000
18	Two bays of the bridge of Zaisan	0	0	10,000	0	10,000
19	Apartment area	3,600	2,300	8,200	5,500	19,600
20	Area of the stadium	0	0	24,000	0	24,000
21	Area of schools and kindergartens	0	0	3,400	2,000	5,400
22	To Van street	3,600	0	4,400	0	8,000
	TOTAL	262,800	16,300	118,700	41,900	439,700

Table 3-23: Public Areas Cleaned in CHD

#	Names of the streets and squares	Ro	ad	Green area	Total
"	Nallies of the success and squares	Highway	Sidewalk	Green area	iotai
	unit	m2	m2	m2	m2
1	Peace Avenue	24,900	9,500	10,863	45,263
2	Baga toiruu	38,700	10,000	22,980	71,680
3	West Selbe	28,300	4,100	4,168	36,568
4	Jigjidjav street	6,000	1,000	1,470	8,470
5	Choimbol	8,000	2,400	2,900	13,300
6	Tourist street	31,000	6,000	3,152	40,152
7	Iron man	5,500	1,800	2,014	9,314
8	Denjiin 1000	21,000	1,500	2,800	25,300
9	Sambuu	37,400	10,000	11,136	58,536
10	Liberty square	7,000	0	0	7,000
11	Ikh toiruu	41,000	13,500	8,400	62,900
12	7th station	31,000	5,000	5,200	41,200
13	United nation's street	5,000	1,200	3,967	10,167
14	New way	36,200	4,500	4,800	45,500
15	Sukhbaatar	28,000	4,000	3,200	35,200
16	Road of market	15,000	7,500	0	22,500
17	Square of dates	0	600	1,800	2,400
18	Park named after Asashoryu	0	500	760	1,260
19	High viewpoint of Chingeltei district	0	0	1,190	1,190
20	Park of Yavuu	0	1,000	3,200	4,200
	TOTAL	364,000	84,100	94,000	542,100

b.2 Resources and method used

In all TUKs, there are about 270 people and about 20 trucks working for the public area cleaning work.

The cleaning method is manual cleaning and workers clean with brooms, dust scrapers, and dustbins with wheels and then waste is loaded onto the trucks for the haulage to the disposal site.

The water tankers are sometimes used for spraying water onto roads in order to clean dust on roads.

The main equipment used for public cleaning work are dump trucks, flat bed trucks, water tankers, snow removing trucks, etc.

Although there are many litters scattered along sidewalks of busy roads in the early morning, they are cleaned by street sweepers and people of shops facing sidewalks every morning and occasionally, and it results to maintain the public areas clean generally.

The present public cleaning method and system is considered to be quite satisfactory, however the snow removal work in the winter is understood hard and heavy work load for TUKs.

c. Responsibilities of Relevant Parties

Notification A50 of MUB in Sep. 2001 stipulates the responsibilities of cleaning work of relevant parties as follows.

- a) TUKs are responsible for public roads, streets, green areas.
- b) Owners' unions of apartments are responsible for roads within 50m from apartment buildings and near the entrances.
- c) OSNAAG is responsible for the areas other than item b).
- d) Organization, agencies, service points are responsible for cleaning, removal of illegal dumped waste and removal of snow in the area within 50m from their premises.

3.2.4 Recycling

a. Recycling

Followings are the current conditions of recycling system in the study area.

- There exists recycling system in the study area such that mainly waste pickers at landfill and street collect valuable wastes and sell to waste buyers. Based on the recycle survey conducted in the study, waste buyers are buying 85 to 90 % of those valuable materials from waste pickers.
- Waste buyers export those valuable materials mainly China after washing and sorting.
- The players collecting valuable waste other than waste pickers are collection worker and cleaners employed by the owner's union.
- Base on the recycling survey, there is few end users of collected recyclable materials in the study area. There are factories which reuse bottle of vodka and beer, small scale factories which use waste paper, waste plastic and waste iron as a raw material for their production. As for the factories using waste plastic and waste paper as raw material, they can not use all the type of waste papers and plastics, therefore they

made a contract with the limited discharger of the wastes and controlled the quality of the materials. All the factories which are using those waste pointed out that the shortage of the wastes used as raw materials is the current problem for them.

- All the recycle activities in the study area are carried out by the private sectors.
- Mainly iron, glass bottles, aluminum cans and PET bottles are traded in the recycling market. Copper and aluminum cans are very highly priced, and PET bottles are fairly highly priced. This is consistent with what the Study team has observed in other cities of developing countries.
- One of the factories are producing compost using the dropping of birds using the windrow method piled in his yards. But the compost produced by him is supplied to the residents nearby at free of charge.
- Based on the WACS, the staff working at meat shop is selling bone to the waste buyers or to the households. The study for the bone generated from meat shop has been carried out by WHO and reported that those bones are exported to China for the production of oil and bone meat fertilizers.

b. Intermediate Treatment

There is no intermediate treatment facility other than small incinerators for medical waste combustion. Major hospitals have small incinerators for treating infectious waste. Although they are old, they area still functioning.

There is no major composting facilities except composting droppings of birds at the factory but it is just a piling up in the open yards and not a facility. Composition of Kitchen wastes are very low and the wastes at this study area do not suitable for producing composts.

3.2.5 Final Disposal

There are three final disposal sites in the study area. Each of which has been used as the site approximately from 25 to 40 years. Adequate measures such as covering soil, fence construction, leachate treatment and so on have not been implemented in these disposal sites.



Figure 3-9: Location of Final Disposal Sites





Figure 3-10: Ulaan Chuluut Disposal Site

- UCDS is the biggest disposal site in the study area and around 95 % of the wastes are disposed here. The site is located at Songino Khairkhan District, the north west of the City, and it is around 13km from Sukhbaatar Square.
- There is no clear boundary of UCDS but current land fill area is around 8 ha.
- Wastes from Ger area contain a lot of ash in winter season so, the accessibility inside landfill site has not much problem. The accessibility in summer has to be investigated further.
- There is unpaved access road which is around 2 km between entrance of UCDS to the main road. The surface of this unpaved road is solid so there seems to be no problem for accessibility for the collection vehicles. But the dust caused by heavy traffic caused serious negative impact especially those living along this road.
- The operation and control of UCDS is done by Nuuts company, which is MUB owned organization. The company has two bulldozers but there is only one operator, and one of two bulldozers is frequently breakdown due to lack of spare parts and condition of machineries.
- Operational manner is just an open dumping and there is no soil cover conducted therefore, frequent fire and smoke are causing serious negative impact to the surroundings.
- A lot of wastes are scattered along the access road due to poor and steep access road and there are many plastic bags are scattered due to heavy wind especially in spring season.

- There are few hundred waste pickers in UCDS and they are picking, plastic, metal, pet bottle, glass bottles etc. which are variable wastes for them to sell. There is a risk of accident caused by the operation of bulldozer and collection vehicles working closely with waste pickers.
- There is no garage for bulldozers to keep in night time, therefore it is very difficult and time consuming to start engine in the morning especially in winter season.
- The record of incoming truck is taken at site office manually by the staff of Nuuts company. There are three staffs in charge of recording keeping and one works continuously for 24 hours and rests for next two days.

b. Morin Davaa Disposal Site



Figure 3-11: Morin Davaa Disposal Site

- MDDS is located at Khan Uul District, south west of UBC around 23 km from Sukhbaatar Square and at 5 km south west of UB International airport.
- There is no clear boundary of UCDS but current land fill area is around 9 ha.
- Only wastes from Khan Uul District are disposed at MDDS and it is around 5 % of the wastes in the study area.
- There is unpaved access road which is around 1 km between entrance of MDDS to the main road. The surface of this unpaved road is solid so there seems to be no problem for accessibility for the collection vehicles. There is no resident living along this unpaved access, so there is not much problem of dust caused by the traffic.
- There is one site office and a garage near disposal site. But bulldozer is not stationed at site permanently and is transported from UCDS when it is necessary.
- Operational manner is just an open dumping and there is no soil cover, therefore, fire and smoke come from disposed wastes but the amount of disposal wastes are

very limited, therefore, the negative impact to the surrounding environment also very limited.

• There are 10 to 20 waste pickers in MDDS and they are picking, plastic, metal, pet bottle, glass bottles etc. which are variable wastes for them to sell. There are not much incoming truck so there is less risk of accidents compared with operation in UCDS.

c. Nalaikh Disposal Site (NDS)

- NDS is located at Nalaikh District, south east of UBC around 38 km from Sukhbaatar Square. And this disposal site is solely for Nalaikh District and not for other districts in the study area.
- Nalaikh Disposal Site is operated by Nalaikh TUK. Basically there is no machinery to push and compact disposed wastes, and the TUK hires machinery from adjacent army once a year and push and make it level.
- The disposal site locates at quite flat area and there is no clear boundary.
- There is a slaughter facility in Nalaikh district and animal wastes are disposed. Therefore, there are many craws and odour is causing negative impact to the surrounding environment.

3.2.6 Operation and Maintenance of Vehicles and Equipment

All waste collection equipment and some garages owned by UBC are leased to TUK and UBC has neither mechanical management activity nor own workshop. All those equipment has been managed under the full responsibility of TUK.

TUK to which management has been consigned obtains the income by using these equipment and collecting waste, disposal activities and other cleansing services in the district. It equipment manages it by those incomes

a. Current condition of equipment

Most of the equipment used by TUK is delivered by second hand and most of these exceeds the age 15 years and there are several ones exceeding even 30 years. 90% of equipment are made in Russian and other 10% are made in Japan or China.

Therefore, most equipment has reached the time of the major rehabilitation or exchange of major parts. It is a situation in which major rehabilitation is not made due to the lack of budget and difficulties of obtaining spare parts, especially Japanese made compactors control parts and parts of Russian vehicles which are older than 20 years. Main causes of the breakdown of vehicles are damages of the engine, suspension including tires and transmission. According the observation, it is expected that real equipment workability is considerably low. Therefore, it seems that the availability of this equipment will decrease further in 3-5 years and it is necessary to renew the equipment.

b. Maintenance system

The present maintenance management in TUK does not have any proper maintenance system including mechanical personnel, workshop, facilities, special tools and store.

The following special system has been taken about the control of equipment maintenance. The driver is in charge of not only the waste collection works but also the equipment maintenance. Under the system in most TUK, the maintenance cost expenditure is deducted from the income of drivers every month. Only Chingeltei and Nalaikh TUK don't use this system, however drivers still maintains their vehicles.

The cost sharing system of the repair and new spare parts varies as below depending on TUK.

- Khan-Uul TUK: In case the expenditure is less than 50,000 TG, it is driver's responsibility and the driver halves the cost with TUK.
- Suklbaatar and Bayanzurkh TUK: TUK and the drivers halve.
- Bayangol TUK: 3% of the salary is deducted every month for depositing for paying the maintenance cost, and the remained deposit money is returned to the drives at the end of the fiscal year.
- Nalaikh TUK: Driver maintains equipment and pays cost of spare less 5,000 TG and TUK pay for more than 5000 TG. In most cases, TUK pays the cost because most parts exceed 5000Tg.

However, the abovementioned system is applied only to general repairs, while most TUK fully bear the preventive maintenance cost. However, Bayangol, Khan-Nul, Chingeltei, and Nalaikh TUK provides only filter and oils.

The task of the person in charge of the equipment maintenance management in TUK is the control of drivers and the accounting of their expenses but not a technical support.

c. Preventive maintenance (Periodical maintenance)/ General service (Normal service)

It is managed basically by the distance (km) or time (hours or month), However, the maintenance period sometimes delay or it is even not performed at all, because the many driver don't want to pay for maintenance cost which they are supposed to bear. Therefore, it is often done at even twice the specified distance or the specified period. This phenomenon has deteriorated the equipment condition and cause breakdown.

However, Bayangor, Khan-Uul, Chingeltei, Nalaikh, Sukhbaatar TUK provide the preventive maintenance expenses for them in order to avoid such problems.

A general maintenance repair is also done by the driver's judgment. There is a possibility of missing the proper timing of doing an important repair because there is no technical person who can give reliable judgement.

In addition, the rental contract system in which the driver has to bear the cost for spare parts more than a certain amount has made more difficult to do a general maintenance properly.

d. Facilities, Tools and Manuals

There are neither facilities nor tools that can be called as a workshop of most TUK. Drivers repair vehicles by themselves by using a few hand tool such as fix, ring or combination spanners.

The welding machine was seen in many places such as Songinokhairkhan, Sukhbaatar, Bayangol, Bayanzurkh, Nalaikh TUK. As for other facilities, a compressor was found in Bayanzurkh and Nalaikh TUK, and garage jack was found in Bayanzurkh TUK. However, special tools for adjusting or measurement were not found at any work shop.

The maintenance manual written in Mongolian language was not seen at all. The part catalogue written in Mongolian language for Russia made equipment was found. As for Japanese made equipment, it was only a Japanese manual because it had obtained equipment for domestic use by used car.

e. Personnel & Training

Most TUK, there is no technical person in charge, and only person in charge of equipment section who manages driver.

There is a repair assistance worker who is called repair man or welder. However there are no technical personnel at all in several TUK. Moreover, most drivers who do repair works have never learnt how to repair officially.

No implementation of training nor the training plan for mechanical and drivers have been conducted.

f. Spare parts

The following problems related to spare parts were found.

- 1) It is difficult to get the spare parts for Japanese made compactor, especially electrical control devices and hydraulic parts (compactor component parts) because that compactor are manufactured for domestic use in Japan.
- 2) There are no stock of necessary minimum parts such as oils, brake fluid, oil filter, and fuel filter.
- 3) There are doubts in the quality and safety because parts are being bought by a private trader or shop. (So-called technical market).
- 4) Russian model trucks and plants (heavy equipment) parts are easily to be found, however price is too high.
- 5) Obtaining some Russian parts is impossible because the supply period ended.

g. Record keeping

The record keeping is very important for doing the maintenance management of equipment. Although it was found that most TUK keep equipment ledgers and the maintenance record, these are not united and the management seems vague.

Because the equipment ledger varies depending on TUK, it is too difficult to analyze the condition of equipment. In one of TUK which has the rental contract with the driver, the accountant keeps the equipment repair book (maintenance record) in order to calculate the deduction for repair.

h. Urgent measure

The following actions are recommended in the emergency.

- 1) The equipment ledgers and maintenance record should be standardized to easily analyze the current condition of equipment.
- 2) The person in charge of equipment should keep all the records.
- 3) UBC, owner of equipment, should understand the current condition of the equipment used by TUK.
- 4) The current equipment condition (repair necessity and required spare parts) should be listed up.
- 5) From minor repair should be conducted by urgently providing special budget.
- 6) The equipment maintenance committee should be established and discussed on the maintenance system.

i. Conclusion

To do the maintenance of equipment effectively, it directly contribute to the improvement of the waste management.

The city office should make the standard of equipment usage (vehicle arrangement plan during week or month, monthly report of equipment operation result) and maintenance regulation of the equipment (unification of maintenance period and items, equipment maintenance record, equipment repairing monthly report etc.) used by TUK.

The rental contract executed by the TUK should be banned because it has caused the deterioration of equipment availability and the superannuation of equipment (describe by 3)

The improvement of the equipment maintenance system will be one of the essential conditionality to get financial assistance for equipment from any donors.

Bayangol (BG) TUK

_	J 0- (-) -								
Unit	Туре	Condition		Personnel/Q	Qualification		Maintenance/ Schedule	Facil	ities	Spare parts
			Eng/Tech.	Mechanic	Helper	Driver	/Record material	W/Shop	Tools	
11	Dump truck (russia)	11-Satisfactory	0	1	0	29	· Preventive maintenance done by	·Enough space of garage	Limited hand tool	Russian made equipment
6	Compactor (russia,	5-Satisfactory		supervise			km (each 5000km).	·There are no proper w/shop	No special tools for adjusti	spares are easy to get.
	Isuzu, Mitsu. Nissan	1-Sale(auction)		driver			· Contract bases maintenance system	at all.	ng or measuring.	Japanese made compactor
3	open truck (russia,	3-Satisfactory					has been applied.	Facilities)		parts are difficult to get
	suzuki)						· 3% of the salary is deducted every mo	1-welding machine		because those vehicle are
1	Tractor (komatsu)	1-Satisfactory	Manufactu	red year; year-	number		nth, and the money is assumed to be	1-drilling machine		domestic use and not supp
	-loader &dozer-		Dump true	k; 76-1, 85-1,	90-1, 91-2,	93-1,	expenditure of the spareparts.			ort out of country.
2	Wheel loader (russia)	2-Satisfactory	95-2, 98-1,	2 are not con	fermed		· Company prepared the spare parets	100		
1	Septic truck (russia)	1-Satisfactory	Compactor	, 88-2, 91-1, 3	are not con	fermed	for preventive maintenance	and the second se		
2	Water &snow truck	2-Satisfactory	Open truck	; 90-2, 96-1			· There are equipment ledger and main			
2	light vehicle	1-Satisfactory	Tractor; no	t confermed			tenance book (record)	COAL DOLLARS		
		1-Sale(auction)	Wheel load	ler; 03-2				Frank Ar		
			Septic true	k; 87-1				and the second		
			Water & sr	now; 98-1. 1-n	ot conferme	d				
								Welding machine		
1			1					1	1	

Bayanzurkh (BZ) TUK

	,									
Units	Туре	Condition		Personnel/Q	Qualification		Maintenance/ Schedule	Facil	ities	Spare parts
			Eng/Tech.	Mechanic	Helper	Driver	/Record material	W/Shop	Tools	
14	Open truck (russia)	14-Satisfactory	0	1	4	39	· Preventive maintenance done by	· Enough space of garage	1-set- tool set	Russian made equipment
7	Compactor (russia)	7-Satisfactory		repair	repair man		km (each 5000km)or monthly.	(It is used as a w/shop)	No special tools for adjusti	spares are easy to get.
3	Compactor (isuzu)	3-Satisfactory		mechanic	welder		·Contract bases maintenance system	facilities)	ng or measuring.	Japanese made compactor
1	Septic truck (russia)	1-Satisfactory			tyre man		has been applied.	2- welding machine (portable		parts are difficult to get
3	Wate&Snow truck	3-Satisfactory			plumber		·Compactor parts are responsble for	&normal)		because those vehicle are
	(russia)						company while normal repair works is	1-compressor		domestic use and not supp
2	Excavator (russia)	2-Satisfactory					halving.	1-chain block		ort out of country.
5	Service car	5-Satisfactory	Received y	ear; year-num	ber		·Only maintenance schedule sheet	1-garage jack		
3	Gardening car	3-Satisfactory	Open truck	; 84-1, 87-1, 8	88-1, 89-2, 9	4-2, 99-2	was seen.			
			l-not confi	rmed						
			Compactor	(russia); 85-1	, 87-4, 99-1,	00-1	and the second se			
			Compactor	(isuzu); 90-1,	, 93-4, 95-1					
			Septic truck	k (russia); 97-	1		10 10 10			
			Wate&Sno	w truck; 74-1,	87-1, 88-1					
			Excavator ((russia); 98-1,	01-1					
							1000			
							Compactor (Isuzu)			

Songinokhairkhan (SKh) TUK

Units	Туре	Condition		Personnel/Q	Qualification		Maintenance/ Schedule	Facil	ities	Spare parts
			Eng/Tech.	Mechanic	Helper	Driver	/Record material	W/Shop	Tools	
19	Dumptruck (russian)	9-Good	0	1	1	26	·By km & date (1500km or every	Enough space (1500m ²) but not	Very few	 It is difficult to get the
		10-Satisfactory			repair man		45 days).	workshop. Only 1-repair pit	Limited hand tool	spare parts because of
2	Compactor (Isuzu)	Satisfactory			1		·Repair works record (No equipment	space.	No special tools for adjusti	lack of budget and equip
1	Compactor (Mitsu.)	Satisfactory			Welder		record).	Facilities)	ng or measuring.	ment life.
6	Compactor (russian)	1-Good					·The driver also does the mantenance	1-Welding machine		Most of spare parts pur
		4-Under repair					activities.	1-Rath machine		chased at Technical mar
		1-Sell	Manufactur	ed year; year-	number			1- Drill machine		ket (Local connon parts
1	Septic truck	Satisfactory	Dump truck	; 73-1, 79-2,	80-2,81-1,8	3-1,		1-Overhead crane		market)
2	Open truck	Satisfactory	85-2, 87-1,	89-1, 92-1,93	3-1, 94-1, 95	-2, 97-1	the second second second second second second second second second second second second second second second se		-	
2	Excavator	Satisfactory	98-1, 99-1				- P	and the second se	CONTRACTOR OF STREET,	
1	Crane	Under repair	Compactor;	87-2, 90-1, 9	94-3, 95-1, 9	9-1	The second second			
1	Wheel loader	Good							B. OCART	
2	Mini Trailer	Satisfactory							The second has	
2	Supervise vehicle	1-Good						Carlos Chill		
		1-sell						- Louis -		
							Compactor (Isuzu)	Mobile welding machine	Russian Compactor	

Sukhbaatar (SB) TUK

Units	Туре	Condition		Personnel/Q	Qualification		Maintenance/ Schedule	Facil	ities	Spare parts
			Eng/Tech.	Mechanic	Helper	Driver	/Record material	W/Shop	Tools	
7	Dumptruck (russian)	7-Good	1	0	0	34	· All maintenance works has done by	No work shop , only garage	Limited hand tool	 It is difficult to get the
11	Open truck(russia)	1-Good					driver, The engineer is only supervise	No w/shop facilities at all.	No special tools for adjusti	spare parts because of
		6-Satisfactory					the diver.		ng or measuring.	lack of budget and equip
		4-Need repair	Recieved ye	ear ; year-num	nber		·Rental contract between driver and comp.		All hand tools mainteined by	ment life.
2	Compactor(russia)	2-need repair	Dump truck	; 01-5, 02-1,	03-1		spare parts cost, comp. and driver harving.		driver.	
2	Compactor(isuzu)	2-Good	Open truck	; 82-1, 87-2,	88-1, 94-3, 9	96-1,	· There are equipment resister book			
1	Compactor(mitsubi.)	1-Good	97-1, 98	3-1, 99-1			and repair record book			
2	Universal & small	2-Need repair	Compactor	(russia) ; 86-	1,93-1					
	Tractor (russi&Chi.)		Compactor	(isuzu) ; 03-2	2		and the party of the local division of the l			
6	Snow & water truck	1-Good	Compactor	(mitsub); 03-	-1					
		3-Need repair	Small tracto	or; 94-1, 95-1			A REAL PROPERTY AND A REAL PROPERTY.			
		2-No record	Snow & Wa	ater trck ; 86-	1, 89-2, 99-1	, 04-2				
1	Light truck	Need repair								
1	Jeep	Satisfactory					and the second se			

Khan-Uul (KhU) TUK

11.11	, ,			P 1//			14.1.1			a
Units	Type	Condition		Personnel/Q	Qualification		Maintenance/ Schedule	Facil	ities	Spare parts
			Eng/Tech.	Mechanic	Helper	Driver	/Record material	W/Shop	Tools	
9	Open truck(russia)	3-Good	0	1	1	25	· Preventive maintenance done by	·There are no place that a called	Limited hand tool	· It is difficult to get the
		5-Satisfactory			pepair man		km.	a w/shop .	No special tools for adjusti	spare parts because of
		1-Repair			2		·Contract bases maintenance system	No facilities	ng or measuring.	lack of budget and equip
2	Compactor (russia)	1-Good			welder		has been applied.			ment life.
		1-Repair					· The company prepare the parts for	ALC: NOT THE OWNER OF THE OWNER OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OWNER OWNER OF THE OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNE OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNER OWNE		
2	Compactor (isuzu)	2-Satisfactory					periodic maintenance and normal	COLUMN AND ADDRESS OF		
1	Compactor (mitsub)	1-Satisfactory	Registration	n year's record	l is not descr	ibed .	repair works as for 50000TG or less,	The fact of the second		
1	Univ. tractor	Repair					it is driver's responsibility and the	1 100 100		
2	Water truck	Good					driver halves 50000TG more with the			
2	Septic truck (russia)	1-Satisfactory					company	and the second s		
		1-Repair					·Mechanic is only supervise the driver	and the second second	11 T	
6	2-Service truck	2-Satisfactory					and repairman and welder assite to			
	4-light vehicle	4-Good					driver.	Compactor (russia)	Water tanker	
							· There are equipment ledger and main			
							tenance book (record)			
								1	1	

Chingeltei (Ch) TUK

	0									
Units	Туре	Condition		Personnel/Q	ualification		Maintenance/ Schedule	Facil	ities	Spare parts
			Eng/Tech.	Mechanic	Helper	Driver	/Record material	W/Shop	Tools	
4	Compac. (Russian)	Satisfactory	1	1	0	29	·Periodric maintenance is done every	·No work shop and facilities	Limited hand tool	Most of spare parts pur
2	Compac.(Isuzu)	Satisfactory	Engineer	Repair man			turn of each 6000km or the season.	for the maintenance.	Only 10-15 pic.of spanars	chased at Technical mar
12	Open truck(Russian)	Satisfactory	(Not tec.				· Equipment managed by equipment	· Enough garage space,	Limited hand tool (ring, fix	ket (Local connon parts
1	Compa.(Nissan)	Grounded	person)				record and maintenance record for		,combination spana)	market)
1	Compa.(Mitsubishi)	Satisfactory					each vehicles.		·All hand tools are being	There is no warehouse for
1	Septic (Rssian)	Satisfactory	Manufactu	red year; year-	number		· A part of general repair is requested		managed by the driver	the spare parts.
2	Snow and water (Ru)	Satisfactory	Compactor	(Russian);85	-1, 00-1, 02-	-2	to the private work shop, and it goes about			
5	Others (jeep, Light	Satisfactory	Compactor	(Isuzu); 91-1,	93-1		other periodic and general maintenance			
	vehicle, trailer)		Open truck	(Russian); 83-	2, 84-1, 93-	8, 99-1	works in own workshop.		Contractory of the	
			Compactor	(Nissan); 94-1			·Most repairs are being done by the	A CONTRACT OF A		
			Compactor	(Mitsubishi);	93-1		driver.	and the second se		
			Septic truck	k (Rssian); 02-	-1		·No equipment rental contract		761	
			Snow and y	water (Ru); 83	-2				197	
								STATISTICS.		
								Open truck (russia) and no facili-	Garage	
	1							14		

Nalaikh (Na) TUK

	`	<u> </u>								
Units	Туре	Condition		Personnel/Q	Qualification		Maintenance/ Schedule	Facil	ities	Spare parts
			Eng/Tech.	Mechanic	Helper	Driver	/Record material	W/Shop	Tools	
5	Open truck (russia)	2-Satisfactory	0	0	0	6	· Preventive maintenance done by km or	 No workshop only garage. 	Small amount of hand tool	Russian made equipment
		3-Grounded					monthly .	Facilities)	such as fix, ring, combination	spares are easy to find,, but
3	Tractor with trailer	2-Satisfactory					·No equipment lease contract, However	2- welding machine (portable	spanar.	their prices are expensive.
	(russian)	1-Grounded					driver mainteined equipment and cost of	&normal)		
2	Universal tractor	1-Satisfactory					spareparts below 5,000TG respons for	1-compressor		
	(russian)	1-Grounded					the driver, and more than 5,000TG	1-rath machine		
1	Jeep(russian)	Satisfactory					respons for the company. However,			The Party of the P
All equ	ipment is made in Ru	ssia, and most	Manufactur	ed year; year-	number		because most parts exceed 5000TG, it is			
equipn	nent passes the life (me	ore than 15 years	Open truck:	89-1, 03-1			actually a fact that the company is bearing	1 - 1	Local Distance in the	ALC: NOT THE OWNER.
after it	resisters at the first ye	ar and it was	Tractor with	h trailer; 89-1	, 96-1		most cost.	A DESCRIPTION OF		States and States
brough	t by used car)		Universal tr	actor; 97-1			·Only maintenance schedule sheet	Internet State	ALL DESCRIPTION OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF T	
			Not mantio	ned grouded e	quipment.		and parts purchased book were fund.	and the second s		
								# 17m	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	CONT.
								the state of the s	ALC: NOT THE OWNER OF	
								Universal tractor (Russia)	Open truck (russia)	Welding machine
								1		

Nuuts

Units	Туре	Condition	Personnel/Qualification				Maintenance/ Schedule	Facilities		Spare parts
			Eng/Tech.	Mechanic	Helper	Operator	/Record material	W/Shop	Tools	
3	Bulldozer (Russian)	2-Running	0	1	1	3	 By hours (200~300hrs) 	No maintenance yard ,	1-Small tool box with tools	Most of spare parts pur
		1-Grounded			repair man		· All repair works are done in the final	The welding machine is in the	(Containing small qantities	chased at Technical mar
1	Folk lift (Russian)	Runninng					disposal site	final disposal site.	of socket, spanner, wrench)	ket (Local connon parts
1	Water Tanker	Running					· Equipment record book (maitenance	Facilities)		market)
							record book) no ledger book.	1-Welding machine		There is no warehouse for
								1-Folk lift for repair trcks		the spare parts.
* Running condition but not good condition										
Manufactured year; Bulldozer (1989-1, 1995-2), Folk lift(1989-1), Water tanker(2004-1)						04-1)	T170 Bulldozer (russia)	Wheel loader (Fork lift) Use for undeacarrage service	Tools (Only hand tool no special tools for adjustment	Mobile welding machine
Bulldozer									for track carrier	

3.3 Institutional System

In response to the recommendations made in the Study the institutional system has been changed in accordance with the progress of the Study. It should be minded that this Chapter describes the institutional system in May 2005.

3.3.1 Administration and Organization

a. Introduction

The Section 1.2.1 above indicates the main entities involved in SWM in Ulaanbaatar and their relationships. They are described in more detail below.

b. Ministries

Under Parliamentary Order 201 of 2004 the functions of the Ministry of Infrastructure under the previous Government were re-allocated and the newly established MOCUD became responsible for the formulation of urban development policies and for developing the policy framework for urban development, housing and public services, including SWM. The Construction and Public Services Policy Coordination Department is responsible for SWM policy, drafting new legislation and providing the Government interface with relevant foreign assistance projects.

The Government Implementing Agency for Construction, Urban Development and Public Utilities (GIACUDPU), responsible under the previous Government for the implementation of urban policy is replaced by the Construction and Public Utilities Support Centre (CPUSC). It is newly charged with the national responsibility for implementing SWM policy, including setting national standards and improving management in the sector. However as yet it has not taken become heavily engaged in the sector.

The MOE is responsible for the environmental impacts of SW, including hazardous waste.

The Ministry of Health has been very active in establishing the new legal environment, and the relevant legislation described in the Section 1.6 above. It carried out routine monitoring until 2002 when the State Specialized Inspection Agency (SSIA) was established under the Prime Minister, consolidating the inspection functions of some ten entities. WHO is assisting the Ministry with a study on the volume and composition of health care waste, for which it is directly responsible.

c. Municipal Organizations

The <u>MUB City Maintenance and Public Utilities Division</u> (CMPUD) reports to the General Manager and Head of the Mayor's Office. There are 6 types of entity reporting to it:

- 9 District Maintenance and Public Utilities Departments,
- 9 District TUKs,
- "Reserve" (Nuuts) Company,
- "Water Facility" Company,
- the "Horticulture" Company,
- the "Illumination" Company.

Of the Division's 8 staff one is responsible for citywide SWM and three for SWM, greening / modernization activities in at least one District as well as other matters e.g. the Nuuts or "Water Facility" Companies (see the Figure below). Other staff is responsible for the "Horticulture" Company, "Illumination" Company, approving advertisements in public areas, Divisional statistics, and Divisional accounts.


Figure 3-12: MUB City Maintenance and Public Utilities Department-Organization Chart

The <u>"Reserve" (Nuuts) Company</u> was established in 1993, prior to which it was primarily an organization dealing in secondary raw materials, mainly metal and bones. It is wholly owned by the MUB and largely financed directly from the City Budget. It is responsible to the City Maintenance and Public Utilities Division, to which it reports monthly. Its only activity at present is the management and operation of the two dump sites. The main activities there are (1) recording the number of trucks dumping, their origin by District and the type of waste; and (2) covering and compressing the waste.

The Figure below provides the organization chart. There are 17 staff positions. There are Russian T-170 bulldozers at each of the Ulaan Chuluut and Morin Daava sites, but only one bulldozer driver. Both bulldozers are in poor condition, but it is understood that adequate funds for repair have recently been allocated. The Company also has a water bowser which is driven as necessary, for supplying water to site workers and for fire fighting, by the Company mechanic.



Figure 3-13: Reserve Company-Organization Chart

The Company has to operate in a market economy as far as expenditure goes, but has no control over the pricing of its output, so that its budget has been under considerable strain for several years. Commercially contracted waste, accounting for 17.5% of throughput in 2004, is paid for by the contractor at MNT250/m³ on delivery. All other activities are financed directly from the City budget; which was MNT280 mill in 2004 based on an estimated waste volume of 280,000 m³. This compares with 298,000 m³ handled in 2003, and suggests that the MUB were anticipating a 6% decrease in Nuuts activity in 2004. In fact an additional 28,000 m³ over budget was handled, but no additional money was made available for this. In 1999, when fuel was MNT280 per l, the Company requested payment at MNT160 per m³ handled, but was granted a rate of only MNT100. Fuel currently costs MNT 770 per l (December 2004). The gross budget rate remained frozen at 1999 current values of MNT100/m³ compared with an estimated actual current cost of MNT311. Wages average about MNT60,000 per person per month, which is significantly lower than those currently paid for similar work elsewhere in the Municipality. The Company is in a weak negotiating position

because it does not have the right to argue the case for its budget. It is reputedly the only MUB company to be deprived in this way, and it is not surprising that equipment cannot be maintained in good condition and staff turnover is relatively high. It is understood that MUB has recently approved an increase in the budget handling rate from MNT100 to MNT 300/m³ handled.

The <u>"Water Facility" Company</u> is responsible for storm water drainage, with the Water Supply and Sewerage System Authority (USAG) being responsible for potable water supplies and sewerage. Its 2004 budget is MNT50 mill, MNT10 mill of which is used for pump repairs. In addition to the Director and support staff the 14 permanent staff include two engineers who maintain the 4 pumps at the single pumping station; and 3 repair workers who maintain the network of 45 k of trunk drains and 700 manholes. For three months from April to July about 18 seasonal workers are employed in cleaning out the drains, at a cost of MNT3 mill.

For 2005 the City budgets for the <u>"Horticulture"</u> and <u>"Illumination" Companies</u> are MNT30 mill and MNT125 mill respectively.

The <u>Nature and Environment Department</u> is an Implementing Agency of the MUB. Its main functions are to protect, rehabilitate and properly use the natural environment i.e. the City's soil, air, water and vegetation. The Figure below presents the main types of activity. The Department provides the City's official point of view on these issues e.g. in representations to Ministries. It also implements improvement projects e.g. forestry, re-forestry, use of forest products, land rehabilitation, fire fighting, pest control; and would expect to be charged with the rehabilitation of any SWM disposal sites which are no longer required. It also conducts environmental policing, including illegal dumping etc, but is not otherwise involved in the management of solid waste. It reports to the Ministry of Environment on professional matters and to the Governor's office on management performance.



Figure 3-14: Main Operation of Nature and Environment Department of MUB



Figure 3-15: Nature and Environment Department of Capital City-Organization Chart

An important aspect of its work is as part of the approval process for development applications, in accordance with EIA legislation, with significant applications having to be referred to it for comments, which may be approval, modification or even refusal. As part of the "Stockholm" requirements it organizes, using the Districts, twice yearly surveys of hazardous waste and annual surveys of slow-degrading waste.

As indicated on the Figure above it has 41 staff, 33 of whom are "protectors" of the environment, and another a policeman. Only the latter has any effective penalizing powers. Although they will reprimand illegal SW disposers this is not their primary function.

<u>MUB's Property Relation's Department</u> is the custodian of the City assets used by the TUKs, and is signatory to their management contracts.

The <u>City Specialized Inspection Agency (CSIA)</u> was established on 23rd January 2003 in accordance with the 7th Mongolian Government Resolution on "Ways of Implementing Laws", the 39th Decree of the Mayor of Ulaanbaatar and the 29th Decree of the SSIA. It prepares reports once each season for the Governor's Office and reports twice per year to the SSIA. It has policy review and policy initiative functions e.g. the current proposal to the Ministry of Construction that the building construction permission and inspection procedures should include arrangements for the proper handling and rehabilitation of any excavated material. It also has implementation functions in enforcing compliance with many of Mongolia's laws, whilst some areas of the law are monitored by the SSIA. Outside Ulaanbaatar the State Agency is responsible for enforcing all laws.

21 City Agencies were consolidated in the Department, and it now has five Sections, a laboratory and 214 inspectors. As indicated on the Figure below the Environmental and Infrastructure Supervision Division is responsible for general, industrial and hazardous waste, whilst the Social Health Supervision Division is responsible for supervising medical waste at source. It has 36 inspectors divided between two units. The Infrastructure Unit has 21 inspectors responsible for engineering, building, transport, communication and energy inspection. The Environment



- Only Environmental and infrastructure supervision division is shown in detail

Figure 3-16: City Specialized Inspection Agency-Organization Chart

Unit has 15 inspectors responsible for monitoring compliance with 6 International Conventions, 33 Laws and some 300 Regulations relating to natural resources, soil and vegetation, air quality, forestry, land, hunting, geodesy etc. It is organized around the laws with different officers being responsible for different sets of legislation. Seven of the 15 work at transport check points monitoring illegal timber and skins etc seeking to enter the City. Only one inspector is primarily responsible for monitoring general and industrial SW dumping, and this responsibility is only one, and not the most important, aspect of several land pollution issues which also include the major concerns of toxic sludge from skin processing factories and animal waste from meat processing factories.

An annual plan and schedule for monitoring SW and accomplishing environmental improvements is prepared during the first 10 days of the year. This is developed in detail for quarters and months. Some spot-checking is scheduled, but daily inspections are not possible. In addition to the planned activities there are many ad hoc activities triggered by complaints from citizens and TUKs e.g. about dumped construction waste.

d. District Organizations

The <u>District Maintenance and Public Utilities Departments</u> are responsible for SWM in their respective areas. They report to their Governors and are inspected by the MUB for SWM performance, amongst other things, and also implement improvement projects, sometimes with the assistance of the MUB. They report to MUB four times per year on public area amenity, SWM work, including public awareness campaigns etc.

Although Departmental structures are reputedly determined by Cabinet Decree they differ in practice; with the Khan-Uul (KhU) Department also having responsibilities for the OSNAAG branches for example (see the Figure below). However each of the Departments has five basic staff: (1) the Departmental Chief, who in the case of Sukhbaatar (SB) is also

specifically responsible for regulating the personal services industry (hairdressers etc), and officers responsible for (2) trade; (3) business premises, including hotels and restaurants; (4) infrastructure and (5) local amenity plus environment plus SWM.

SW operations in the Districts are carried out by the District TUKs which collect waste from apartments, *ger* areas and organizations. In the case of SB however, ostensibly because of a shortage of TUK vehicles although it has more than any other TUK, a decentralized SWM system operates without the involvement of the TUK. In the six *ger* area *Khoroos* the Maintenance and Public Utilities Department, working with the *Khoroo* Governors, has to be creative in order to provide any semblance of a service. For example prisoners and incarcerated drunks are sometimes used, as well as students and competitions etc. However very soon after cleaning the conditions quickly revert to being seriously spoiled with SW.

The Figures below illustrate the Organization Charts for KhU and SB TUKs. Each District has inherited its TUK from the communist era with the functions of 1. Improving and maintaining street furniture and green areas; 2. Cleaning public areas; and 3. SWM. Progression to less rigid institutional structures began in March / April 2004 with the awarding of three-year management contracts on an ostensibly competitive basis. There are 3 Government parties to the contracts: (1) the MUB Maintenance and Public Utilities Department; (2) the City Property Relations Department, which retains ownership of the capital assets (trucks etc); and (3) the respective District Maintenance and Public Utilities Departments. The Companies report to these bodies twice per year when the scope of works is reviewed and may be revised. Ownership of capital assets is retained by the City through its Property Relations Department. Chingeltei (Ch) TUK is typical, with the vehicles, main offices, workshops and garage being inherited from the preceding regime rent free, although rent is paid for the use of the basement of the District Offices by TUK staff. KhU TUK appears to be rather different with the assets administered by the Company including the whole of the main building, which is also occupied by the police for Khoroo No. 3 amongst others; garages and some 30 vehicles, including three of the 19 Nissan compactor collection trucks of 2-4 ton capacity purchased in 2003. These assets are understood to be registered in the Company's name, although only a deposit against possible purchase has been made. No capital assets have been added here since Company formation.

Improving and maintaining street furniture and green area activities, as well as cleaning public areas are financed from the District Budgets; and SWM is financed by:

- payments by apartment residents through OSNAAG branches;
- directly by contract from organizations;
- directly by *ger* area residents.

KhU TUK work on "road cleaning and greening" is reported to the Governor, not the Head of the Maintenance and Public Utilities Department. Also here the Head monitors the Management Plan, but the Governor monitors the Work Plan.

Each government and commercial organization in a District has a SWM contract with its respective TUK. These range from 285 contracts in KhU to 1,450 in Songinokhairkhan (SKh) with daily or less frequent services. The mean value of all contracts is MNT100,000 ranging from District means of MNT35,000 in SKh to MNT230,000 in Bayanzurkh (BZ). Organizations often complain about high charges, and in cases of multi-occupancy buildings with communal bins particularly there are problems of extracting payment from small businesses.

Apartment residents have paid MNT200 per person per month for the last three years, with 4% of this retained by the collecting agent – currently the privatized OSNAAG branch office.

The balance is passed to the TUKs with 8% of the collected total being devoted specifically to the cleaning of public areas around apartment areas. Each TUK has about 150 bins in the apartment areas, from which garbage is, in principle, collected daily. The mean distance to the final disposal site is 29 km for SB TUK, with each $3.5m^3 / 5$ ton / truck load reputedly costing MNT18-25,000.

Ger area services are nominally monthly with door-to-door collections being the norm at present. It was found that many people denied depositing waste at the formal communal collection points, and therefore refused to pay for the service. The money is typically collected on the same evening as the waste collection. Coal bags are often used for coal and wood ash. In Chingeltei the Director has arranged for *Khoroo* Governors to inform households of impending collections, so that they know when to put out rubbish. Otherwise households leave it out at any time, to be scattered by scavengers and dogs, when their compounds are locked and unoccupied. Some *ger* areas are not serviced, particularly in winter because of access problems, others have narrow streets, as people occupy as much land as they can in the emerging land market, and vehicles have to reverse for hundreds of metres.

Each year the District identifies the households in the *ger* areas which cannot afford, and should not be pressurized, to pay the charge. For the remainder the collection rates approach 100%. The *Khoroo* Governors should help to collect the charge, but are not usually involved at present. The legally levied charge is MNT700-1,000, fixed some years ago by the Citizens Representative Hural; but the effective current minimum is MNT 1,000, with more prolific waste-producing households being charged more. From 15th November 2004 Ch TUK sharply increased its charges, in order to reflect increases in fuel and spare parts charges, from MNT1,000 to MNT2,300-3,500 but reputedly has met little resistance to this from an understanding customer base. It is understood from the Director that no other authority is required to sanction such increases.

In addition to contracted SWM, there is a lot of pressure on the TUKs from various directions to remove SW free of charge.

KhU and Ch have, according to the Study's TUK Key Indicators Survey, large sewage collection and transporting functions, to the extent that the volume handled exceeds that of waste removed from the *ger* areas. In KhU in the second half of 2004 1,923 trips and 11,538m3 were handled, mainly from schools and other organizations in Yarmag, which is not connected to the Municipal sewerage network. The waste is taken to the Municipal sewerage works for treatment and disposal.



Figure 3-17: Maintenance and Public Utilities Department of Khan Uul District-Organization Chart







Figure 3-19: Sukhbaatar TUK-Organization Chart

e. NGOs

World Vision in Mongolia (WVM) has a medium term commitment to Mongolia having worked in some areas for 6 years already. On behalf of JICA they prepared a Feasibility Study for Air Pollution Reduction in Ulaanbaatar, in September 2003.

Following a baseline survey of an area WVM prepare Five Year community based programs targeting the very poor, with 80% of their beneficiaries in Mongolia being below the poverty line. There are six program areas in Mongolia:

- 1. Health child mortality, ger community etc
- 2. Education pre-school involvement, school management, ethics etc
- 3. Income Generation training, loans etc for the entrepreneurial poor
- 4. Civil Society community leadership etc for program sustainability
- 5. Environment to receive increasing attention in the future: planting, SWM, air pollution, sewage systems, land issues.
- 6. Child Rights and advocacy street children rehabilitation, re-socializing child and other prisoners. Also organizing Self-Leading Children's Committees.

Whilst community activity is traditionally not strong in Mongolia it is the basis of much of WVM's work, and is built on units of 10 households each with a leader. A lesson learnt is that if communities are involved in design and construction they will value and use the facility. There are 12 WVM supported CBOs in Mongolia, six of which are in the *ger* areas of Ulaanbaatar with about 5,000 active and fee-paying members in total, representing 5-10% of the local populations:

• In Bayanzurkh District - in all *ger* area Khoroos (2 CBOs)

- In Sukhbaatar in most *ger* area Khoroos (1 CBO)
- In Nalaikh District in all *ger* area Khoroos (1 CBO)
- In Songinokhairkhan about 15 of 21 i.e. all ger area Khoroos (2 CBOs);
- Just beginning operations in Khan-Uul and Chingeltei Districts

WVM have organized SW cleaning campaigns, increased SWM awareness and provided garbage collection points in a couple of Khoroos, handing over to TUKs and CBOs for operation. They have also done some work with waste pickers at Ulaan Chuluut, particularly children. Most waste-pickers are homeless, unregistered immigrants from rural areas and without relatives in Ulaanbaatar, and the objective has been to re-integrate them into society. WVM have little involvement in re-cycling apart for introducing another NGO to their CBOs to undertake a remunerated glass jar collection after the vegetable harvest. However they may well be interested in encouraging waste separation and recycling; and would welcome co-operating with the JICA project.

The <u>International Centre for Sustainable Cities</u> (ICSC) has prepared a draft Proposal for a "Waste Pickers Improvement Project in Ulaanbaatar" and is seeking finance for its implementation (as at December 13, 2004). It has relevant experience from similar projects in South East Asia (South East Asian Local Solid Waste Improvement Project – SEALSWIP) and proposes a partnership amongst stakeholder groups to execute the project.

Other NGOs with SWM interests are the <u>Mongolian Women's Federation</u> with its Blue Bag Campaign supporting sorting into blue bags for commercial re-cycling; <u>Baigal Erdene San</u>, the <u>WWF</u>, <u>Tuul 21</u>, <u>Ariun Orchin</u>, the <u>Union of Mongolia Ecologists</u> and the <u>National</u> <u>Steering Committee of Condominiums</u>.

f. Small Scale Recycling Companies and the Informal Sector

Estimates of potentially re-usable waste in Ulaanbaatar vary from 20% to the 30% figure attributed to the WHO. In 2003 the City paid MNT 4 mill for 100,000 bags which were distributed to households by the TUKs to be used for different types of SW. The exercise was unsuccessful, with many distributed bags not being seen again.

The informal agents in SWM, by definition non-institutionalized stakeholders, perform significant SWM functions, which may well become more formalized at some time in the future. In particular waste pickers and street callers separate and sell to a network of buyers and a small number of businesses are active in re-cycling these secondary materials. Whilst these activities may at first sight be regarded as a fledgling industry they are more accurately described as the vestiges of a once thriving secondary materials industry.

Estimates of the number of waste pickers vary, with the World Bank estimating 5,000-7,000 scavengers in Ulaanbaatar many of them young children (Mongolia Environment Monitor 2004), compared with ICSC's 500-1000. The Director of Nuuts estimates the number for Ulaan Chuluut final disposal site at about 300, compared with ICSC's 200-250. Some of these simply look for food but many are involved in separating cans, other metals, plastics, glass and cardboard waste. Whilst the Nuuts Company has successfully recruited waste pickers to its payroll other people are of the view that many are not interested in rejoining formal society; for example some sold the ger tents given to them by the City, preferring to be homeless.

Separated waste at Ulaan Chuluut is sold to buyers who visit the site. In the case of plastics Nuuts assists by providing free transport for the material to the buyer. Waste pickers can earn up to about MNT3,000 per day. Apart from bottles and jars, which are reused or sold directly by householders, other items are broken down and compressed as much as possible

by buyers prior to transport and sale to China. There is a good deal of secrecy surrounding the identity of buyers, presumably to protect markets. Some examples of prices for the initial transactions in the chain are given in Table 3-24.

Waste Item	Unit	Price (MNT)
Plastic bottles – dirty	kg	50
Plastic bottles – clean	kg	250-300
Vodka bottle	each	20-70
Jam jar	each	10-20
Can	kg	600
Copper	kg	1,200
Brass	kg	600
Styrofoam	kg	100

Table 3-24: Initial Transaction Prices for Recycled Waste

Source: Nuuts Company Director, December 2004.

There is a market in these products throughout Ulaanbaatar, with buyers for different items established at many points and itinerant buyers calling out for business in residential areas. These are visited by secondary buyers who consolidate the products and sell them to Chinese or Chinese speakers, who take or send them to China. Some households conscientiously collect their waste items and sell them. This was a more common practice during the communist period. The market for aluminium, but not other, cans is well established, bottles and jars are used domestically, broken glass is dumped. Specialized commercial plastic bottle washing and cutting-up facilities in Darkhan and Ulaanbaatar have proved not to be profitable to date.

A number of Chinese chicken farmers in the City process bones, and possibly take the oil and meal to China as well as using them locally. Since the failure of the main bone processing factory, which used to produce oil and bone meal fertilizer, the meat processors simply dump their animal waste as cheaply as possible, and not infrequently illegally. Most schools prefer to burn waste paper rather than sell it for recycling at MNT30,000 per ton.

3.3.2 Enforcement of Legislation

The main SW related legislation is described in the Section 1.6 above. Following the national policy shift to concentrate enforcement powers for virtually all sectors in the SSIA enforcement is carried out, with varying degrees of success, at six levels of authority:

- 1. Professional Supervision Department of MUB Governor's Office;
- 2. Maintenance and Public Utilities Division of MUB Mayor's Office;
- 3. Nature and Environment Department of MUB Governor's Office;
- 4. District Maintenance and Public Utilities Departments;
- 5. Khoroo Governors;
- 6. District TUKs.

The State Inspectors of the City Specialized Inspection Agency (CSIA) have the greatest authority to stop activities that are regarded as damaging the environment; suspend operations that violate regulations or standards; impose penalties on violators; develop local programs of environmental protection and rehabilitation; relay environmental information from surveys and monitoring to national information and data management agencies and systems; and regulate and control activities of commercial and industrial entities. The level of fines is enshrined in law, including the new SWM Law effective since July 2004. Citizens are liable for MNT1,000-10,000 for casual littering; and MNT1,000 – 15,000 for illegal dumping. The law also, rather curiously, provides for penalties for people making use of waste which has been properly disposed of; with citizens, i.e. waste-pickers, liable for fines of MNT30,000 –

50,000, and organizations MNT150,000 – 250,000. The CSIA must refer to the SSIA for endorsement of sanctions against very serious offences.

The City Maintenance and Public Utilities Division can bring infringements to the attention of the District and the TUK, but cannot take any more direct action.

Although the City Nature and Environment Department's 33 environmental "protectors" will reprimand illegal SW disposers this is not their primary function, and only the policeman has any effective deterring and penalizing powers.

The District Maintenance and Public Utilities Departments carry out inspections and, along with the District Governors, receive complaints from others. Their effective actions are largely limited to requesting and instructing the TUK to take necessary action.

Most of the District TUKs have no effective enforcement authority, but Sukhbaatar TUK employs two State Inspectors to (a) collect money; (b) enforce the law; and (c) issue claims for damage to public property e.g. bus shelters.

The Khoroo Governors are regarded as having relatively strong sanction powers, but cannot fine and must rely on powers of persuasion e.g. to collect money from households in order to contract for the removal of dumped material. In some cases they may be unwilling or too busy to vigorously exercise their authority.

Thus, with the exception of Sukhbaatar's two State Inspectors, only Numbers 1. and 5. in the above list have relatively strong authority for actually cleaning up illegal waste. Since the consolidation in the SSIA, the others have only weak powers - little more than drawing attention to problems and requesting actions from the TUKs.

3.3.3 Privatization and Contracting System

As noted above, as part of the transition to a market economy, the TUKs currently have three-year Management Contracts, the result of a tendered process. Bidding for TUK management privatization was technical only, and then limited only to a demonstration of experience and capability. There was no financial element. Furthermore the successful bidder was instructed on what work to do and how much they would be paid for it. The level of tender interest varied from District to District - Ch had to be re-tendered following the initial sole bid, and in all cases the incumbent Director was the successful bidder supported by the existing workforce. Business Plans are sometimes attached to the contracts and include detailed activity programming for the entire duration of the contract.

Although the management companies are nominally 100% private the ambiguity of their situation is indicated by the fact that in some cases Directors' name cards incorporate the national logo and represent the holder as part of the District Governor's Office.

The new arrangements have enabled Directors to introduce improvements to their organizations. The Ch Director, with four years experience in the company, made four important changes: 1. introduced a manager / engineer for "green area" activities and made workers in the unit multidisciplinary rather than specialist; 2. added an economist to the accountant to strengthen monitoring etc of the business; 3. added a Human Resources person at manager level; and 4. Is building a new workshop, scheduled to open in April 2005, to improve metal repair and fabrication capacity. In addition to the Human Resource and Finance Department Managers there are two others responsible for 1. the operational areas under the District Budget and 2. The collection and transport of SW.

Considerable thought has been given to privatizing public area cleaning in particular e.g.

individuals and groups of people have offered routine cleaning services for specific areas in Ch. Such arrangements would probably be cost effective but the problem is one of TUK cash flow, which prevents them being able to commit to regular payments.

KhU TUK practices a level of privatization within its operations. Since privatization in April 2004 one bill collector, one driver and vehicle and two loaders have operated in each of the seven *ger* Khoroos. Following a survey of the workload in each *Khoroo*, individual contracts were made between the Company and each crew member. The bill collector pays directly for fuel and pays the crew each week; and the balance is paid in at the Company's head office on Monday of each week. The arrangement is said to be very successful, although booked receipts were lower for the second half of 2004.

3.3.4 Waste Collection Fee and Charging System

a. Current Fee Collection System

a.1 Waste collection fees and fee collection rates

The fee revenues of the TUKs are constituted of waste collection fees for gers, apartments and organizations.

The monthly fees for households in the six central Duuregs - BG, BZ, KhU SKh, SB and Ch - are 200 MNT/person for apartments and 500-2,500 MNT/household for gers depending on transportation distances and the amount of waste. In Na Duureg, the monthly fees for households are 150 MNT/person for apartments and 700 MNT/household for gers. The fee for organizations and small businesses varies from 1,000 to 27,000 MNT depending on the waste amounts and transportation distances.

The authority to determine the fee for apartment area collection in the six Duuregs rests with the General Manager of MUB while the directors of the TUKs have the authority to determine the fees for the waste collection services in ger areas and organizations. As for Na Duureg, the authority to determine all the waste collection fees rests with the Governor of the Duureg. The current fee for apartment area waste collection in the six Duuregs has been in practice since 2001 while all the other fees were reviewed in 2004 and some were increased.

The fee collection rates in apartment areas in all Duuregs are 80 - 85%, which is much higher than those in ger areas since the fees are collected together with other utility charges. On the other hand, the fee collection rates in ger areas vary between Duuregs. The monthly fees, the number of households that should pay or are actually paying the fees, and the fee collection rates for ger area in each Duureg are shown in the following figures.





Figure 3-20: Monthly Fees for Ger Household Source: TUKs and the Estimate by JICA Study Team

Figure 3-21: Number of Households that Pay and Should Pay the Fees in Ger Area Source: TUKs and the Estimate of JICA Study Team



Figure 3-22: Fee Collection Rate for Ger Area Source: TUKs and the Estimate by JICA Study Team

The difference in the fee level among TUKs is significantly large in ger areas compared to that in apartment areas.

As the Figure above shows, the number of households that are actually paying the waste fee is considerably small in ger areas. Among others, BZ and SKh TUKs have a large number of ger households that are not paying waste fees, implying that a substantial amount of waste is illegally dumped in these Duuregs.

The fee collection rates are very low in ger areas, as shown in the Figure above. Fees are lowest in Na and KhU TUKs (700 and 750 MNT per household respectively) while they are highest in BZ and Ch TUKs (1,500 and 2,400 MNT respectively). On the other hand, fee collection rates are highest in Na and KhU TUKs (24% and 20% respectively) while they are lowest in BZ and Ch TUKs (both 11%), implying that the fee level and collection rate are inversely proportional. It should also be noted that the collection rates of TUKs which have big ger areas - BZ, SKh and Ch - are lower than the other TUKs which have smaller ger areas.

a.2 Fee collection methods and monitoring

Fee collection for apartment households in the six central Duuregs is contracted out to OSNAAG, while the fees for ger households are collected by TUKs themselves. Nalaikh TUK collects all the fees by itself.

OSNAAG collects waste service fees from apartment households together with its own service and utility fees and transfers the waste fees to TUKs after a 4% commission deducted. Since OSNAAG cuts the electricity if the residents fail to pay the fee, almost all the apartment residents are obliged to pay the waste fee. On the other hand, the waste fee is calculated on a family member basis – 200 MNT per person. Since the actual size of families are not known to OSNAAG, quite a few apartment residents are apparently declaring smaller numbers to OSNAAG. As a result, the overall collection rate of the waste fee by OSNAAG is estimated at 80% to 85%. The payment from OSNAAG to TUKs is usually delayed for three to five months, which sometimes causes TUKs a cash shortfall.

As for the collection from households and small businesses in ger areas, the fee collectors of each TUK collect fees on the spot when collecting their wastes at their doors. If these residents/businesses refuse to pay the fee, TUKs' waste collection staff usually do not collect their wastes.

The fees from small businesses located in apartment areas are paid, usually once a month, directly to the fee collectors based on the agreement with respective TUKs.

Medium to big organizations usually pay the fees through bank transfer in accordance with

the contracts signed with the TUKs. Not all organizations have contracts with TUKs; some organizations transport their wastes by themselves or use private collectors. In these cases, it is not known where the waste is dumped.

Summerhouse areas are mostly located in the northern part of the city, and thus, Sukhbaatar and Ch TUKs are responsible for waste collection in these areas. Many households come from other Duuregs to stay in these areas during summer. Although many households living in summerhouses are richer than the households living in ger areas close to the city center, the fee collection rates are usually low. There is a drawback in the fee collection system in these areas. These households discharge their waste at the collection points where the two TUKs place containers, not directly hand their waste to waste collectors. This is the reason why many of these households refuse to pay for the collection services when the fee collectors visit them.

Fee collectors are paid a fixed percent of the fees they have collected for the TUKs. The TUKs have difficulties in detecting fee collectors' fraudulence. Although fee collectors' supervisors in some TUKs including BG, KhU and Na occasionally visit households and small business entities to check whether customers have received the proof of payment, the companies cannot cover all the customers. Although the fee collectors have detailed list of payment status of each customer, none of the TUKs has created a database to monitor the waste and fee collection¹. As for medium and large organizations, all TUKs know the payment status of the organizations.

a.3 Enforcement in payment

As was discussed above, the fee collection rate in apartment area is high since the fees are collected by OSNAAG together with public utility charges. Since electricity supply of those who failed to pay the fees for months is disconnected, apartment residents are obliged to pay the waste fee regardless of their willingness.

As for the fee collection in ger area, TUKs cannot take effective measures against non-payers, since they have no authority to levy penalties. Instead, TUKs simply stop collecting their wastes, which, in turn, triggers illegal dumping.

As for the fee collection for organizations, TUKs also stop waste collection from businesses entities if they do not pay the fees for months. There is no effective measure against non-payers of small businesses located in apartment areas since they are able to dump the waste, regardless of payment, in a designated area as other apartment residents do. Medium to large businesses usually pay the waste fee since their operation is to some extent monitored by the Duureg government and the Specialized Inspection Agency of Ulaanbaatar City.

Inspection of Businesses by Duureg Governments and Specialized Inspection Agency

The City Specialized Inspection Agency (CSIA) is the only responsible body to issue operation permits to businesses that deal with services in Ulaanbaatar City. The CSIA examines the location, working space, working condition and standard fulfillment after an application for an operation permit is submitted. The operation permits has no expiration date. The CSIA inspects how small businesses satisfy related standards and requirements in their operations and if they fail, CSIA's inspectors order suspension of their operations.

Duureg offices make contracts with all service businesses that have operation permits from the CSIA and are operating in their Duuregs. For example, Chingeltei Duureg office collects 500 MNT/once as a service charge from each business that has the contract with the Duureg. The main purpose of the contract is to make sure that the businesses do not violate standards and regulations on sanitation,

¹ Nalaikh and Sukhbaatar TUK have just recently started to set up a database.

working hours, etc., including waste discharge. The period of the contracts varies from 3 months to a year.

Duureg officials conduct inspections either by themselves or together with CSIA inspectors. When Duureg officials detect a violation, they inform it to the CSIA since only the latter has a right to fine or order the suspension of the operation of business entities.

If business entities violate any conditions written in the operation permit, the inspectors of the CSIA give a necessary period of time so that the business entities correct the condition and then, an examination is conducted again. If the businesses do not correct the condition, the CSIA orders the suspension of the operation of the entities.

Overall, penalties are rarely applied to those who do not pay the service fees. Although the City Specialized Inspection Agency has authority to fine delinquent people and organizations, there is no systematic information sharing system between TUKs and the City Specialized Inspection Agency nor institutional capacity to implement the regulations. The Agency's inspectors of environmental protection currently examine, once a year, only factories that create hazardous waste, and moreover, the Agency fine the organizations only when the latter cannot show any proof that their waste is collected by a waste collector.

b. Problems and Countermeasures

The problems of the current fee collection system and their countermeasures are the following:

b.1 Low fee revenue and fee collection rate

- Apartment residents often falsely declare the number of their family members since most of apartment utility fees as well as waste fee are set per person, not per household.
 - Countermeasure: Considering that the number of family members in apartments cannot be anyway detected by the authority in Ulaanbaatar, a household-based fee or a floor size-based fee² should be introduced instead of a person-based fee. Although there is an argument that to levy the same fee regardless of the amount of waste is not fair, cross-subsidy can be attained since there is generally a reverse relationship between the number of residents in an apartment and their income level.
- TUKs do not effectively control fee collectors working for ger areas and small businesses, thus there may be many cases of frauds by fee collectors.
 - Countermeasure: A database for the payment status of households and business entities should be developed to properly monitor fee collection. It will be efficient to be built on the electricity company's customer's account database
- Since there is practically no effective measure against non-payers of waste fee in ger area, the fee collection rate is considerably low, constituting a main reason of TUKs' low fee revenue.
 - Countermeasure: A strict payment enforcement system should be introduced in ger area in order to maximize fee revenues, such as collection of waste fees together with electricity charges or suspension of administrative services to non-payers.

 $^{^2}$ Information on each household's floor sizes is available at OSNAAG, since heating charges are collected based on the floor sizes.

b.2 Large difference in the level of fees and lack of cross-subsidy between Duuregs

- In each Duureg, waste collection services are operated financially independently, and there is a significantly large difference in the level of fees in ger area between Duuregs. The difference in efficiency is largely attributable to the different sizes of ger areas. However, there is no cross-subsidy system between Duuregs to reduce the burden of less privileged Duuregs.
 - Countermeasure: A cross-subsidy system should be introduced through centralization of fee revenues into a fund and reallocation of the fund between Duuregs. In this framework, MUB should be responsible for fee collection and fund management through Duuregs while waste collection services are contracted out to private contractors.

b.3 Existence of ger areas only partially covered by waste collection service or without service

- The major reasons why there are ger areas that are only partially covered or are not at all covered by waste collection service are: (1) some ger areas are difficult to reach; and (2) there are people who either cannot afford or do not want to pay the fees. Since TUKs' fee collectors do not collect wastes from those people who cannot or do not pay, the latter usually dump their wastes illegally.
 - Countermeasure: In order to cover all the accessible ger areas, wastes of the people who either cannot afford or do not want to pay the fees should be collected regardless of payment on condition that a proper payment enforcement system is in place. For those households who cannot afford the waste fees, other types of payment such as participation in waste collection should be introduced.

b.4 Increase of illegally dumped wastes

- Since MUB and the Duuregs do not monitor private waste collectors, illegal dumping by private waste collectors cannot be detected.
 - Countermeasure: The private waste collectors that work for waste collection service should be registered and licensed. At the final disposal sites, accurate record should be taken to monitor the performance of these waste collectors.
- There is no monitoring system for the business entities that transport their wastes by themselves; some of them dump wastes illegally in order to avoid related costs.
 - Countermeasure: In order to monitor illegal dumping by business entities, those that transport their wastes by themselves should also be registered and licensed. Use of unlicensed waste collectors must be prohibited.

b.5 High fees in ger areas vis-à-vis apartment areas

- Waste collection fees are much higher in ger area than in apartment area, simply reflecting the difference in waste collection costs. As a result, poor people in ger areas are obliged to pay much higher fees than rich people in apartment areas do.
 - Countermeasure: The fees for ger and apartment area collection should be reviewed and the difference in the fee level between these two areas should be minimized by introducing cross-subsidy.

b.6 Open dumping at the final disposal site

- Most wastes are not compacted and covered with soil at the final disposal because of the low budget from MUB for the final disposal operation.
- There is no transfer of revenue from waste collection to disposal operation.
 - Countermeasure: The MUB's budget for the final disposal operation should be increased. Disposal operation should also be financed from the centralized fee revenue (waste fund), by including the disposal fee in waste collection fees.

The Figure below on the next page summarizes the structure of problems and causes of the current fee collection system and its countermeasures.



Figure 3-23: Problems of the Current Fee Collection System and the Countermeasures

3.3.5 Financial Conditions of the relevant Organizations

a. Calculation of Costs

Financial statements and materials provided by TUKs and Nuuts Municipal Company were used for the revenue-cost analysis of waste collection services. Since none of the companies has a detailed cost accounting system, cost breakdowns for each type of waste collection services were obtained from receipts and accounting records of each company, provided by each company's general accountants and economists. (See attachment for the cost breakdowns)

The cost breakdowns of each company were obtained in the following way:

- *Bayangol TUK:* The cost breakdowns for each type of services were estimated based on the income statement, tax reports and other internal reports of the company provided by the general accountant.
- *Bayanzurkh TUK*: The company supplied cost breakdowns for (1) transport depot, (2) cleaning of roads and squares / renovation and greening, (3) administration and (4) others. Since the study team needed detailed cost information of each type of waste collection services, the Transport Depot costs were divided between collection services by estimating each cost by using the size of assets, vehicle taxes, gasoline and oil utilization reports and the record of vehicle performance for January 2004.
- *Khan-Uul TUK:* Like Bayanzurkh TUK, the company provided detailed information of costs of cleaning of roads / renovation and greening operation, administration and transport depot activities. The transport depot costs were divided into each waste collection service based on receipts, the general ledger and other financial records, provided by the general accountant of the company.
- *Songinokhairkhan TUK:* Detailed cost breakdowns were provided by the company. Further information on each service was collected from the service performance report, financial records, accounting materials and the general ledger provided by the general accountant.
- *Sukhbaatar TUK:* The detailed cost breakdowns were provided by the company.
- *Chingeltei TUK:* Cost breakdowns were provided by the company, based on which the study team estimated the costs of several items of waste collection services in proportion to the gasoline cost.
- *Nalaikh TUK:* The cost breakdowns were calculated in cooperation with the company's accountant based on financial and asset records.
- *Nuuts Municipal Company:* The cost breakdowns were calculated in cooperation with the accountant based on monthly financial reports, receipts and other materials.

Since the periods of cost information provided by Khan-Uul, Songinokhairkhan and Sukhbaatar TUKs were those starting from March to December 2004, the study team calculated the whole year's costs by using monthly average costs.

Depreciation costs for all TUKs were calculated by the study team uniformly in accordance with the following rates: buildings - 50 years; heavy duty equipment and vehicles - 10 years; and office equipment - 5 years.

Table 3-25: "Revenue-Expenditure-Income" of BG TUK for the year of 2004

		Wa	aste collection s	Other services		
No	Cost items	Ger area	Apartment area	Organization	(cleaning, renovation etc)	Total
1	Revenue	8,744	199,900	128,200	81,401	418,244
	Operation costs:					
2	Salaries and social insurance costs	5,232	14,535	14,565	68,916	103,248
3	Petroleum and lubricant costs	21,228	39,967	40,050	11,443	112,688
4	Maintenance and spare parts costs	890	2,471	2,476	0	5,837
5	Depreciation costs	4,226	7,956	7,973	2,278	22,433
6	Administration costs	7,156	15,079	15,110	15,459	52,804
7	Other costs	15,609	33,542	33,610	12,461	95,221
8	Total operation costs	54,340	113,551	113,784	110,557	392,231
9	Net income	-45,596	86,349	14,416	-29,156	26,013
					Collection Amount	(ton/year)
					Unit cost (MNT/t	on)
10	Monthly fee (Unit: MNT/household)	1,100	864	19,077		

	10	Monthly fee (Unit: MNT/household)	1,100	864	19,077	
ſ	11	Monthly unit cost (Unit: MNT/household)	6,836	491	16,932	
	12	Average number of households/organizations that actually pay the waste fee	662	19,280	560	
	13	Number of households that should pay the waste fee	3,800	21,591		
Γ	14	Collection rate (Unit: %)	17	89		

Source: Bayangol Renovation Company and estimate of JICA study team

(Note)

(5) The depreciation costs were calculated as follows:

Buildings would be used for 50 years

Vehicles and equipments would be used for 10 years

Furnitures will be used for 5 years

(10-1) The commission by the OSNAAG for the apartment area collection has been calculated as 4% of 200 MNT/person and deducted (10-2) Average number of people per household (4.5) of the district was calculated based on the data of "Statistical handbook of UB-XX century" and used for calculation of monthly fee per household of apartments

Table 3-26: "Revenue-Expenditure-Income" of BZ TUK for the year of 2004

		Ti	ransport Dep	Other services					
No	Cost items	Ger area	Apartment	Organization	(cleaning, renovation,	Total			
	_			•	Siudge eic)				
1	Revenue	44,898	90,968	166,392	189,409	491,667			
	Operation costs:								
2	Salaries and social insurance costs	20,209	24,912	48,440	42,416	135,977			
3	Petroleum and lubricant costs	21,325	21,502	61,553	8,198	112,577			
4	Maintenance and spare parts costs	2,839	2,863	8,195	1,091	14,988			
5	Depreciation costs	2,836	2,860	8,187	1,090	14,974			
6	Administration costs	11,935	13,370	31,424	25,549	82,277			
7	Other costs	8,150	9,881	19,385	65,712	103,128			
8	Total operation costs	67,294	75,386	177,184	144,056	463,921			

-22,397

15,581 -10,792 45,353 27,745 Collection Amount (ton/year)

Unit cost (MNT/ton)

10	Monthly fee (Unit: MNT/household)	1,500	826	20,302				
11	Monthly unit cost (Unit: MNT/household)	2,248	684	21,618				
12	Average number of households/organizations that actually pay the waste fee	2,494	9,182	683				
13	Number of households that should pay the waste fee	23,109	11,568					
14	Collection rate (Unit: %)	11	79					
<u> </u>								

Source: Bayanzurkh Renovation Company and estimate of JICA study team

(Note):

9 Net income

(5) The depreciation costs were calculated as follows:

Buildings would be used for 50 years

Vehicles and equipments would be used for 10 years

Furnitures will be used for 5 years

(10-1) The commission by the OSNAAG for the apartment area collection has been calculated as 4% of 200 MNT/person and deducted

(10-2) Average number of people per household (4.3) of the district was calculated based on the data of "Statistical handbook of UB-XX century" and used for calculation of monthly fee per household of apartments (13) Number of households that should pay the waste fee for apartment area collection is taken from the "Statistical handbook of UB-XX centure"

Table 3-27: "Revenue-Expenditure-Income" of KhU YUK for the year of 2004

					Ui	nit: 000 MNT		
		Was	ste collection se	Other services				
No	Cost items	Ger area	Apartment area	Organization	(cleaning, renovation, sludge etc)	Total		
1	Revenue	26,440	41,532	54,872	134,397	257,241		
	Operation costs:							
2	Salaries and social insurance costs	11,218	7,560	8,901	52,557	80,235		
3	Petroleum and lubricant costs	11,465	15,284	15,973	25,706	68,428		
4	Maintenance and spare parts costs	2,096	2,032	3,767	1,167	9,062		
5	Depreciation costs	3,772	5,029	5,255	8,458	22,514		
6	Administration costs	9,694	8,638	9,788	33,538	61,659		
7	Other costs	6,962	3,408	3,408	30,384	44,162		
8	Total operation costs	45,207	41,951	47,092	151,810	286,061		
9	Net income	-18,767	-420	7,779	-17,412	-28,820		
	Collection Amount (ton/year)							

clion Amount (lon/year)

					Unit cost (MNT/ton)	
10	Monthly fee (Unit: MNT/household)	750	864	16,044		
11	Monthly unit cost (Unit: MNT/household)	1,282	873	13,770		
12	Average number of households/organizations that actually pay the waste fee	2,938	4,006	285		
13	Number of households that should pay the waste fee	12,330	4,367			
14	Collection rate (Unit: %)	24	92			

Source: Khan-Uul Renovation Company and estimate of JICA study team

Source: Khan-Uul Renovation Company and estimate of JICA study team (Note): *The info for the whole year was calculated based on the 10 months' data from 1 Mar to 31 Dec 2004 (2; 3) Wages and gasoline costs for ger area collection between April and Dec, 2004 were not included in the income statement; the amount (8898 thousand for wages and 8563 thousand for gasoline) was added into the calculation (5) The depreciation costs were calculated as follows: - Buildings would be used for 50 years - Vehicles and equipments would be used for 10 years - Furnitures will be used for 5 years (10-1) The average fee for a ger household collection is calculated as 750 MNT since the fee varies from 500 to 1000 MNT per household (10-2) The commission by the OSNAAG for the apartment area collection has been calculated as 4% of 200 MNT/person and deducted (10-3) Average number of people per household (4.5) was calculated based on the data of "Statistical handbook of UB-XX century" and used for calculation of monthly fee for an apartment household. (13) Number of households that should pay the waste fee for ger area collection is taken from the "Statistical handbook of UB-XX century"

(13) Number of households that should pay the waste fee for ger area collection is taken from the "Statistical handbook of UB-XX century'

Table 3-28: "Revenue-Expenditure-Income" of SSKh TUK for the year of 2004

					Un	it: 000 MNT
		Was	ste collection se	Other services		
No	Cost items	Ger area	Apartment area	Organization	(cleaning, renovation, sludge etc)	Total
1	Revenue	57,354	91,217	53,540	88,039	290,150
	Operation costs:					
2	Salaries and social insurance costs	45,095	21,645	13,154	44,508	124,401
3	Petroleum and lubricant costs	75,920	22,844	12,931	10,214	121,909
4	Maintenance and spare parts costs	7,139	1,623		136	8,898
5	Depreciation costs	13,399	4,032	2,282	1,803	21,515
6	Administration costs	18,657	7,105	3,697	9,446	38,906
7	Other costs	989	239		10,730	11,957
8	Total operation costs	161,199	57,487	32,064	76,836	327,586
9	Net income	-103,845	33,730	21,477	11,202	-37,436
					Collection Amount (ton/	year)

10	Monthly fee (Unit:	1,200	902	3,077	
	IVIN I / nousenoid)	,		*	
11	Monthly unit cost (Unit: MNT/household)	3,373	569	1,843	
12	Average number of households/organizations that actually pay the waste fee	3,983	8,424	1,450	
13	Number of households that should pay the waste fee	24,000	9,149		
14	Collection rate (Unit: %)	17	92		

Source: Songinokhairkhan Renovation Company and estimate of JICA study team

Source: Songhoknalikhair renovation company and obtained of the source o

Table 3-29: "Revenue-Expenditure-Income" of SB TUK for the year of 2004

						Unit: 000 MNT
		Waste	e collection ser	vice	Other services	
No	Cost items	Summerhouse area	Apartment	Organization	(cleaning, renovation etc)	Total
1	Revenue	3,350	72,986	213,781	249,384	539,501
_	Operation costs:					
2	Salaries and social insurance costs	1,982	43,177	103,277	92,644	241,080
3	Petroleum and lubricant costs	5,644	56,694	83,750	41,236	187,324
4	Maintenance and spare parts costs	0	2,113	3,637	17,662	23,411
5	Depreciation costs	701	7,042	10,402	5,122	23,266
6	Administration costs	528	6,667	12,632	12,640	32,468
7	Other costs	529	2,225	4,876	46,802	54,432
8	Total operation costs	9,384	117,918	218,576	216,105	561,982
9	Net income	-6,034	-44,931	-4,794	33,279	-22,481
					Collection Amoun Unit cost (MNT/to	t (ton/year) n)
10	Monthly fee (Unit: MNT/household)	1,250	864	23,753		
11	Monthly unit cost (Unit: MNT/household)	3,502	1,396	24,286		
12	Average number of households/organizations that actually pay the waste fee	670	7,040	750		
13	Number of households that		7,822			

¹³ should pay the waste fee14 Collection rate (Unit: %)

Source: Sukhbaatar Renovation Company and estimate of JICA study team

(Note):

(Note):
The info for the whole year was calculated based on the 9.5 months' data from 15 Mar to 31 Dec 2004
** Collection in the summerhouse area is conducted for 4 months from Jun to Sep
(5) The depreciation costs were calculated as follows:

Buildings would be used for 50 years
Vehicles and equipments would be used for 10 years

Venices and equipments would be used for 10 years
 Furnitures will be used for 5 years
 (10-1) The commission by the OSNAAG for the apartment area collection has been calculated as 4% of 200 MNT/person and deducted
 (10-2) Average number of people per household (4.5) was calculated based on the data of "Statistical handbook of UB-XX century" and used for calculation of monthly fee for an apartment household.

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Table 3-30: "Revenue-Expenditure-Income" of Ch TUK for the year of 2004

						Unit: 000 MNT
		Wast	te collection se	Other services		
No	Cost items	Ger area	Apartment	Organization	(cleaning, renovation etc)	Total
1	Revenue	43,460	45,000	148,515	75,000	311,975
	Operation costs:					
2	Salaries and social insurance costs	33,938	7,909	7,884	37,379	87,111
3	Petroleum and lubricant costs	50,011	32,014	28,950	22,581	133,555
4	Maintenance and spare parts costs	5,241	3,355	3,034	0	11,630
5	Depreciation costs	6,073	3,887	3,515	2,742	16,218
6	Administration costs	6,488	3,244	2,974	4,775	17,481
7	Other costs	22,773	11,680	10,562	27,858	72,873
8	Total operation costs	124,524	62,090	56,919	95,335	338,868
9	Net income	-81,064	-17,090	91,596	-20,335	-26,893

Collection Amount (ton/year)

					01111 0001 (1111 11/1	011/
10	Monthly fee (Unit: MNT/household)	2,400	864	10,314		
11	Monthly unit cost (Unit: MNT/household)	6,877	1,192	3,953		
12	Average number of households/organizations that actually pay the waste fee	1,509	4,340	1,200		
13	Number of households that should pay the waste fee	14,137	5,981			
14	Collection rate (Unit: %)	11	73			

Source: Chingeltei Renovation Company and estimate of JICA study team

Source: Chillingener Renovation company and estimate * Most overheads of the Transport depot were divided into waste collection services based on their shares in the gasoline cost. (5) The depreciation costs were calculated as follows: - Buildings would be used for 50 years - Vehicles and equipments would be used for 10 years - Euroitures will be used for 5 years

- Furnitures will be used for 5 years (10-1) The commission by the OSNAAG for the apartment area collection has been calculated as 4% of 200 MNT/person and deducted

 (10-2) Average number of people per household (4.5) was calculated based on the data of "Statistical handbook of UB-XX century" and used for calculation of monthly fee for an apartment household.
 (13) Number of households that should pay the waste fee for ger areas is taken from the "Statistical handbook of UB-XX centure" while that for apartment areas is provided by the TUK

Table 3-31: "Revenue-Expenditure-Income" of Na TUK for the year of 2004

				L L	
		Waste colle	ection service	Other services	
No	Cost items	Ger	Apartment*	(cleaning, renovation etc)	Total cost
1	Revenue	7,107	5,929	53,136	66,172
	Operation costs:				
2	Salaries and social insurance costs	8,297	1,692	9,049	19,038
3	Petroleum and lubricant costs	5,214	4,350	2,946	12,510
4	Maintenance and spare parts costs	5,851	975	0	6,826
5	Depreciation costs	2,043	1,705	1,154	4,903
6	Administration costs	3,474	1,315	4,800	9,589
7	Other costs	4,544	462	20,493	25,500
8	Total operation costs	29,423	10,499	38,441	78,364
9	Net income	-22,316	-4,570	14,695	-12,192
				Collection Amount (to Unit cost (MNT/ton)	on/year)
10	Monthly fee (Unit: MNT/household)	700	630		
11	Monthly unit cost (Unit: MNT/household)	2,898	1,116		
12	Average number of households/organizations that actually pay the waste fee	846	784		
13	Number of households that should pay the waste fee	4,200	936		

14 Collection rate (Unit: %)

Source: Nalaikh Renovation Company and estimate of JICA study team

(Note):

20

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(Note):
(1) The apartment area collection was transferred to Nalaikh Renovation Company in May 2004 from the OSNAAG
(2) The cost breakdowns for waste collection for organization is not separated due to unclearness of the financial records
(3) Some organizations are included in the ger and apartment area collections
(4) Average number of people per household (4.2) was calculated based on the data of "Statistical handbook of UB-XX

century

(5) Monthly fee per household for apartment areas is calculated as multiplying fee per person by 4.2, the average number of people per household.

(6) The depreciation costs were calculated as follows:
 Buildings would be used for 50 years
 Vehicles and equipments would be used for 10 years

Furnitures will be used for 5 years

Unit: 000 MNT No Cost items Disposal site Dog hunting Total Revenue Dog hunting from UBC 49,273 49,273 1 28,000 Waste compaction from UBC 28.000 2 3 Waste compaction from institutions 18,451 18.451 4 Income from the sale of fixed assets 4,033 4,033 Other revenue (sale of dog skins) 1,500 1,500 5 **Total Revenue** 50,484 50,773 101,257 Operation costs: Salaries and social insurance costs 14,900 14,900 6 Petroleum and lubricant costs 21,509 21,509 7 8 Maintenance and spare parts costs 6,134 6,134 Depreciation costs 6,260 6,260 9 7,278 Administration costs 10 13,933 21,211 11 Other costs 18,739 35,282 54,021 12 **Total costs** 81,475 42,560 124,035 13 Net income -30,991 8,213 -22,778 373,127 32.848 14 Volume of wastes (m3) / number of dogs 1,546 135 15 Average revenue 16 Average costs 218 1,296 Source: Nuuts company and estimate of JICA study team

Table 3-32: "Revenue-Expenditure-Income" of Nuuts Company for the year of 2004

(Note):

(1) The cost breakdowns were calculated in cooperation with the accountant based on monthly financial reports,

(2) The depreciation costs were calculated as follows:

Buildings would be used for 50 years Vehicles and equipments would be used for 10 years Furnitures will be used for 5 years

b. **Main Indicators and Analysis**

The following table shows the shares of services in total revenue of each TUK³.

³ Since Sukhbaatar TUK does not collect wastes from ger areas, the company's indicators on ger area collection imply those of summerhouse areas in this report.

Types of services	Bayangol	Bayanzurkh	Khan-Uul	Songino khairkhan	Sukhbaatar	Chingeltei	Nalaikh
Waste collection from ger areas	2%	9%	10%	20%	1%	14%	11%
Waste collection from apartment areas	48%	19%	16%	32%	14%	14%	9%
Waste collection from organizations	31%	34%	21%	18%	40%	48%	-
Other services (public area cleaning, gardening, etc.)	19%	38%	53%	30%	45%	24%	80%
Total	100%	100%	100%	100%	100%	100%	100%

Table 3 33. Sharee	of Sonvicos in	Total Dovonuo	of Each TLIK (2004)	
Table 3-33. Shales		Total Nevenue	$U = a_{U} + U = U = (2004)$	

Source: TUKs

Revenues from ger areas account for only a minor share in most TUKs; among all TUKs, SKh TUK is most dependent on revenues from ger areas (20%). Waste collection revenues from apartment areas are larger than those from ger areas, except for Ch and Na TUKs. Among others, BG is most dependent on revenues from apartment areas (48%). Revenues from organizations constitute a largest share in the total revenue of Ch TUK (48%) while those from public services are the largest revenue source for BZ (38%), KhU (53%), SB (45%) and Na (80%) TUKs.

The following figure shows the total revenue, total cost and net income of all TUKs. BG, BZ and SB TUKs have relatively large operation sizes, while Na TUK's operation size is one-tenth of that of SB TUK. Among seven TUKs, only BG and BZ TUKs recorded a positive net income in 2004.



Figure 3-24: Total Revenue, Total Cost and Net Income of TUKs (2004)

Source: TUKs and the Estimate by JICA Study Team

The following Figures show TUKs' revenue and cost in ger area and in apartment area. All TUKs are losing money in ger area; among others, the scales of loss in ger area of SKh and Ch TUKs are quite large, significantly eroding these TUKs' viability. As for the revenue and cost in apartment area, four TUKs recorded positive net income in this area; among others, waste collection in apartment area is quite profitable for BG TUK. On the other hand, the cost in apartment area exceeds the revenue for SB, Ch and Na TUKs.



Figure 3-25 TUKs' Revenue and Cost in Ger Area (2004) Source: TUKs and the Estimate by JICA Study Team





The following Figures show TUKs' monthly fee and cost per household in ger area and apartment area. There is an extremely large difference in average monthly costs per household; it exceeds 6,500 MNT for Bayangol and Chingeltei TUKs while it is only 1,300 MNT for Khan-Uul TUK. Average monthly fees in ger area also very among TUKs, from 700 MNT (Nalaikh TUK) to 2,400 MNT (Chingeltei TUK).





Figure 3-27 TUKs' Monthly Fee and Cost per Household in Ger Area (2004) Source: TUKs and the Estimate by JICA Study Team

Figure 3-28 TUKs' Monthly Fee and Cost per Household in Apt. Area (2004) Source: TUKs and the Estimate by JICA Study Team

The following figures show the net incomes from each service of TUKs, which reflect the above-mentioned differences of financial conditions of TUKs.

20,000	Apartme	nt		
0,000	area			
\$0,000				Total net
50,000				income
10,000		Organization	15	
20,000	. 🗱	. 🖂		. 1883
20,000			- 6333	
10,000			Other service	ces
60,000 Ger are	a			
\$0,000				
00,000				



80,000					
60,000					
40,000		Apartment	Organizat	ions	
20,000		area			
0	XXX			888	888
-20,000	Ger area			Other services	-666
40,000					Total ne
80,000					income

Khan Uul







Songinokhairkhan

100,000					
80,000					
80,000					
60,000			0	ther services	
20,000				2223	
20,000				888 .	
20.000	0000	×××			- XXX
-20,000	Ger area	XXX	Organizations		Total net
-40,000					income
-60,000		Apartmen	t		
-80,000		area			

80,000 60,000 40,000 20,000 0 XXX			
20,000		- <u> </u>	
-20,000 - DOOL-	Apartment	Other services	
-40,000	area	Other service:	Total ne income







Figure 3-29: Net Incomes from Each Service of TUKs (2004)

Source: TUKs and the Estimate by JICA Study Team The Specific features of each TUK are discussed below.

<u>Bayangol TUK</u>: The largest revenue source of the company is the waste collection service in apartment area, which constitutes 48% of its total revenue. The revenues from organizations are also significant, accounting for 31% of the total revenue. Although the number of organizations the company serves is relatively small (560), their sizes are mostly big.

Bayangol TUK is one of the two TUKs in Ulaanbaatar that operated profitably in 2004. Although the company faced losses from ger area collection and other services including cleaning of roads and renovation and greening operations, the profit from apartment area waste collection (86 million MNT) was large enough to compensate all the losses. As a result, the company recorded a net profit of 26 million MNT.

The losses from the waste collection in ger area are caused by the company's high operation cost per household, approximately 7,000 MNT, which is 6 times bigger than the monthly average revenue (fee) from a household. The company's high operation cost seems to be caused by the uneconomical utilization of manpower and equipment due to the relatively small size of ger area in Bayangol Duureg.

<u>Bayanzurkh TUK</u>: The company's main revenue sources are waste collection from organizations and from other services. The shares of these services in the total revenue were 34% and 38% respectively in 2004. Like Bayangol TUK, the number of organizations that Bayanzurkh TUK serves are relatively small (680), however, their sizes are big.

Although the waste collection service for organizations is one of the company's big revenue sources, the company faced a loss from this category (11 million MNT). The company also faced a loss in ger area waste collection (22 million MNT). However, the company recorded an overall net profit of 28 million MNT owing to the profitability of the services paid from the Duureg budget.

<u>*Khan-Uul TUK*</u>: Although Khan-Uul TUK gains the largest revenue (53% of the total revenue in 2004) from the service paid by the Duureg, the service itself is not profitable since the related operation costs were also big, causing a loss to the company (17 million MNT).

The company recorded a net loss of 29 million MNT in 2004. The only service category from which the company gained profit was the waste collection from organizations (8 million MNT). The company could not make profit even in the waste collection in apartment area.

<u>Songinokhairkhan TUK</u>: Songinokhairkhan TUK is gaining revenues relatively evenly from all four categories: waste collection in apartment area (32%); other services paid by the Duureg (30%); waste collection from ger area (20%); and waste collection from organizations (18%).

The company recorded the largest loss among all TUKs in 2004: 37 million MNT. The loss from waste collection in ger area (104 million MNT) is the reason of the company's overall loss, not being able to be covered by the profits gained from the other categories of services. The major reason of the cost overhang in ger area is the large number of ger households that the company currently covers (approx. 4,000 households).

<u>Sukhbaatar TUK:</u> Sukhbaatar TUK's major revenue sources are the services paid by the Duureg (45%) and the waste collection from organizations (40%).

The company faced a loss of 22 million MNT in 2004, most of which is attributable to a loss from apartment area waste collection $(45 \text{ million MNT})^4$. Although the company gained profit (33 million MNT) from the services paid by the Duureg, the amount of the profit in this category was not large enough to cover the losses from waste collection services.

<u>Chingeltei TUK</u>: The largest revenue source of the company is the waste collection from organizations (48%).

The company faced a loss of 27 million MNT in 2004, which is mostly attributable to the loss from ger area waste collection (81 million MNT). The company also faced losses from apartment area waste collection (17 million MNT) and other services paid by the Duureg (20 million MNT). Although the company made the largest profit (92 million MNT) from the waste collection of organizations among all TUKs, the total of the company's losses is far larger than the profit.

<u>Nalaikh TUK:</u> The majority of the company's revenues (80%) is cleaning of roads and renovation and greening operations paid by the Duureg.

The TUK faced an overall loss of 12 million MNT in 2004. Although the amount of the loss is the smallest in all TUKs, it is still significant when considering the small size of Nalaikh Duureg.

c. Conclusions

The following is the summary of the observations on TUKs' financial status.

- All TUKs are making losses in waste collection in ger area.
- Given the drawbacks of the current fee collection system, the larger the ger area is, the less viable becomes the waste collection. Therefore, from the commercial point of view, TUKs would be better off if they reduced the size of ger area to which they provide services.
- Waste collection from apartments and organizations is mostly profitable, although there are some TUKs, including Sukhbaatar TUK, that are still making losses in apartment areas.

⁴ The reason seems to be the lack of a cost control system.

• The unit costs for waste collection services significantly vary between Duuregs regardless of the distance from the final disposal sites. It seems that the lack of competition in selecting each TUK's management team would constitute a major reason of the low efficiency in TUKs' operation.

3.3.6 Human Resources Development System

Of the 116 workers prior to privatization at the Chingeltei TUK only two have left and 15 have been taken on. The new workshop will increase the total to 150, which at first sight is a large increase in recurrent cost commitment with little obvious return. This experience is typical of the TUKs, but although staff working in SWM have displayed a great deal of loyalty to their employers e.g. in supporting TUK management bids, this must be seen in the context of extreme levels of unemployment in Ulaanbaatar. There is still little difficulty in attracting permanent and even seasonal labor for MNT50,000 per month - the per capita poverty line, established on March 19th 2004, is MNT26,500⁵, so that this is not adequate as the sole support for the average family of five people.

Typical TUK wages are MNT70,000-80,000 per month for most workers. For example since privatization the Chingeltei TUK Director has increased the wages for *ger* area workers from MNT40,000 to MNT80,000, which he still regards as inadequate for the average family. He has also introduced a 10 point grading incentive system for staff – for punctuality, performance etc. and employees receive the full MNT80,000 per month salary for 10 points, but less than this for fewer points.

Staff costs are about half of total expenses and vary greatly from an average of about MNT105,000 per month for Khan-Uul and Sukhbaatar to, according to the TUK Key Indicator Questionnaire, almost MNT300,000 in Chingeltei. In Khan-Uul the *ger* area workers reputedly earn some MNT150,000 per month and those working in apartment areas rather more than this on the basis that they have to make more trips. Office staff receive MNT80,000-150,000 plus some allowances e.g. for transport, and there are possibilities for half-yearly bonuses. These arrangements are generally better than those available to equivalent civil servants.

Nuuts wage levels average only about MNT60,000 per person per month. The Company is in a weak negotiating position because it does not have the right to argue the case for its budget, with salaries being set by the City Property Relations Department. Staff turnover, averaging some two to three years, is high, particularly for government employees, and given the fact that recruitment is mainly from the waste pickers.

Nuuts also provides an interesting example of the effectiveness of the market economy. The most valued member of staff there is the single bulldozer driver who operates both sites. His value is reflected in his earnings which, at about MNT120,000 per month based on piecework, are significantly higher than the Director's MNT92,000. The recently retired Director of the Nuuts Company had been in post since 1999, prior to which he was the Director of the Songino Khairkhan TUK from 1993. At that time it was one of the few TUKs in which income exceeded expenditure; which compares favorably with the current loss making constraints under which Nuuts has had to operate.

Senior staff in the sector are invariably both educated to a high level and experienced in SWM. For example the staff in MUB's Maintenance and Public Utilities Division responsible

⁵ The poverty line was revised to MNT 30,000 per capita in March 2005.

for monitoring the Nuuts and TUK companies have been in post for a minimum of two years and an average of about 7 years. All are required to have a BA and preferably post graduate qualifications e.g. training in SWM, and at least three to five years experience. They have a range of responsibilities, which helps to maintain job interest and the exchange of ideas in the current transitional situation.

Whilst many believe that SWM is understaffed, the constraints on Government structures make it difficult to increase this. On the contrary the staff of MUB's Maintenance and Public Utilities Division has recently been reduced from 11 to 8. The Division was in fact seeking approval from the City's Representatives Khural for an additional two or three staff, which would have eventually required Government Cabinet approval.

Since 1990 many senior policy and monitoring staff have benefited from SWM training and seminars abroad as well as in Mongolia, and they have also been exposed to foreign practice and the latest technologies. However such exposure is much less common at the operational level. There is virtually no comparison of practice between TUKs, so that innovations and best practice are very slow to spread for the City's wider benefit. At the operational level any training for new recruits is done on-the-job.

3.4 Assessment of Present SWM

3.4.1 Summary of SWM Problems Identified by the First Workshop

The first Workshop was held two days on 9th and 10th 2004 in order to share experience and problems regarding the current SWM. The section present SWM problems identified by the First Workshop.

a. Problems with Public Attitudes and Behavior

- 1. Many residents have the ideology that some people generate waste and others are supposed to clean it up
- 2. People's morale is low and their cooperation and monitoring of each other is poor.
- 3. Poverty has lead to a widespread inability to pay for SW services and a disinterest in using them.
- 4. Illegal settlement in *ger* areas is not registered, and such residents do not pay SW charges.
- 5. Waste is often thrown randomly in the open as well as into storm-water drains and dams, causing blockages and flooding. The cheapest way to improve matters may be to change this behavior.
- 6. There are no sewerage systems in the *ger* areas thus every family digs a hole for its sewage and when it is full and frozen they dig it out and throw it together with the household wastes.
- 7. There are many families with livestock, which creates a large amount of waste, (but this is not regarded as being so serious as to warrant inclusion in the Master Plan).

b. Problems with Inadequate Public Information / Education

- 1. Residents lack the principles and knowledge for dealing properly with waste; but there are strong Mongolian traditions dealing with the proper treatment of settlement waste.
- 2. Public knowledge about the laws and regulations concerning waste is low; and public information about waste issues e.g. hazardous waste, pollution and health risks, is inadequate. It has been suggested that there should be a couple of well-publicized SW public events each year involving all companies and organizations, including messages about penalties for irresponsible behavior; as well as radio and TV broadcasts, billboards etc.
- 3. There are no lessons or programs about waste management in kindergartens and schools.
- 4. It has been suggested that District, Khoroo and Bag Governors would also benefit from training.
- 5. It is not clear who will / and how to dispose of industrial waste; causing organizations to throw dangerous solid and liquid wastes randomly, thus polluting the environment
- 6. Recycling and reusing and the "3 Rs" concept are not recognized and utilized.
- 7. Some consider that SWM specialists would benefit from short and long-term training in both Mongolia and abroad.

c. Legal / Regulation Problems

- 1. The law on implementation for the sector is inadequate, and, possibly, confused.
- 2. Responsibility boundaries are blurred it is not clear what the City and districts should each do, and "everything is left to the TUKs (Renovation Companies)".
- 3. Some believe that there should be import tax concessions for specialized vehicles and waste containers (such as those for ger areas currently being imported by Sod Mongol Co.).
- 4. Others believe that there should be import tax surcharges on products with high waste generation content, and that the revenue should go to the TUKs.

d. City Planning Problems

- 1. The organization of ger area streets is disorderly, making SWM more difficult.
- 2. There is no sewerage system in the ger areas thus every family digs a hole for their sewage and when it is full and frozen they dig it out and throw it together with the household wastes
- 3. Difficult road conditions constrain SW transport: snow, slippery steep roads, blocked roads.
- 4. Buildings are not properly designed for SW disposal systems; and apartment waste chutes emit very bad smells.
- 5. Summerhouses are being increasingly used throughout the year, and need winter as well as summer service provision.
- 6. Waste is taking up too much land area.

e. Pollution Problems

- 1. Waste is blown around by the wind and pollutes the environment: soil, water and wells, and the atmosphere from burning refuse.
- 2. Household waste is not formally separated from dangerous waste, causing risks to the health of those exposed to the waste and by pollution.
- 3. Some plastic bags and bottles are re-cycled but there is widespread disposal of these non-bio-degradable materials.
- 4. Industrial waste is often transported by the enterprise in open trucks, and spills during transport.
- 5. It has been suggested that a project on re-using ger area ash would be useful.

f. Health Problems

- 1. People and animals are eating openly dumped waste and contracting and transmitting infectious diseases.
- 2. SW is an increasing source of insects and rodents.
- 3. Health risks are increased because of increasing open dumping.
- 4. There is no disposal site for medical and dangerous chemical wastes, giving rise to environmental and health problems.

5. The quality of the general environment for residents, and communities' morale, is adversely affected by SW.

g. Technology Problems

- 1. Waste transport vehicles and equipment are outdated and in short supply, and are not maintained and renewed regularly. There is insufficient snow-clearing capacity.
- 2. There are not enough waste bins in the streets.
- 3. There is no waste separation.
- 4. There is a need for a proper final disposal area, with garaging, warm work places, electricity and water supplies; and for an intermediate treatment facility.
- 5. Some believe that there should be recycling and treatment sites in the middle of each District, but this may be an excessive provision for the latter.
- 6. Domestic waste bins in ger areas are not big enough.
- 7. One proposal is for a plan for a hazardous chemical waste disposal area at Takhir Soyot in Songino Khairkhan District designed and costed but on hold for lack of finance but other options should also be considered.

h. Financial Problems

- 1. There is no waste management fund, as provided for by legislation.
- 2. The collection fee is not collected fully in the ger areas because of inability to pay and incomplete attempts to collect because of only partial address registration. The SW fee is still at its 1999 level; and some reports are that the collection rate is only 30-40%, and that the system should be replaced, at least in part, by one using general taxation.
- 3. Some consider that a system should be established whereby waste has a value and can be traded; and that tax incentives might be granted to recyclers and exporters. Renovation Companies might usefully be involved in the management, and Government might assist with land for a treatment facility.

i. Operational Problems

- 1. There is no organized schedule for waste collection, causing residents to throw out their waste at any time.
- 2. The amount of waste is unnecessarily large because there is no formal waste separation. Waste is therefore not reused or recycled, including dangerous wastes such as batteries and car oils.
- 3. Industrial waste and wastes that include heavy metals like chrome, lead, and even radioactive waste, are not buried properly, and there is no mechanism for this procedure.
- 4. A lack of funds prevents proper waste burying.
- 5. Informal waste-pickers are not managed or controlled, and perhaps should be partially formalized; and NGOs may be a useful element in improved SWM.
- 6. The Specialized Inspection Agency (SIA) penalizes the TUKs for transgressions, rather than the offending household or enterprise. It has been suggested that every Khoroo should have at least one inspector to help make up for the staff shortfalls.

- 7. Transport is a problem because of poor quality vehicles, long distances to the remote dumpsite, poor roads and poor management.
- 8. New illegal dumping areas are created because unauthorized transport companies dump waste at illegal spots
- 9. The waste amount, composition, and quality are unknown due to lack of documentation and information. It has been suggested that the levels of bacteria in ger area waste should be measured.
- 10. Management and monitoring and information systems are inadequate- they must be improved; and adapted to Mongolia's weather.
- 11. One view is that monitoring and inspection responsibilities should be transferred to the TUKs and citizens. There is an ongoing discussion about District Inspection Authorities appointing TUK staff for inspection work; and a quite strongly felt view that the TUKs would be more effective than the District Authorities in inspecting.
- 12. Working methods are poor, staff training is poor; and there is a lack of responsibility amongst workers.
- 13. Performance is hampered by the poor quality of human resources in the sector, low salaries and wages and dirty working conditions. It has been suggested that there should be rewards for good work.
- 14. Construction "waste" is usually handled by the contractor rather than the TUK, who would naturally prefer to handle it. However regulations regarding construction excavation / reinstatement may need attention.

3.4.2 Assessment

a. Introduction

Basic Policy 1 of the IC/R states that the study team will support the capacity development of organizations in the Mongolian Government which can solve the problems of SWM in the Study area by themselves. Therefore it is important to assess the capacity for greater responsibility as well as the current performance of the agencies. Basic Policy 2. stresses that the Master Plan should be practical, and this too is best achieved by maximizing efficiency e.g. by eliminating duplication and taking advantage of economies of scale, and building onto the existing institutional structure rather than embarking on something radically different.

The former Section provides a synthesized summary of the SWM problems identified by the first Workshop in December 2004; and these are referred to at appropriate points below.

As stated in Workshop Problem I.10. *Management and monitoring and information systems are inadequate- they must be improved; and adapted to Mongolia's weather.* the data relating to SWM was indeed found to be of variable quality. The following assessment draws on the available data attempting to interpret appropriate implications without reconciling the large differences between different sources and even amongst data from the same source. The half-yearly TUK reports are not in a standard format and omit key items of information. A short TUK Key Indicators Questionnaire as shown table below was therefore put to the six central TUKs in an attempt to generate comparable data.

District							
Reporting Period: 1st half 2004 OR 2	2nd half 2004 (b	oth periods requi	ired)				
No. Apartment residents							
No. Organization Contracts							
No. Ger Residents eligible to pay / collection % / %							
No. Ger Residents too-poor to pay							
Total No. TUK staff.							
MNT spent on TUK staff.							
Activity	m3	MNT Income	No. Vehicles	No. Staff			
Apartment SW							
Ger Area SW							
Public Area & Drains Waste							
Greening / modernization							
Organization SW							
Any Other (specify e.g. sewage to sewage works)							

Table 3-34: TUK Key Indicator Questionnaire

b. Levels of Service – Collection and Transport

As with other public services there is a clear distinction between SWM in the formal and informal / ger area parts of the city. Not only are apartment residents provided with low cost, and subsidized, heating, potable water, hot water, sewerage and paved roads; but they also have their garbage removed on a daily basis. Ger area residents, living along unmade roads, have to buy and carry their water, wood and coal, dig and empty their own pit latrines and, where they are served at all in winter, may get a monthly SW service. Ger area households may pay MNT 2,400 for a single monthly visit, compared with the typical apartment households' MNT800 for a daily service.

Ulaanbaatar Service Improvement Project (USIP)-1 Feasibility Study, Volume 2, Annexes, December 1995 reported that in most ger areas there were informal, non-improved waste collection points where residents dropped their waste, from where it was collected fortnightly or monthly. There has been a subsequent shift to door to door collections; but, although this has some advantages in terms of effective SW charge collection, it is significantly more expensive to operate and should not be the only option considered by the study. In ger areas small vehicle, perhaps non-motorized, collection with bulking up might be cost effective.

As indicated in Workshop Problem I.1. There is no organized schedule for waste collection, causing residents to throw out their waste at any time. Apartment residents object to unsightly garbage enclosures in their compounds, which are amenable to indiscriminate scattering by waste pickers and dogs. However TUKs can often only collect directly to the truck after residents have gone to work, and left their plastic bags to the mercy of pickers and dogs etc. Some residents therefore prefer to use public litterbins, which are consequently overloaded and overflow.

Ulaanbaatar Service Improvement Project (USIP)-2 interviewed some 2,000 households in 7 *ger* areas in UB in 2003, and the results are compared with those from USIP-1 for 1995 in the Figure below. In 87.6% of cases in 2003 collection was by the "Municipality", and in 12.4% by the household itself. The Figure below suggests that there has been a significant deterioration in SW collection in the *ger* areas since 1995. Whilst the incidence of monthly collections is about the same, at half of households, the fortnightly service has been reduced from some 30% to only 7% and the less than monthly service, including households without a service, has doubled to about 40%.



Source: USIP-1 Feasibility Study, Volume 2, Annexes, December 1995 and USIP-2 Feasibility Study, November 2003.

Figure 3-30: Ger Area Waste Collection Frequency 1995 and 2003

The Table below presents an assessment of the current extent of these difficult conditions, which are worsening year by year,.

District	Population	Inaccessibl in W	e Population /inter	Inaccessible Population in Summer		
	2004	%	persons	%	persons	
Songino Khairkhan	114,485	10%	11,449	6%	6,869	
Khan-Uul	49,401	0%	-	0%	-	
Chingeltei	79,979	43%	33,991	23%	17,995	
Sukhbaatar	62,912	10%	6,291	25%	15,728	
Bayangol	29,176	10%	2,918	5%	1,459	
Bayanzurkh	67,994	25%	16,999	20%	13,599	
Total	403,947	18%	71,647	14%	55,650	

Table 3-35: Ger Areas Difficult to Access by Truck

Source: Based on estimates by TUK Directors, April 2005.

Summer and winter problems affect households in different locations: the steep slopes of Chingeltei present the biggest year-round problem, whereas in Sukhbaatar the problem is mud in the valley bottoms of Khoroo 11, 12, 13 and 14 in the summer and difficult upland access in Khoroo 16 in winter. Between 55,000 and 72,000 people in ger areas are not readily accessible by waste trucks in summer and / or winter. Moreover these people, who presently enjoy only a very poor service if any, are the ones that most need a door-to-door SWM service, since conditions outside their Hashas (fences) are very difficult.

The current untidiness of the ger areas is a widely recognized and significant debilitating effect on their general improvement. The Study's POS found that 82% of ger area residents regard scattered waste as a problem, and 69% complain of its offensive odor. Unless specific provisions are made for cleaning, it will continue to be a distinct SW problem even if all households pay for SWM services. This "street cleaning" is a universal problem, and some 30% of all, not just formal area, TUK staff are engaged in this separate SWM activity of cleaning the public areas streets of the formal parts (planned area, i.e. Apartment area) of the City. Despite these efforts 66% of apartment residents regard scattered waste as a problem, and 38% complain of its offensive odor.

Prior to 1990, i.e. during the communist era, the trucks ran on time and there was no serious SW problem. According to Municipal data (XX Century Statistical Handbook, Department of Statistics, Information and Research of Ulaanbaatar, 2004) the volumes of transported waste at the beginning of the 1980s were some three times those of the 1990s – $1,480,200m^3$ in 1981 compared with 672,200m³ in 2003. There was no financial cost attached to the improper behavior of organizations, and it would not have occurred to them to dump waste illegally.

Whilst it is commonly believed that SWM standards have now slipped to such low levels that public tolerance of poor conditions is high, Maintenance and Public Utilities Departments do still receive complaints from citizens (three or four per week in Khan-Uul), apartment condominiums and the CSIA; and these are passed on, with varying levels of authority, to the TUKs for action. At the fortnightly meeting of all District Governors SW is invariably on the agenda, and the Governors regularly return to their respective District meetings and instruct their TUKs accordingly. The SW issue is often featured on television.

Although when the Study's POS was conducted only 9 months after privatization of the TUKs interviewees made clear assessments of performance. The Figure below indicates that whilst most people did not notice any change more apartment dwellers considered that the service had improved rather than deteriorated (31% : 5%). The survey of businesses also found some, although less noticeable, improvement since privatization; although a majority of businesses found that the service was still unsatisfactory. On the other hand more ger area residents considered that the service had deteriorated rather than improved (20\% : 10%). It thus appears that privatization has brought a distinct shift in resources away from the difficult and more-expensive-to-serve ger areas in favor of the easy-to-serve apartments and businesses.





Source: Study Team's POS January 2005.



The annual turnover of the TUKs is about US\$1.5 mill; and collection and transport is by far the largest cost element. Despite the apparent similarity between the TUKs there are large and important differences, as illustrated in the Figure below which compares the differences amongst their features with the mean for the six TUKs. Thus Bayangol, with nearly 100,000 apartment residents, has six times as many as Chingeltei; Songinokhairkhan TUK serves 140,000 *ger* area residents and Sukhbaatar none; Bayanzurkh's turnover is three times that of Chingeltei and Songinokairkhan's total volume of waste handled is three times that of Khan-Uul.



■Songino Khairkhan ■Khan-Uul ■Chingeltei ■Sukhbaatar ■Bayangol

Source: TUK Key Indicator Questionnaires, January 2005.

Figure 3-32: Difference in Key Indicators Between TUKs

There are also large differences in the types of SW handled by the TUKs. The Table below indicates that the proportion of *ger* area SW by volume handled ranges from 63% in Songinokhairkhan to 0% in Sukhbaatar; and sewage from 31% in Khan-Uul to 0% in Sukhbaatar and Bayangol. The proportion of *ger* area residents who are too poor to pay SW charges also varies significantly – from 20% in Bayangol to 52% in Bayanzurkh.

	Songino Khairkhan	Khan-Uul	Chingeltei	Sukhbaatar	Bayangol	Bayanzurkh
Apartment	19%	18%	20%	36%	40%	21%
Ger Area	63%	25%	20%	0%	16%	32%
Organizations	11%	20%	0% (1.)	49%	43%	45%
Sewage	3%	31%	28%	0%	0%	1%
Other	4%	6%	15%	15%	2%	1%

Table 3-36: Proportions of SW by Volume Handled by TUKs in 2004

Note. 1. Organizational waste cannot be distinguished from apartment area waste in Chingeltei. Source: TUK Key Indicator Questionnaires, January 2005.

Figure 3.4.4 presents indicators of staff productivity. The relatively outstanding performance of Songinokhairkhan, almost three times as productive as Sukhbaatar and Khan-Uul, may incorporate the advantage of being the closest TUK to the final disposal site. Workshop Problem I.7. noted that *Transport is a problem because of poor quality vehicles, long distances to the remote dumpsite, poor roads and poor management*; and Figure 3-33 may also perhaps be a warning about the likely impact on performance of selecting even more remote disposal sites. However not all productivity differences are attributable to the shorter distances from the disposal sites. Bayanzurkh has the highest sub-sector productivity because it has large and lucrative organization contracts: the average size of its contract is more than six times greater than at Songinokhairkhan by volume; whilst it is further from the dumpsite than the other TUKs. On other non-distance related criteria Songinokhairkhan is the most efficient e.g. its payment collection rate for apartment residents is, along with Bayanzurkh, close to 100%, and much better than the other TUKs.



m3(000) / staff ger resident
 □m3 (000) / staff organisation

Source: TUK Key Indicator Questionnaires, January 2005.

Figure 3-33: TUK Staff Productivity by m³ Volume Handled in 2004.

Distance is more clearly a factor in vehicle productivity, illustrated in the Figure below where Songinokhairkhan vehicles are three and four times more productive than those in Khan-Uul and Sukhbaatar. Sukhbaatar has the most vehicles: 43 compared with only 24 in Songinokhairkhan, which handles twice as much waste. In fact Sukhbaatar has by far the lowest vehicle productivity of all six TUKs despite the fact that it only operates in the formal area and does not provide a *ger* area service. It is fairly clear in this case that Sukhbaatar is much better provided with vehicles but also uses them less productively than any other TUK; and there may be a case here for the MUB Property Relations Department considering the redistribution of its waste handling vehicle fleet amongst the TUKs.



Source: TUK Key Indicator Questionnaires, January 2005.

Figure 3-34: TUK Vehicle Productivity by Volume Handled in 2004.

The Figure below indicates large differences in the amount of money which TUKs are able to collect for their different services. Once again there will be a transport element here, with waste handling further away from the collection points being at least a rational justification for higher costs and charges. Nevertheless it is perhaps surprising that there is such a large variation, with Khan-Uul attracting over five times as much income per total m³ as Songinokhairkhan.


Source: TUK Key Indicator Questionnaires, January 2005.

Figure 3-35: TUK Income per Volume of Waste Handled in 2004

The Districts were established as part of the top-down hierarchical administration during the communist period. In the current economic climate where Districts and the Municipality have great difficulty in finding money for public services the District-based TUKs are not necessarily the optimum size for all or any of their functions e.g. vehicle maintenance and public area furniture fabrication may be more efficiently carried out in larger units. The Figures below suggests that their efficiency varies significantly, and this should be reflected in their ability to bid competitively for contract work.

Excluding Nalaikh the six TUKs all operate in very close proximity in the center of the city, frequently driving through other Districts during normal working operations. It may be that the building up of capacity for SWM, greening and other amenity improvements in the six Districts would be more efficiently achieved with fewer service providers. Most people in the sector agree that more competition would improve performance, and the easiest way of achieving this is to introduce competitive bidding for such works. Most, but not all, assets are owned by the Municipality rather than the Districts, so that there could be little objection from this point of view about currently assigned assets being used outside the District – the total application of assets will be the same.

The key "collection and transport" component is in the initial stages of privatization but is operating in an information vacuum. Performance under the existing arrangements can only be properly assessed and improved by introducing well defined performance measures, vigilant monitoring, enforceable sanctions for non-performance and cost accountability. Beyond this increased transparency and competition are required to maximize SWM efficiency.

c. Levels of Service – Disposal

Workshop Problem I.8. noted that *New illegal dumping areas are created because unauthorized transport companies dump waste at illegal spots*; and both the TUKs and other contractors reputedly dump illegally. For example, and in relation to Workshop Problem I.14. *Construction "waste" is usually handled by the contractor rather than the TUK, which would naturally prefer to handle it. However regulations regarding construction excavation / reinstatement may need attention;* both of the official final disposal sites are on the west side of the city, remote from activity on the east. At Bumbat some 15 km east of city center, and despite attempts at monitoring, contractors persistently dump mainly construction waste on their way to collect construction sand and gravel. The system whereby commercially contracted waste should pay a disposal fee at the site discourages them from actually

delivering the waste. The extent of this problem may be indicated when the reported volumes of waste collected and received at the dumpsites are compared – see the Figure below



Source: Ulaanbaatar – XX Century Statistical Handbook, Department of Statistics, Information and Research of Ulaanbaatar, 2004.

Figure 3-36: Volumes of Officially Transported and Dumped Solid Waste

Whilst the figures fluctuate they have been diverging from equality since 2000, so that in 2003 it appears that only half of the collected waste was actually disposed of properly. It may be that the transported data includes sewage, which is taken to the sewage works and/ or that TUKs are over-reporting their performance. However it unlikely that the dumpsites are under-reporting the decrease in theirs; so that even if the volume of transported waste was constant from year to year there would still be an increasing discrepancy between the two figures. Assuming that the interpretation of the figures is correct, the implication is that illegal dumping is of the same order as legal dumping, and that illegally dumped waste does not find its way to the disposal sites via secondary collection.

The Table below provides information on Waste Handled at the dumpsites in 2004. Equal amounts of waste, and 77% of the total, from apartment and ger areas were disposed of at the Nuuts sites in 2004, despite the fact that the ger area population may be, according to some unofficial estimates, about double that of the apartments. However no less than half of the ger area waste was from a single District - Songinokhairkhan, which happens to be the District in which the Ulaan Chuluut disposal site lies. This very probably reflects the importance of short transporting distances on the performance of the sector. Organizations accounted for 18% and other sources for 6% of the total. The types of waste, and associated activities, vary significantly. Thus Khan-Uul has 35% of the total organization waste, much of this under contract to relatively large and wealthy businesses, and it comprises 47% of the total which it handles. Bayanzurkh, Sukhbaatar and Bayangol have the highest proportions of apartment waste, with 26%, 24% and 22% respectively; and the lowest levels of ger area waste, with 9%, 7% and 5% of total ger area waste respectively. This latter figure for Sukhbaatar is curious since the TUK states that it does not collect in its ger areas.

Table 3-37: Information on Waste Handled at the Disposal Sites in 2004

						Type of Was	te				
	Apartn	nents	Ger /	Area	Organiz	ations	Road Cl	eaning	Othe	ir 1.	Total
District	m3	% of District	m3	% of District	m3	% of District	m3	% of District	m3	% of District	m3
Songino Khairkhan	15,489	15.0%	73,640	71.4%	7,502	7.3%	4,034	3.9%	2,448	2.4%	103,113
Bayangol	31,466	53.6%	7,821	13.3%	15,314	26.1%	4,141	2.0%		%0.0	58,742
Sukhbaatar	34,431	63.1%	9,931	18.2%	6,523	12.0%	3,210	5.9%	440	0.8%	54,535
Chingeltei	14,413	33.6%	22,873	53.2%	1,741	4.1%	3,608	8.4%	324	0.8%	42,959
Bayanzurkh	37,722	58.1%	13,083	20.2%	11,329	17.5%	2,770	4.3%		%0.0	64,904
Khan-Uul	9,936	20.3%	15,255	31.2%	22,950	47.0%	399	0.8%	334	0.7%	48,874
Total	143,457	38.4%	142,603	38.2%	65,359	17.5%	18,162	4.9%	3,546	1.0%	373,127

1. "Other" comprises sludge and waste from drains and rivers

d. Hazardous Waste

Capabilities, both technology and staff, to monitor toxicity are very limited in Mongolia and toxic waste management remains weak, with some 20% (World Bank, *Mongolia Environment Monitor 2004*) being stored in non-standard facilities and a further 20% at open sites. There is no inventory of industrial, hazardous or toxic wastes, and no air sample analyses or visits to the disposal sites. Concerns are increasing about possible consequent water pollution and soil contamination.

Infectious medical waste is disinfected before being dumped; and there is supposed to be a designated area at the dump for burying medical waste. The activities of the many new private hospitals are not well controlled. The principle issue currently concerning the Ministry of Health in this area is whether to try and get a large incinerator or a more expensive but more environmentally friendly autoclave for the treatment / disposal of medical waste.

e. Sewage

The TUK Key Indicator Survey found that 13% of waste handled by them is sewage, which is taken to the sewage works, and much of this is from the ger areas. The USIP-2 Household survey found that the average life of a pit latrine was 5 years (minimum 3.7 years, maximum 9.8 years) and that when full 81.5% of households dug a new pit and 12.3% used a vacuum truck. 76.6% of households reported that they had space on their plot for an additional latrine. The availability of new latrine sites will decrease over time, so that this will become an increasingly important SW and health problem.

A more serious public health problem is the disposal of sewage from apartments in ger areas which do not have sewer connections. The public pit latrines associated with them are invariably derelict or non-existent, and residents simply tip their faeces and urine on a convenient heap. Domestic dogs scavenge here and trail human waste back into the apartments.

Given the complete absence of any plans to extend networked sewerage into the ger areas, and the minimal impact of individual or communal septic tanks, this problem may well continue to fall to the SW sector by default, in cooperation with USAG, for effective resolution.

f. Separation and Re-use

Workshop Problem I.2 noted that *The amount of waste is unnecessarily large because there is no formal waste separation. Waste is therefore not reused or recycled, including dangerous wastes such as batteries and car oils.* Mongolian eating habits, with an annual average per capita consumption of one and a half sheep and a quarter of a cow, produce a higher proportion of bone and other animal waste than most, if not all, other societies. Landfill disposal is an anaerobic technology that generates methane, which is a significant greenhouse gas, and bones are a particular problem at the disposal site. Here they are largely responsible, as they decompose amidst the partially compressed waste beneath the hard covering, for the gas generation which gives rise to fires and smoke, seriously polluting the atmosphere and endangering formal site workers, waste pickers and residents alike. USIP-1 found significant ger area separation for recycling in 1995, including bones being separated by two thirds of households.

Although in the past there was a government owned entity processing bones for fertilizer and other usable products, there is now little further use, beyond a few chicken farms, or market for this considerable bone "biomass". This entity still exists but the machinery is defunct.

Many people are of the opinion that a relatively modest investment in bone processing equipment would be sufficient to create a sustainable market and business for the effective reuse of this potentially valuable product. More generally, TUK Directors are of the view that they could, building on the waste separation and re-use experience described in Section 3.3.1.e above and on Workshop Problem I.5 *Informal waste-pickers are not managed or controlled, and perhaps should be partially formalized; and NGOs may be a useful element in improved SWM;* pay for and pick up separated materials, and even that the SW bills of individual households could be reduced accordingly.

g. Inspection

Whilst there are many levels of SW inspection they are ineffective in curbing illegal dumping. In accordance with the law, there is only one officer in each District Maintenance and Public Utilities Department directly responsible for SWM and other environmental matters; although in practice it is by far the biggest Departmental problem and all staff are involved to some extent. The responsibility for enforcing the environmental laws and regulations are not supported by effective sanctions against offenders at this, and most other, levels in the Government hierarchy. Even the State authorized Inspectorate is regarded as being ineffective: there are a few fines imposed each year, on enterprises but not individual citizens, for SW infringements; but these are generally too low to be an effective commercial deterrent.

Workshop Problem I. 6. Noted that The Specialized Inspection Agency (SIA) penalizes the TUKs for transgressions, rather than the offending household or enterprise. It has been suggested that every Khoroo should have at least one inspector to help make up for the staff shortfalls. Some Government officers believe that either the SIA should be strengthened or that locals should again be empowered with five or six inspectors per District or one per three or four Khoroos, with the authority to inspect industry etc as well as illegal dumping. Some believe the TUKs should also have sanction rights against offenders. Workshop Problem I. 11 noted that One view is that monitoring and inspection responsibilities should be transferred to the TUKs and citizens. There is an ongoing discussion about District Inspection Authorities appointing TUK staff for inspection work; and a quite strongly felt view that the TUKs would be more effective than the District Authorities in inspecting. One feature of the communist system was the network of "street-observers" which reported, amongst many other things, on households which improperly disposed of their SW. Therefore one option which has been suggested for improving the system is to establish a network with a similar function. For example the Khoroo Governor or TUKs might appoint volunteer / modestly remunerated citizens to monitor the SW situation in individual streets / khesegs. These might then report to the Khoroo Governor, or, either directly or via the TUK, to the Professional Supervision Department. Such Measures are considered too bureaucratic and intrusive in a democratic society.

Whilst some inspection is necessary, heavy institutional inspection is a symptom of poor system performance. In efficient SWM systems inspection is only light-handed. Thus the many calls for more inspection are an indication of poor performance and the initial response should be not to increase the size and power of the inspectorate but to improve the day-to-day efficiency of collection and transport. Beyond this there is the need to strictly monitor significant illegal dumping by construction and other enterprises simply seeking to avoid the costs of transport to the final dumpsite. This responsibility is presently vested in the CSIA, which is the most appropriate administrative level, and powers should be strengthened here as necessary.

h. Finance

Workshop Problem h.2 noted that *the collection fee is not collected fully in the ger areas because of inability to pay and incomplete attempts to collect because of only partial address registration. The SW fee is still at its 1999 level; and some reports are that the collection rate is only 30-40%, and that the system should be replaced, at least in part, by one using general taxation.* SWM services in the *ger* areas have deteriorated since management privatization; and this is so unattractive an activity, largely because of low household payment rates, that there is no market as a basis for competition. According to the TUK Key Indicator Survey the average payment per household in 2004 was less than MNT200 per month for three of the five TUKs, but MNT 2,600 in the case of Khan-Uul. The Study's POS found a mean *ger* area household waste payment of MNT1,745 per month. However payment collection from households do not pay directly for a door-to-door service then the payment collection rate for a communal-bin disposal system, in which households are responsible for depositing their waste in the bin, will be much reduced. The current door-to-door service is however expensive to operate, and other options should be explored.

Workshop Problem I.4. noted that *A lack of funds prevents proper waste burying;* and a shortage of finance is universally regarded as the basic problem throughout the sector; and has not been satisfactorily resolved during the 15 years to date of transition. For example the monthly charge for the *ger* area service was MNT140 in 1995, which is equivalent to MNT 370 in 2004 and only about a quarter of actual current levels. Whilst the 1995 charge appears to have been unsustainable, some of the TUKs did, based on data in the USIP-1 Feasibility Study, enjoy a nominal profit at that time e.g. in Khan-Uul and Songinokhairkhan; as did Nuuts, with an income of MNT23.1 mill compared with expenditure of MNT22.8 mill in 1994. It is unlikely that practice at that time took full account of asset depreciation.

Before introducing additional funding into the sector it is necessary to ensure that SWM is organized for maximum efficiency- it may then be found that the sector is financially more healthy than it appears, and does not require the introduction of massive new funding. In fact the financial arrangements for SWM in UB are much better than in many developing countries, with a good deal of it decentralized and directly related to user activity. One means being considered for tackling many of the financial problems is the establishment of a SW Fund, which is already provided for in the legislation (noted in Workshop Problem h.1). An issue here is whether this would be a City or District Fund. Whilst SW collection and transport are District activities the City operates the final disposal site; and the oppressed financial regime under which Nuuts operates may have something to do with the ease with which pressure can be applied by the City in the name of minimizing the costs of urban service to UB residents. MUB's reluctance to increase water supply charges for apartment residents was a serious problem throughout USIP-1 and continues in USIP-2. In order to avoid such a financial constraint blighting the whole sector, and because SW is predominantly a District activity, it may be preferred to have District Funds under the control of each Governor, with final disposal costs being paid to the Fund from either City or District budgets or directly from user charges. Nuuts could then be paid from the Fund on the basis of volume accepted from each District for residential waste, and perhaps directly for volume delivered under other contracts, although the similar existing arrangement provides insufficient incentive for correct delivery. There is no point in the additional bureaucratic burden of TUKs collecting from households and then paying into a Fund only to draw out later.