

## **THE CURRENT STATUS AND MANAGEMENT OF SOLID WASTE TREATMENT IN ULAANBAATAR CITY, MONGOLIA**

Ulaanbaatar, the capital city of Mongolia, is settled down on the bank of Tuul River in the valley named Khun Chuluu between 4 mountains 224 years ago.

The city is located between Branches of Khentii Mountains in 1850m above sea level, territory is 530hectar square, population is 815.0 thousand and this is the biggest center of economics, education, culture, science, trade, services and business of the country.

30% of population of Mongolia live in Ulaanbaatar City. 68% of the population of the city are young people under 30 years, therefore this is young city.

The administration is located in the center of the territory of the city. The city consisted of 6 districts and 3 districts, which are located in 100-200km far from the city.

During the difficult period, in which the country is transferring to market economics, the number of people, who are making from local areas to the capital city, is increasing so much, year to year.

Also there is a direct to degenerate the environment of the city according to centralizing of population and industry. The centralizing of population, industries and economies is causing difficulties to infrastructure, telecommunication, medicine, schools and domestic services of the Capital City and also influences negatively for environment and residents' health.

The current status, disposal and affection of solid waste collection to environment are important problems faced to the city. A definite policy and management with levels and purposes have to be implemented for solving the problems.

1500-1800m<sup>3</sup> solid waste is thrown per day from the city. From this: 50% is from industries and 20% is made from others. The solid waste treatment has 3 main stages: collection, transportation, and disposal. The General Maintenance Company of each district responds the solid waste collection, transportation, and disposal. But the solid waste is usually delivered to the disposal areas without any elementary classifying.

A company, which is owned by the city, responds the activities of abolishing the solid waste to the disposal area. There are some central disposals in Ulaanbaatar City. 2 of them cover almost 90-95% of solid waste and they are located on the upper side of the city and they cause soil and soil waste pollution and smoking, ash, fire dust for purpose to abolish pollution the environment badly. The activity of not classifying the waste but covering it by soil does not provide the requirement of preventing the environment pollution. Also the activities except them; to reuse and separate, which is useful for decreasing of the solid waste, raw materials from waste and reuse them are not executed as the required level. Therefore the problems to upgrade the management of work to collect, classify, transport, and exterminate them are so important for the city. And we have to study experiences about the matter of foreign countries and distribute the methods to our activities. To live healthily and hold industries and services without bad influences for environment for our country, which is moving to market's economics with ecological orientation, are important for not only Mongolian but also for the world countries.

### **SOLID WASTE**

70% of soil pollution is caused by human activities and classified as the following 3 main sorts. In this:

- Chemical
- Bacterial
- Radial are included.

Bacterial pollution of soil is increasing so much.

Especially: more than 70 thousand restroom-places and dust-points/ There waste of about 4000 vans were collected in 488 dust-point in territory of the city as April 1, 2001/

The overflowing of dirty waster/ more then 150 organizations and business entities have dirty-holes and 10% of them make overflowing/ and 300 000 cattle pollute environment by waste caused by people and animals. There was 3<sup>rd</sup> grade bacterial pollution as May 2001.

## I. DISPOSAL OF INDUSTRIAL AND LIVING WASTE

One of bad sources, which are polluting water of Tuul River, is activity of Cleaning Constructions. 15 Cleaning Constructions are examined in the Capital City for the state environmental exam, which is held in 2001. The cleaning result of other Cleaning Constructions except the Central Cleaning Construction did not provide the appropriate standard. According to the classification them by putting waste into environment, 6 of them put waste into rivers, 4 of them into soil and 5 of them clear the waste chemically or mechanically and put it into the central dirty line. Now Cleaning Construction of "Khargia" Co., Ltd cleans dirty waster from industries in Ulaanbaatar city. The Construction was established in 1972 by direction of activities to make mechanic clean with first washer formed as radiation, sand holder, pump station with hand-working lattice. The lattice receives and supplies dirty water. The Cleaning Construction was planned with power capacity to receive and supply  $13865\text{m}^3$  dirty water per day but now the Construction receive  $5000\text{m}^3$  dirty water and clean chemically and mechanically. More than 20 big and little industries, which hold activities of elementary processing leather and fur, clean their dirty water in this Construction. But as the result of examination, which is taken on February 2002, the cleaning does not provide present requirements, ventilation system foes not work and the neutralizing system has become hand working since broken. From the matter, the station is only executes the duties of conductor. One of soil pollution is about 80 general toilets and dirty water holes of house-region. The dirtiness of the points dissolves to soil and pollute river very much by transmitting with rainwater. The level, which is compared in 100 people, of infecting of infectious disease and stomach diseases in Ulaanbaatar City is usually higher than local provinces and state. Especially, there is a direct to increase stomach disease because of dirty water holes.

## II. SOLID WASTE SERVICES

Collection of solid waste is a duty of Ulaanbaatar City. The City Administration distributes the duty to 6 districts and gives the responsibilities to dispose the waste to Ulaanbaatar Disposal Company. Each district has established a general maintenance company /GMC/.

They response the refusing collection, street cleaning, park and green area maintenance and development, and maintenance of public buildings and private and governmental industrial organizations. GMCs make bulk collections from local disposal areas and some families' fences in house-regions. Also there are some informal points, which collect some wastes. Residents pay 50 MNT per each person for clean and dirty water and others monthly.

Solid waste is divided into 2 sorts: from apartment and from house-regions. The amount of solid waste is studied by the City Administration for some times. The results are as follows:

Apartment:	$0.0025\text{m}^3/\text{person}/\text{day}$	
House region:	$0.005\text{m}^3/\text{person}/\text{day}/$	(October-May)
	$0.0012\text{m}^3/\text{person}/\text{day}/$	(June-September)

Waste disposal is being responded by city organizations. Some scavengers collect wastes of glass, cans, cardboard and bones and sell to various companies and the companies sell the wastes to companies of Beijing. Due to that,  $0.0025\text{m}^3/\text{persom}/\text{day}$  declines the amount of wastes of apartments. The amount reaches to about  $0.0013\text{m}^3/\text{person}/\text{day}$ .

About 60% of solid waste of house-region are mostly ash in winter because coal of 4 tonn/ $2.5\text{m}^3$  and wood of  $6\text{m}^3$  in a winter. If we consider that 90% of fuel become ash the amount of ash per day is  $0.0071\text{m}^3/\text{day}/\text{family}$  or  $0.001\text{m}^3/\text{person}/\text{day}$ . 60% of the house region waste is ash, from the, waste of  $0.002\text{m}^3/\text{person}$  generated in winter and  $0.001\text{m}^3/\text{person}/\text{day}$  is generated in summers from house-regions.

Residents have to pay collection fee to city and district administrations or governors or inspectors. The fee is passed usually via drivers. The collection fee is so lower therefore collection is not executed much. This condition will not be upgraded if there is not any distribution of budget capital from the City Administration and collection waste fee between districts. The resource does not soil condensation and also fee of consideration is not paid. And 3 dust-points do not work resource is financed by City Administration fully. The City Administration relates to inspectors of city modernizing of districts. These departments can advice about new methods to collect fees and examine the new methods are distributed or not to waste collecting system. Also this organization would help for sanitation keeping around new constructions.

### **III. LAND FILL DUST-POINTS**

About 95% of the total waste are accumulated in the centralized dust-points in Dari-Ekh and Ulaanchuluun and the points are located in the area of waster collecting. Dust-point in Dari-Ekh is located in the upper side of stream in water streaming square of Selbe River and in 2km far from Tuul River. These points are located in water supplying system of the city so there are so many possibilities to dirty water and the population of the city is increasing and pollution also will increase. In 200-400m of the lower side of these points there are house-regions are located and the residents of the regions use water of springs around them. There is a requirement to close these points as possible as quickly. The III dust-point in Murun Davaa is used sometimes, and before a time, the point was a sand carrier. There is as appropriate and good place to open a centralized dust-point in southwestern side of the point. The planned dust- point has got some advantages for waste destroying.

In these:

- Road to city is quite good
- Transportation distance between city and the point is average 50km.
- Cost of upgrading and repairing is so cheap.
- Bad affect for environment is not very much.

### **IV. SORTING OF SOLID WASTE**

Transportation of solid waste and recycling it are important for decreasing the amount of waste, which transported and to be eliminated in centralized dust-points. Also if there is a possibility for market of renewable waste is found, the city administration would support the work as possible. Methods of disposal or reuse of ash waste have been researched again. The ash can be used for construction materials. But it can not be very good material because the ash is mixture of burnt coal and soil. In any case the ash can be sorted and covered in mining, which do not work. For transporting it, face masks, cover truckloads, tripping methods and watering the ash points would be used preventing from getting the ash into human body by breathing.

### **V. RECYCLING**

The following offers are made for encouraging and improving the existing informal recycling efforts. To issue permission certificates to people or organizations, who and which buy, receive and save renewable materials, and for purposes to support these business entities to use possible methods with renting reduction. A form of reduction condition is 5 year-rent and if the organization has worked successfully, the rent term can be extended. As that, the city administration has possibility to support, control and organize recycling activities in house-regions.

The city administration has to research possibility to recycle and reuse the ashes from house-regions actively. Also the City Administration can search possibilities, to make construction materials in light concrete industries by using material industries. Some researches for reusing ashes, which are from power stations, are made any research for appropriate versions of reprocessing, especially for house-regions. The most important problem for making construction materials by using ashes is there are under-burnt coals in ashes. Ashes consist of many kind substances and mixed with other solid wastes. This is a problem for reusing ashes from house-regions. There is not waste reprocessing industry except the industries of bone processing and toilet paper.

### **THE CONCLUSION**

The waste management is required to be upgraded by using appropriate methods to collect, transport, reuse reprocess and destroy.

#### **Further purposes:**

1. To upgrade regulations and laws for wastes and reform methods of implementing for them.
2. To upgrade works to collect and destroy solid waste completely.
3. To clean present waste completely and health the soil.
4. To have a united construction, which destroy waste provided the ecological and hygienic requirements.

5. To develop industries of reusing and reprocessing of wastes.
6. To prepare specialists as direction of waste management and develop the level of people's knowledge and culture.
7. To close the dust-points in Dari-Ekh and Ulaanchuluun, which are located in the upper side of the city, health the ground and cover with good topsoil. To establish a united Waste Destroying Construction in Moringiin Davaa of Khan-Uul district. These purposes are faced to the city administration.

**Table-1**

**AMOUNT OF WASTE IN ULAANBAATAR CITY**

*/average in a year/*

No.	Source of waste	m <sup>3</sup>	Ton
1	From house regions	144.009	86.406
2	From apartments	152.051	45.615
3	From cleaning of streets and squares	15.442	6.117
4	From industries and economies	75.977	30.391
5	Others	64.610	25.844
	<b>Total</b>	<b>452.090</b>	<b>194.433</b>

**Table-2**

**STRUCTURE OF SOLID WASTE**

Form of wastes	Amount /by percent/
Paper	25.20
Waste of synthetic bag and hard paper boxes	9.19
Synthetic material	2.90
Rubber	0.30
Cotton material	2.50
Glass	4.41
Cans	5.54
Aluminum	0.4
Copper	0.25
Metal	2.46
Leather and fur	0.60
Wood and wooden furniture	1.51
Plant	2.64
Vegetable	2.61
Bones	4.48
Ashes	21.38
Power of coal	3.67
Soil, stones	7.96
Others	1.98
<b>Total</b>	<b>100.0</b>

**Source and amount of wastes**

- House regions
- Apartments
- Street and squares
- Industries
- Others

**Amount renewing wastes**

- Waste
- Reused

### THE AMOUNT OF SOLID WASTE

<b>Year</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
The total amount of waste for the city thousand/m <sup>3</sup>	550	580	600	650	700	770
The amount of waste for the city is increasing by 5-10 percent year to year.						

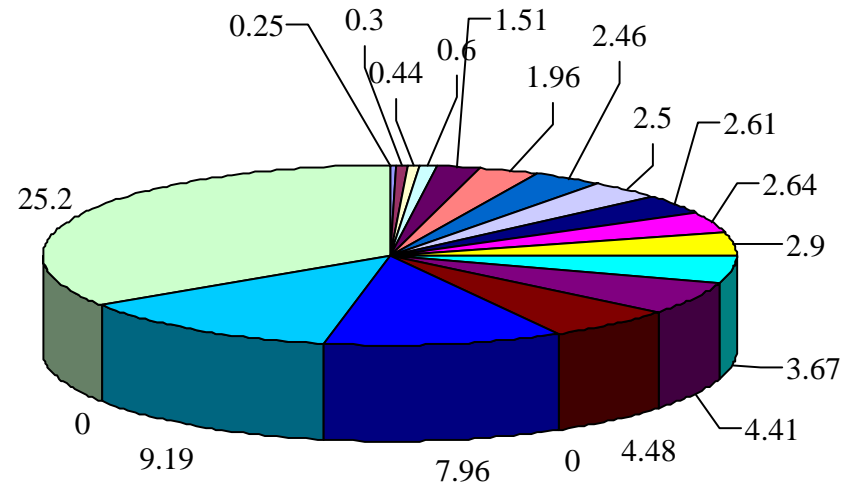
### AMOUNT OF TRANSPORTED WASTE BY GENERAL MAINTENANCE COMPANY

/as last 6 years/ Year	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>
Transported waste thousand/m <sup>3</sup>	436.5	477	539.4	377	492	541.3
Apartment	125.2	161	113.9	133.7	134	147.1
House region	130.6	125	165.1	11.9	112	123.1
Offices	139.2	145	133.6	161.6	162	177.8
Road and square	41.5	46.2	40.2	52	52	57.2

Waste of 464.4 thousand/m<sup>3</sup> is being transported and disposed in a year on in average. The General Maintenance Company is transporting and disposing 71.4 percent of the total waste.

## STRUCTURE OF SOLID WASTE

Form of waste	The total
Copper	0.25
Bumper	0.3
Aluminum	0.44
Leather and fur	0.6
Wood and wooden furniture	1.51
Others	1.96
Metal	2.46
Cotton materials	2.5
Vegetables	2.61
Plant	2.64
Synthetic materials	2.9
Coal power	3.67
Glass	4.41
Bones	4.48
Cans	Financial situation of 2000 /million tugrigs/
Soil and stone	7.96
Waste of synthetic bags and hard paper boxes	9.19
Ash	Income of total waste transportati on of 2000 /million. tug
Paper	25.2



### Indicators of solid waste services in Ulaanbaatar city

No.	Indicators	Chingeltei	Bayangol	Songinokh airkhan	Sukhbaat ar	Bayanzur kh	Khan-Uul	Total amount for the city	
1	The total size of owned road and square thousand /m2	398.5	777.7	393.2	678	536	107.9	2890.4	
2	Population /thousand/	130.6	130.2	156	87	149	65.2	718	
3	Total regions	18	19	21	16	21	13	108	
	House	12	4	12	5	10	9		
	Apartment	6	13	7	10	6	3		
	Mixture	-	2	2	1	5	1		
4	Association of apartment owners	55	80	40	51	46	18	290	
5	The quantity of the total organizations and business entities	1350	1789	1670	2150	1320	1200	9479	
	From this organizations with waste transportation agreement	875	520	605	432	615	115	3162	
6	Waste amount and passages of transportation per each month /thousand/ m3/	1120	733	984	1857	1114	742	6550	
		passages	passages	passages	passages	passages	passages	passages	
		14.8	4.4	5.9	13	7.8	5.2	51.1	
7	The size of flood protection canal /thousand/ m2/	28.9	21.2	18.1	11	12.6	8	99.9	
8	Financial situation of 2000 /million tugrign/	Planning,	1115	60.2	46.8	66	59.5	67.7	415.2
		Executing	148.8	57.9	60.8	71.2	84.9	71.3	482
		Receivable	-	22.8	14	-	26.1	-	48.9
	Income of total waste transportation of 2000 /million. tug	Apartment	17.5	56.8	38.7	22.9	33.4	12.4	181.7
		House-region	16.5	7.4	21.4	29.4	27.6	12.5	114.8
		Organizations /entities	80.8	32.1	89.2	93.3	85.3	49.5	430.2
	Total	114	96.3	149.1	145.6	147.3	74.4	727.5	
9	Accumulated dust-points amount /amount m3/	-	2/1000	7/2250	2/1200	3/1500	2/1500	16 points or 7450	
10	Quantity of waste transporting tracks	16	14	14	17	18	11	90	