



THE ECONOMIC BUREAU

المركز الاقتصادي

JAPAN INTERNATIONAL COOPERATION  
AGENCY (JICA)

HOUSEHOLDS WASTE  
IN SAUDI ARABIA

A SECTOR PROFILE

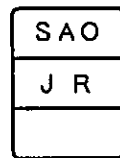
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Prepared By:

*The Economic Bureau*  
Riyadh, Saudi Arabia



May 1999

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**Section 1**

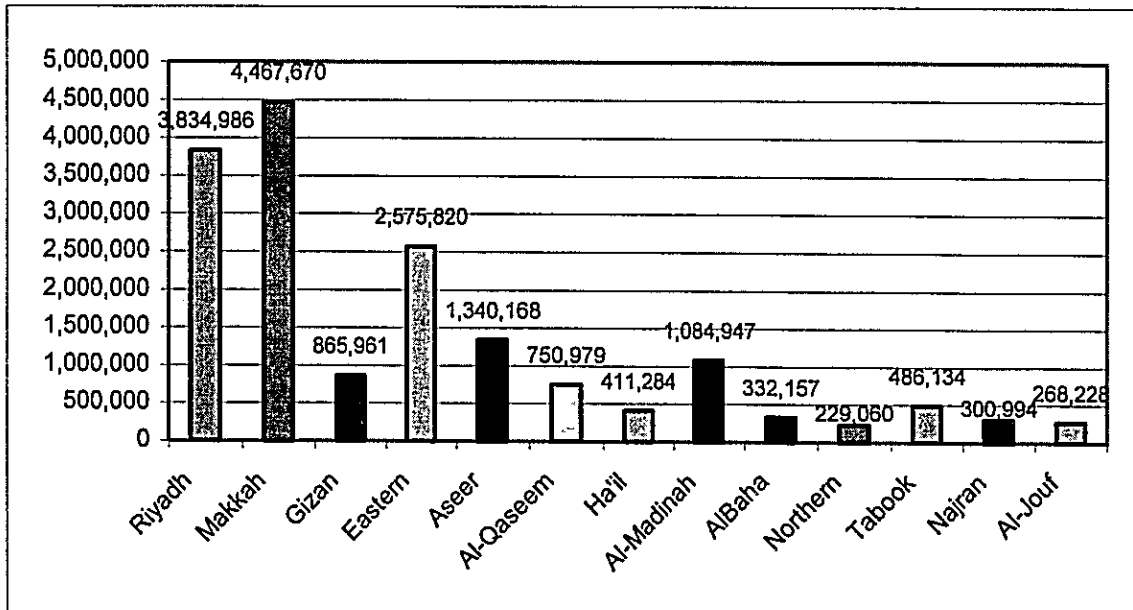
**GENERAL DESCRIPTION**

**Section 1**  
**GENERAL DESCRIPTION**

**INTRODUCTION**

The Kingdom's population has been growing at an average annual rate of over 3 percent. It grew from about 17 million to 20 million over the five-year period from 1993 to 1998. With more than half the population younger than 20 years old, the Saudi population is expected to continue to grow at an average annual rate of 3 percent over the next ten years. Over 70 percent of the Saudi population live in urban areas, which puts the country among the highly urbanized in the world. Thus, the Saudi population is expected to reach the 27 million by the year 2010. Figures 1-1 and 1-2 show the distribution of population and residential units over the country's thirteen regions in 1993. It is evident that almost half the Kingdom's population and about 61 percent of its residential units are concentrated in two regions of Riyadh and Makkah.

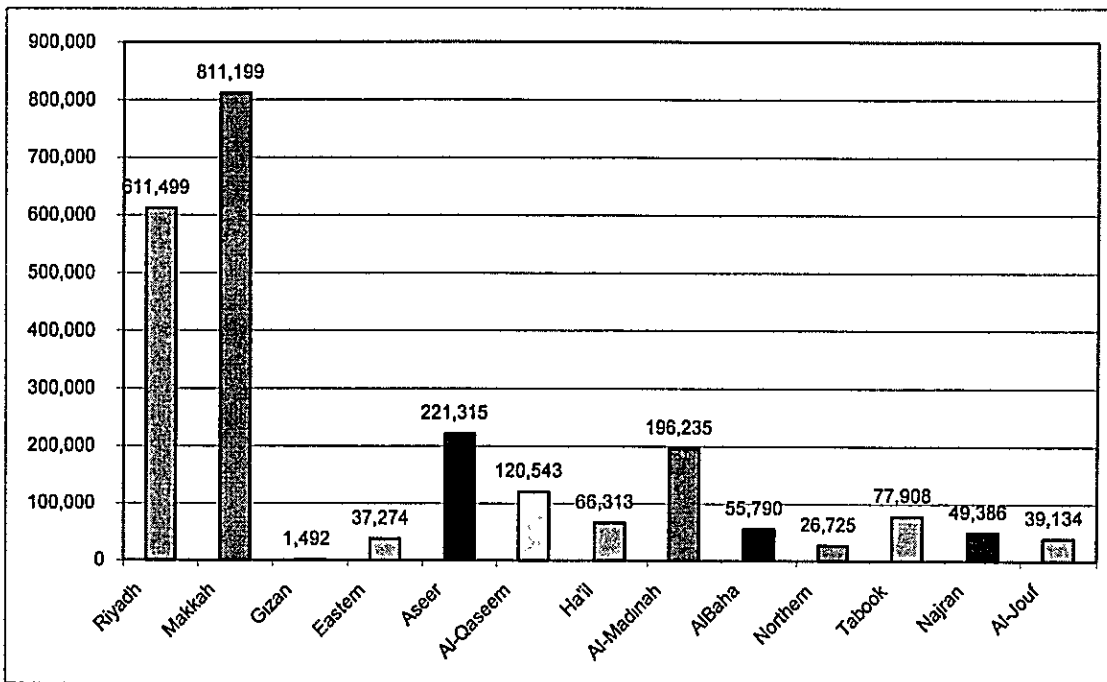
**Figure 1-1**  
**Population Distribution Over the Kingdom's Regions (1993)**



Source: The Department of Statistics, 1993.



**Figure 1-2**  
**Residential Units Distribution Over the Kingdom's Regions (1993)**



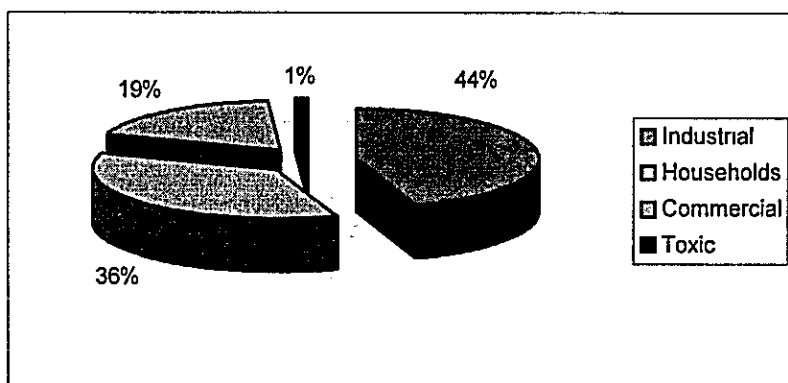
Source: The Department of Statistics, 1993.

Rapid increases in oil prices during the 1975-85 period and economic boom, which took place then, led to high investment rates in all economic sectors. This resulted in the expansion of employment and income base, and a sharp increase of living standards. Among the serious implication of all such rapid changes has been generation of high volumes of households, commercial, industrial, and toxic wastes. **Figure 1-3** shows the percentage of various types of wastes from total volume of wastes generated in the Kingdom. The figure shows that industrial waste accounts for almost 45 percent of total volume of all wastes. This is followed by households, commercial and toxic wastes, which account for 35.7, 18.6, and 1 percent, respectively. The Ministry of Municipal and Rural Affairs (MOMRA) oversees the task of managing households and commercial wastes, while the Ministry of Industry & Electricity (MOIE) oversees the task of managing industrial and toxic wastes. Dealing with households' waste has been considered one of the most critical challenges which MOMRA has to address. Not only has gross volume of households'

wastes been rising rapidly, but average per capita waste generated has been rising as well. The latter has reached 2.2 kilogram per person per day and is considered high compared to international standards. Faced with increasing volumes of wastes, which outstrip resources, MOMRA has made many efforts to develop and to adopt new and innovative solutions to address main issues concerning waste collection, dumping, and recycling. Some of the main issues are addressed in this document.

Figure 1-3

Percent of Various Types of Wastes in the Kingdom



Source: MOMRA, 1998. Municipal Services & Utilities in 100 Years

## SANITATION AND WASTE MANAGEMENT ON THE GOVERNMENT AGENDA

MOMRA defines sanitary operations as all operations which include tasks of:

- Collecting all types of solid wastes from various sources according to a set of organized and advanced procedures.
- Transporting and disposing of solid wastes with minimum time and cost.
- Implementing various methods and appropriate technologies to recycle certain items and to produce some new products such as fertilizers.

Sanitation, waste collection, and treatment, particularly in the Kingdom's cities, have been among central issues in the country's two latest five-year plans. This

has been reflected in resource allocations and administrative structure, which concentrate many efforts to deal with such problems. New specialized administrations and sections have been formed in all levels of municipal units to handle the following tasks:

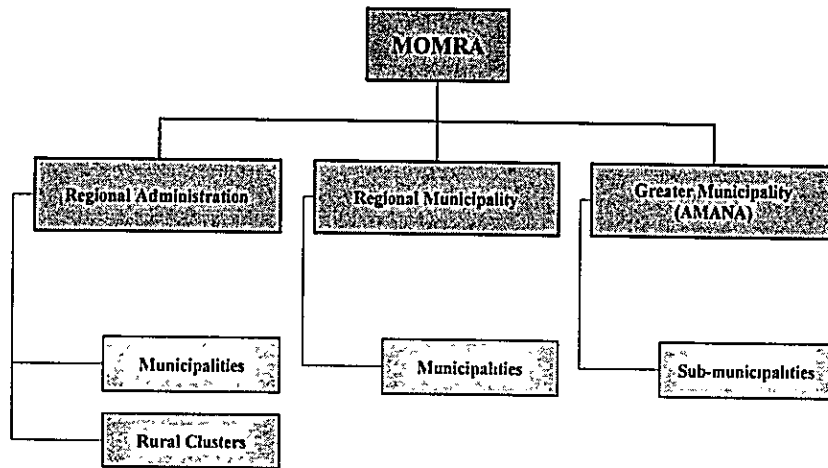
- Administer all sanitation operations.
- Propose new plans aimed at improving level of services.
- Develop and adopt policies necessary to improve and preserve high standards of public hygiene.
- Propose, implement and monitor new methods to improve current operations.
- Issue all technical requirements and specifications for all operations and machinery to handle waste collection, dumping, and recycling.
- Prepare all technical and statistical reports.
- Undertake research projects aimed at improving operations. This has been enforced by organizing national and international conferences, focusing on waste management. The next upcoming conference will be held in Jeddah on June 14-16, 1999.
- Develop and conduct programs to raise level of public awareness and importance of better hygiene for progress and development. MOMRA organizes an annual one-week awareness program on the subject.

#### MUNICIPAL HIERARCHICAL STRUCTURE & SANITATION ADMINISTRATIONS

MOMRA, the highest level of authority responsible of all municipal services and utilities, presides over and oversees an intermediate level of municipal units, which consists of **Greater Municipalities**, **Regional Municipalities**, and **Regional Administrations**. Each Greater Municipality presides over and oversees a group of sub-municipalities, each Regional Municipality and Regional Administration presides and oversees a group of municipalities or rural clusters as in the case of the latter (**Figure 1-4**). Thus, MOMRA oversees

all tasks of managing household waste in various lower municipal units through its Deputy Ministry for Technical Affairs. This task is accomplished through

Figure 1-4  
STRUCTURE OF MOMRA



the Public Health and Sanitation section of the Administration of Environmental Welfare (Figure 1-5). This administration in MOMRA oversees the task of handling the households' wastes in all subordinate departments in municipalities throughout the Kingdom. However, in the case of the five Greater Municipalities, the department of Environmental Welfare and the Department of Sanitation are to a large extent independent from MOMRA, and report directly to the Mayor through the Deputy Mayor (Figure 1-6).

Figure 1-5  
 POSITION OF PUBLIC HEALTH & SANITATION IN MOMRA

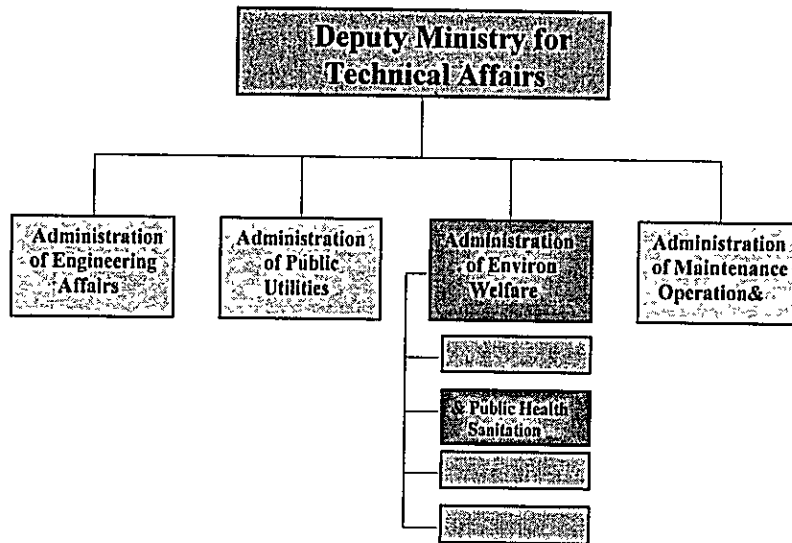
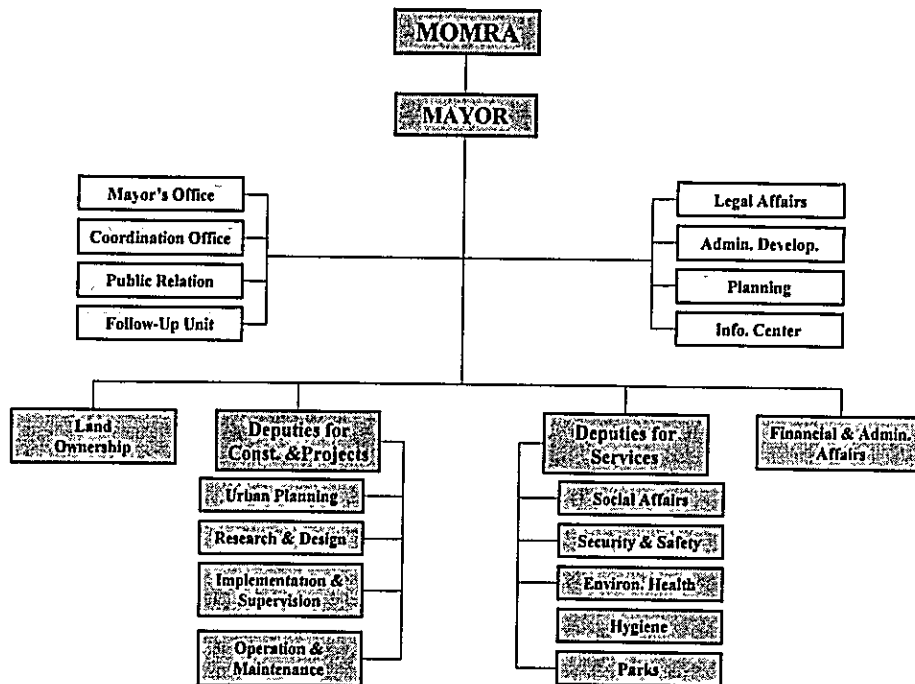
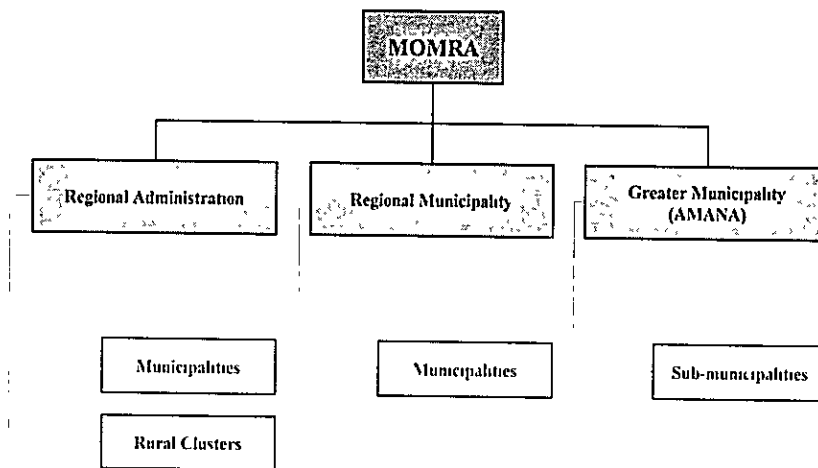


Figure 1-6  
 RELATIONSHIP BETWEEN MOMRA & MAYORALTIES



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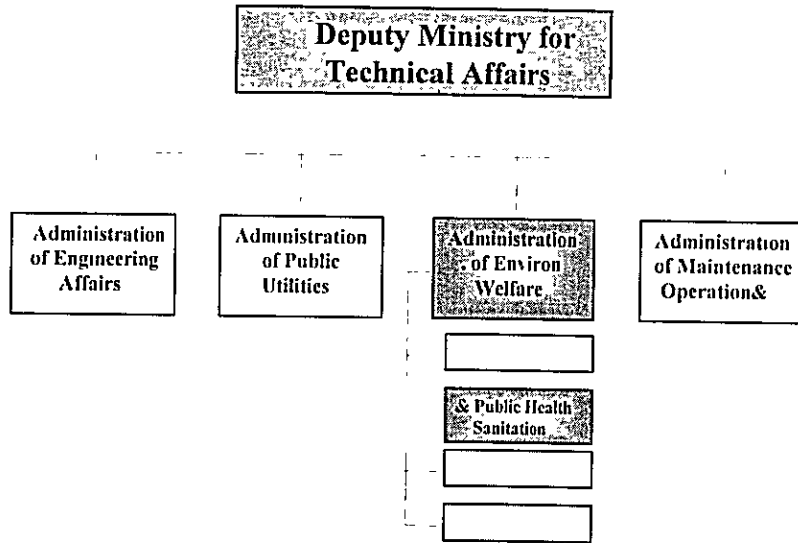
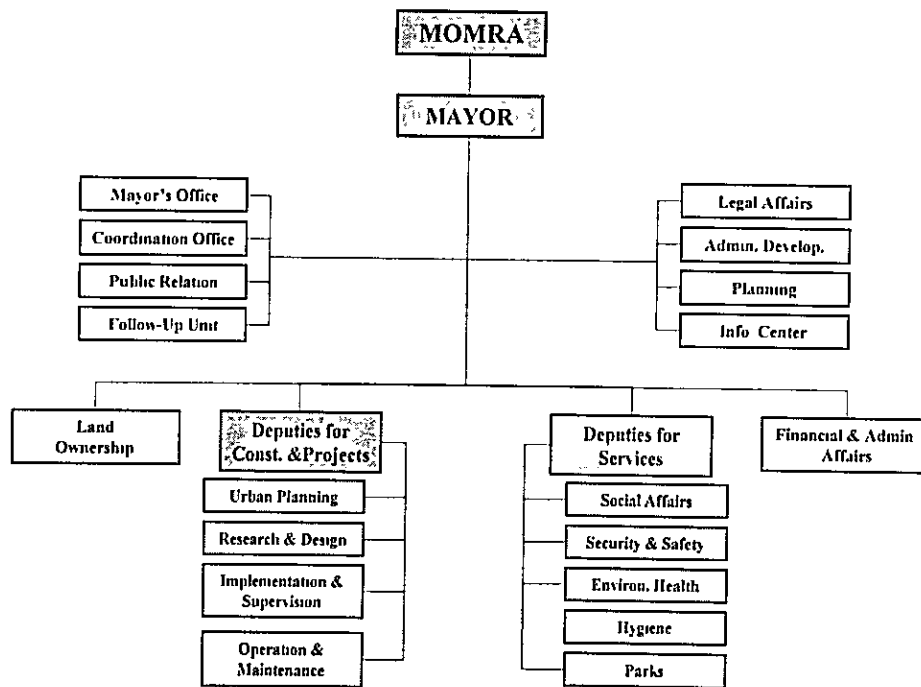


Figure 1-6  
 RELATIONSHIP BETWEEN MOMRA & MAYORALTIIES



**Section 2**

**VOLUME & CONTENTS**



**Section 2**  
**VOLUME & CONTENTS**

**VOLUME**

**Tables 2-1** summarizes the findings of a MOMRA report on the amount of households and commercial waste generated in the five greater municipalities and twelve largest cities in the country, representing all thirteen regions in 1985 and 1995. **Table 1** shows that the volume of households and commercial wastes, which the seventeen municipalities generated, increased by 44 percent over the ten-year period, increasing from 4.9 million tons in 1985 to 7.1 million in 1995.

Table 2-1

Total Households & Commercial Waste For 17 Municipalities During 1986-95 (1000 tons)											
	Annual Growth Rate (%)	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Riyadh	4.7	1,554	1,627	1,703	1,783	1,867	1,955	2,047	2,143	2,244	2,349
Jeddah	4.7	1,074	1,125	1,178	1,233	1,291	1,352	1,415	1,482	1,551	1,624
Makkah	4.3	592	609	626	644	662	681	701	722	743	766
Ihsaa	3.7	344	357	370	384	398	413	428	444	460	477
AlMadinah	4.3	293	303	313	324	335	347	359	372	385	398
Al-Taif	3.7	250	259	269	279	289	300	311	322	334	347
Dammam	4.2	241	251	261	272	284	296	308	321	335	349
Khamees Mesheit	3.7	120	125	129	134	139	144	150	155	161	167
Bredah	3.7	100	103	107	111	115	119	124	128	133	138
Tabook	3.7	99	102	106	110	114	118	123	127	132	137
Ha'il	3.7	60	62	65	67	70	72	75	78	80	83
Abha	3.7	51	53	55	57	59	61	63	66	68	70
Seehat & Anak	3.7	51	53	55	57	59	61	63	66	68	71
Hafr Al-Baten	3.7	37	39	40	42	43	45	46	48	50	52
Al-Jouf	3.7	26	27	28	29	30	31	32	33	35	36
Gizan	3.7	20	20	21	22	23	24	25	25	26	27
Al-Baha	3.7	16	16	17	17	18	19	19	20	21	22
<b>Total</b>		<b>4,928</b>	<b>5,131</b>	<b>5,343</b>	<b>5,565</b>	<b>5,796</b>	<b>6,038</b>	<b>6,289</b>	<b>6,552</b>	<b>6,826</b>	<b>7,113</b>

Source: Proceeding from the Symposium on the Economic Benefits from Waste,  
held in Jeddah on 25-26 May 1989

The Table 2-1 also shows that the three greater municipalities of Riyadh, Jeddah, and Makkah generated about 66 percent of total waste generated by the seventeen municipalities. The average annual increase varied among municipalities between 3.7 and 4.3 percent.

Table 2-2 shows the expected volumes of total households and commercial wastes projected for the years 2000 and 2010. It shows that by 2010 the seventeen largest municipalities will generate an annual total of 10.3 million tons of wastes. This figure is based on annual growth rates of 3 percent, being in line with expected rates of population growth.

Table 2-2

Estimated Growth in Total Households & Commercial Wastes in 17 Municipalities Upto 2010 (1000 tons)			
	1995	2000	2010
Riyadh	2,349	2,701	3,406
Jeddah	1,624	1,868	2,355
Makkah	766	881	1,111
Ihsaa	477	549	692
AlMadinah	398	458	577
Dammam	349	401	506
Al-Taif	347	399	503
Khamees Mesheit	167	192	242
Bredah	138	159	200
Tabook	137	158	199
Ha'il	83	95	120
Seehat & Anak	71	82	103
Abha	70	81	102
Hafr Al-Baten	52	60	75
Al-Jouf	36	41	52
Gizan	27	31	39
Al-Baha	22	25	32
<b>Total</b>	<b>7,113</b>	<b>8,180</b>	<b>10,314</b>

TEB projections based on an average annual growth rate of 3 percent, in line with expected population growth.

The latest estimates put daily household and commercial waste generated per capita at 2.2 kilograms, being very high by international standards. Assuming a lower figure of 1.5 kilograms per capita for rural population as opposed to 2.2 kg for urban population, places total household waste generated in 1998 in the Kingdom at an estimated 15 million tons (Table 2-3).

**Table 2-3**  
**Estimate of Household and Commercial Waste Generated in the Kingdom in 1998**

	(%) of Total	Population (million)	Avg. Daily Per Capita of HH Waste (kgms)	Total HH Waste Generated Per Day (tons)	Total HH Waste Generated Per Year (1000 tons)
<b>Urban Population</b>	75.00	15,000,000	2.2	33,000.00	12,045.00
<b>Rural Population</b>	25.00	5,000,000	1.5	7,500.00	2,737.50
<b>Total Saudi Population</b>	100.00	20,000,000		40,500.00	14,782.50

TEB estimate based on MOMRA estimates of daily per capita household waste generated.

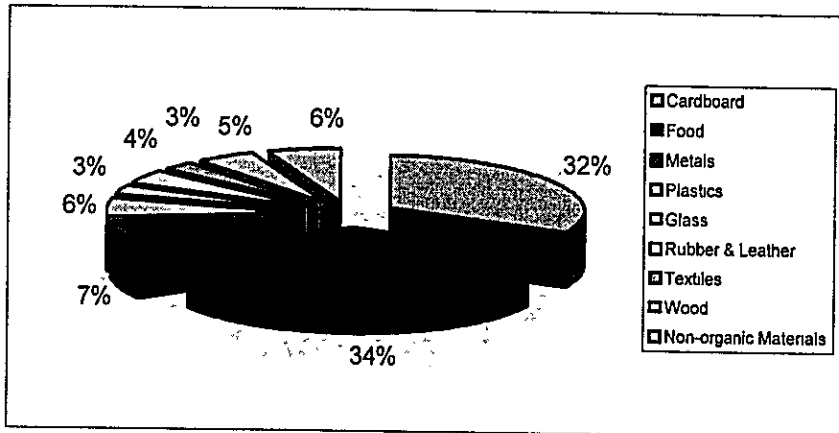
## COMPOSITION

The waste's composition depends on society's pattern of consumption, social and cultural awareness, economic activities and climate. Analysis of households and commercial waste in the Kingdom's seventeen cities shows that there are three different compositions (Figures 2-1, 2-2 and 2-3). The figures point to the following important observations:

- Percentage of food waste component ranges from 30 to 34 percent, which is high, compared to many other countries.
- Percentage of paper and cardboard component ranges from 22 to 32 percent, which is also high.
- The Percentage of metals, particularly iron, ranges from 5 to 11 percent, which is high in all of the Kingdom's cities particularly the coastal ones.
- Percentages of non-organic materials are also high.

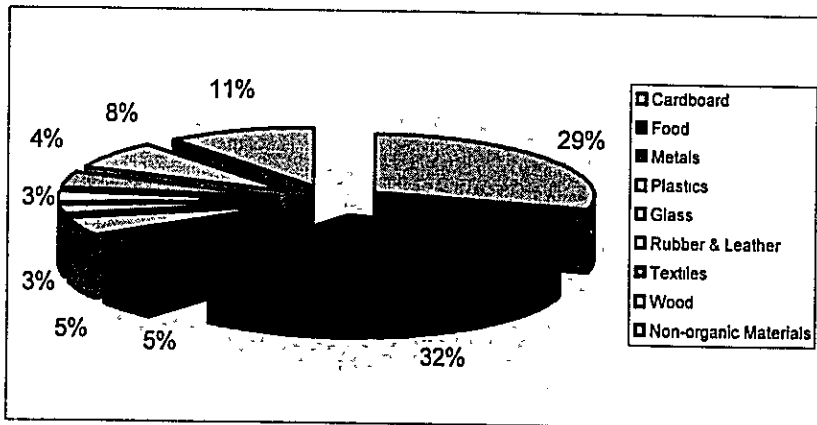
The level of humidity is high and ranges from 25 to 45 percent, with density ranging from 250 to 450 kilograms per cubic meter.

**Figure 2-1**  
**Composition of Households & Commercial Waste in Riyadh, Jeddah, Makkah, Al-Madinah, & Dammam**



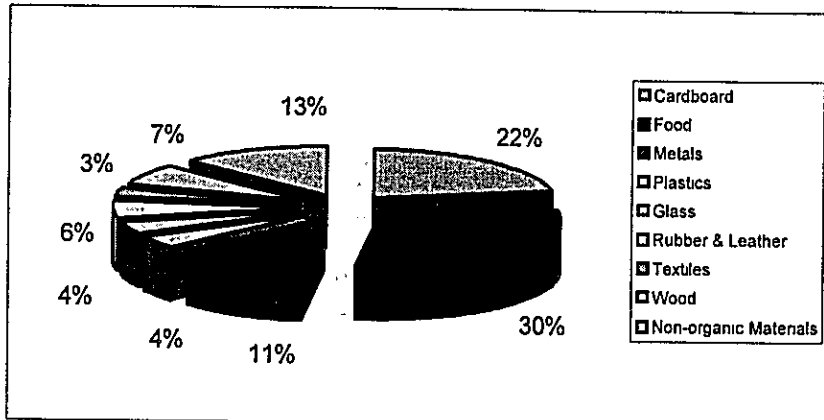
Source: MOMRA 1985 Report on Waste Accumulation in the Kingdom's Cities.

**Figure 2-2**  
**Composition of Households & Commercial Waste in Al-Taif, Al-Ihsaa, Abha, Bredah, Tabook, Khamees Meisheit, Ha'il**



Source: MOMRA 1985 Report on Waste Accumulation in the Kingdom's Cities.

**Figure 2-3**  
**Composition of Households & Commercial Waste in**  
**Al-Baha, Gizan, Hafr Al-Baten, Al-Jouf, Seehat, Anak**



Source: MOMRA 1985 Report on Waste Accumulation in the Kingdom's Cities.

**Section 3**  
**COLLECTION**

**Section 3**  
**COLLECTION**

**COLLECTION**

Most of the Kingdom's municipalities used to handle all the tasks of waste management, including collection and disposal. However, since the beginning of the 1980's many greater and large municipalities have contracted private companies to handle most waste management tasks and operations. The two municipalities of Dammam and Al-Ihsaa led the trend to privatize the waste management sector in the Kingdom when their sanitation departments contracted private companies to handle all waste management tasks. Hence, roles of sanitation departments in such cases have been limited to administering, monitoring and supervising contractors to insure their compliance with the contract's conditions.

According to MOMRA records, by 1998 there were a total of 39 contracts between various municipalities and contractors specialized in waste management. The total value of such contracts amounts to SR 2.5 billion. This is in addition to an additional SR 954 million approved for additional waste management and sanitation operations in other municipalities and rural clusters. Out of the latter figure, a sum of SR 680 million is approved for more private contracts, with the balance of SR 274 million approved for municipalities to handle waste management tasks using their own resources.

The role of the private contractor is limited to collecting all households and some commercial wastes. Contractors distribute 3 cubic meters metal containers in certain location, where residents place their households waste. Private contractors use 10 cubic meter trucks with hydraulic lifts to collect waste from such metals containers once a day. Private contractors dump the waste in municipal dumps and landfill sites, which municipalities own and supervise. In most municipalities residents are not required to separate various types of waste.

For example, the following three companies are main private contractors who are handling waste collection and all other sanitation operations in the city of Riyadh. having a total of 3,292 employees and workers.

- Resources for Services Establishment, serving the sub-municipalities in central Riyadh.
- Al-Darweesh Al-Ahliyah Establishment, serving sub-municipalities in southern and eastern Riyadh.
- Toweik Establishment, serving sub-municipalities in northern Riyadh.

### WASTE COLLECTION REGULATIONS

The following are regulations of the Royal Commission of Jubail and Yanbu for municipal waste collection, which may serve as standard guidelines for private contractors throughout the Kingdom. Thus, all collection operations of household wastes may be subject to the following regulations.

1. Owners and operators of facilities, which collect and deliver municipal waste to the landfill, shall follow the Sanitation Department procedures before disposal of such materials.
2. Containers, on-site collection systems and storage areas for municipal waste shall be selected and designed to prevent accumulation of refuse and creation of health, fire and nuisance hazards. Containers for non-hazardous waste shall be of adequate size and provided in sufficient numbers to contain all food wastes, rubbish, ashes and non-hazardous wastes that a residence or other establishment generates in the period of time between collections.
3. Containers shall be selected for the specific service intended, and shall be equipped with tightly fitting lids for all municipal wastes except for those used for inert, non-blowing wastes. The selected containers shall be reusable and be constructed of corrosion resistant metal or other



material, which shall not absorb water, grease, or oil. The containers shall be leakproof. Lightweight plastic or paper bags shall not be used as containers.

4. Occupiers of residential buildings shall provide suitable containers to hold their non-hazardous waste whilst awaiting collection, being responsible for maintenance and cleanliness of these containers.
5. Construction debris and demolition waste shall be collected and removed to the designated solid waste disposal area on a regular basis. These wastes shall not be allowed to accumulate such that the material presents a safety hazard for workers or members of the public, or create a nuisance to the community.
6. Municipal waste, non-hazardous industrial waste and inert waste shall be segregated at all times.
7. Construction debris and demolition waste generated in residential areas shall be collected directly into compatible bulk containers and removed to the designated solid waste disposal area on a regular basis.
8. The minimum collection frequency consistent with public health and safety shall be adopted to minimize collection costs and fuel consumption. Collection frequencies shall be established based on generation rates, waste composition and storage capacity.
9. The minimum municipal waste collection frequency shall be as follows:

- Residential area Three times per week
- Commercial establishments which generating putrescible food wastes Daily
- Other commercial establishment Twice per week
- Litter containers Daily

10. Non-hazardous industrial waste collection and delivery to waste disposal facilities shall be responsibility of the generator. The minimum non-hazardous industrial waste collection frequency shall be as follows

- Process waste To suit safety criteria
- Putrescible materials As generated
- Construction and demolition debris As generated
- Sewage sludge, grit, screenings Daily

11. Owners of derelict vehicles shall remove such vehicles from streets, roads, and vacant properties fourteen (14) days from the time the owner of either vehicle or property, where the vehicle is located, have received notification from the municipality to remove the vehicle.

**Section 4**

**DUMPING & DISPOSAL**

**Section 4**  
**DUMPING & DISPOSAL**

**DUMPING**

Municipalities own and operate dump and landfill sites, hence all private contractors have to follow all rules and regulations, which municipalities issue. For example, there are four dumps and landfill sites, which may be typical of dumps and landfill sites throughout the Kingdom, for burying and burning households' wastes.

- The first is located at the southern section of Riyadh, south of the ring road and towards the sub-municipality of Sulai. This landfill site has reached full capacity and is closed to any additional waste except for that which will be burned. This site has three waste burners, which are used for burning wastes that do not require separation. The residues, which result from burning operations, are buried in this site. After the site has reached its full capacity, the municipality covered it with soil and planted trees. The site is planned for conversion to serve as a public park in the future.
- The second site is located 6 kilometers from Sulai to the southeastern direction from the first site. It is operational and serves central, northern and eastern Riyadh.
- The third site is located in the Badr district along the Makkah Highway occupying one of the branches of Hanifa Valley. It is 96 hectares serving southern, western, and central Riyadh. It is operational and is expected to reach full capacity in 4 years.
- The fourth site is also located in the Badr district 5 kilometers to the southeastern direction from the third site. It is 420 hectares and it is being prepared for use.

## DISPOSAL

Municipalities in the Kingdom have mainly used three methods to dispose of households' wastes.

1. The first method is burning using mechanical means. This method has been used mainly in Jeddah, Makkah, and Al-Madina.
  - Makkah has a total of 8 mechanical burners with a total capacity of 40 tons per hour.
  - Al-Madinah has a total of three burners with a total capacity of 90 cubic meters daily.
  - Jeddah has a total of 4 burners with a total capacity of 13.5 tons per hour.

However, the number of municipalities who abandon this method for more environmentally sound methods is increasing.

2. The second method is burying using technologically advanced methods. Current trends show that municipalities have preferred this method over the previous one. Studies have shown that this is the least expensive method to dispose of households and commercial waste (Table 4-1).

Table 4-1

	100 tons	250 tons	1000 tons
	Cost Per Ton (SR)		
Production Cost of Fertilizers	288.00	244.00	205.00
Burning	110.00	90.00	75.00
Transform waste to Fertilizers	96.00	74.00	62.00
Burying	38.00	25.00	15.00

Source: Proceeding from the Symposium on the Economic Benefits from Waste, held in Jeddah, on 25-26 May 1989.

3. The third method is using households' waste to produce agricultural fertilizers. This method helps to reduce volume of waste to dispose, and is environmentally sound. Waste generated in the Kingdom contains a high percentage of organic materials, making it suitable for producing fertilizers. However, there has not been enough demand for fertilizers produced from wastes, since most farmers tend not to favor it for the following reasons:

- Ingredients are not always consistent.
- Product may contain various types of foreign objects such as glass.
- Lower levels of Nitrogen, Phosphorus, and Potassium, which are main nutrition elements for plants.

**Appendix A** contains a list of all factories, producing fertilizers from households and commercial wastes.

#### NON-HAZARDOUS WASTE DISPOSAL REGULATIONS

The following are regulations of the Royal Commission of Jubail and Yanbu for Non-Hazardous Waste Disposal, serving as standard guidelines for private contractors throughout the Kingdom. Thus, all disposal operations of household wastes may be subject to the following regulations.

1. Non-Hazardous industrial and municipal waste shall only be disposed of in Class II landfill site which has as a minimum, the following characteristics:
  - Landfill cells are lined with an impervious material to prevent direct contact of wastes with surface water or groundwater.
  - The disposal site is above the highest groundwater elevation.

- Separate landfill cells exist to segregate non-hazardous industrial waste from municipal waste.
- Surface water is diverted from crossing the fill site.
- A leachate and runoff collection system is installed.
- Leachate and runoff water from fill sites are collected and treated before being allowed to leave boundary limits of the site. Treated leachate runoff effluent shall meet relevant water quality criteria given in the section **Water Environment** dependent upon final point of discharge.
- The disposal site has stable fountains and embankments.
- The site is fenced and designated as off limits to the public.
- Each landfill cell is equipped with leachate and landfill gas monitoring wells.
- The site is surrounded with groundwater monitoring wells. located at no more than 50 meter intervals.

2. All Class II landfill sites shall be operated such that:

- Wastes deposited in the landfill are compatible with the landfill liner.
- Municipal wastes are segregated from non-hazardous industrial wastes.
- Only Physically, chemically and biologically compatible wastes are deposited in the same landfill cell.

- Waste is immediately spread and compacted with a daily cover of inert materials applied to waste to minimize problems associated with litter, odor or vermin.
  - No unauthorized burning of waste takes place.
  - No feeding of farm or domestic animals within the site boundaries shall be permitted.
  - Sludge and other wet materials are mixed in an appropriate ratio with dry waste to absorb moisture.
  - Adequate equipment to be maintained on-site to control fires and dust problems.
  - Operating procedures including monitoring, safety and emergency procedures approved by the municipality.
3. Inert wastes shall be deposited in a class III disposal site with, as a minimum the following characteristics:
- The disposal site is above the highest groundwater elevation.
  - No liner is required to protect underlying groundwater.
  - Surface water adjacent to the disposal site may contact the waste material.
  - No provision to divert, contain or treat surface runoff from the site is needed.
  - The site is fenced and designated as off limits to the public.
  - The site is fenced to prevent small objects from being blown away from the site.



4. All Class III landfill sites shall be operated such that:
  - Only inert solid waste materials are deposited in a Class III cell.
  - Operating procedures including monitoring, safety and emergency procedures approved by the municipality are followed.
  - No unauthorized burning of waste takes place.
5. Completed portions of the Class II or Class III landfill sites shall be finished with final cover to support vegetation, and vegetation shall be established. Post-closure control shall include maintenance of fill areas and vegetation to minimize erosion.
6. Scavenging shall be permitted subject to authorization for such activities by the municipality or its designee.
7. Monitoring of underground and landfill gas production from boreholes around the Class II landfill shall be undertaken for 30 years after site closure according to a schedule approved by the municipality.

**Section 5**  
**RECYCLING**

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Recycling is among the best and most favorable alternative to reduce volume of waste to be disposed, and hence it is one of most favorable alternatives for its contribution to lower the negative implications for the environment. However, unless it proves to be economically feasible, its adoption will remain limited. Thus, economic feasibility of recycling depends primarily on composition of waste and presence of a reasonable percentage of recyclable materials. As mentioned earlier, household waste in most of the Kingdom's cities contain a high percentage of recyclable materials such as paper and glass.

**PAPER RECYCLING**

**Table 5-1** shows that annual average volume of paper waste generated in the Kingdom is 120.843 tons, pointing to a good market for paper recycling.

Table 5-1  
Waste Paper Generated in Saudi Arabia

Annual Average	Quantity (tons)
Imports of Paper	447.604
Consumption of Paper	409.959
Recoverable Paper waste (80% of Consump.)	327.967
Recyclable Paper Waste (50% of Recoverable)	163.984
<b>Net Available Paper Waste</b>	<b>120.843</b>
Exports of Paper Waste	43.141
Exports of Paper	37.645

Source: Saudi Consulting House 1995. Report on Current Status of Waste Use By Factories in the Kingdom

**Appendix B** contains a list of factories, recycling paper waste from households and commercial wastes to produce paper for local consumption and exporting.

### **GLASS RECYCLING**

There is a total of 8 factories, producing glass products in various forms in the Kingdom (Guide to Factories in the Kingdom, 1998). The total capital investment in the eight factories is estimated at SR 477 million, with total annual production of such factories estimated at 2.5 million square meters of glass panels of various types, including about 130,000 tons of various types of bottles. A 1995 study for Saudi Consulting House estimated that annual production of one-time use bottles is estimated at 127,300 tons. The above figures point to a viable market for ventures, producing sandpaper, cleaning pads, exterior-finishing product, and Sodium Silicate from recycled glass.

**Section 6**

**PRIVATIZATION PRIORITY**

## Section 6

### PRIVATIZATION PRIORITY

The trend toward privatizing municipal services in general has been growing. However, privatizing the household waste sector has been slower than other departmental services. The following are two main forms of privatization, which have been experienced in the Kingdom's municipal services sector.

1. Most large commercial projects such as shopping malls and office buildings, have to contract private companies to collect their waste and transport it to the designated municipal dump or landfill. Thus, the cost of waste collection and dumping fees are paid directly by the user in the form of user charges.
2. Municipalities contract large specialized contractors to collect households waste and that of certain small commercial shops to transport it to municipal dumps or landfill sites for disposal. The users, in this case, receive the service free of charge with cost born solely by the municipality.

Talking to some municipal officials points to the fact that with such rapid population growth, particularly in major cities, the second form of privatization will not be viable in the long run and that some of the cost will have to be passed to households. Also, large contractors have proved not to be very efficient, with a trend towards encouraging smaller companies to participate by opening the bidding process for a wider range of contractors. This is particularly so in the case of recycling contractors. Thus, all indications point in the direction of a faster and wider privatization trend in the foreseeable future in the sector of household waste collection and disposal.

## **APPENDIX - A**

Appendix A

Factories Which Produce Organic Fertilizers From Household and Commercial Waste

Factory Name	City	Annual Production (tons)	Capital (million SR)	Number of Workers
Yanbu Municipality Factory for Organic Fertilizers	Yanbu	60,000		
Koop for Modern Agricultural Fertilizers	Riyadh	60,000	93.5	46
The Arabic Factory for Organic Fertilizers	Riyadh	50,000	66.0	30
Hail Municipality Factory for Organic Fertilizers	Hail	45,000		
Al-Qaseem for Organic Fertilizers Industrial Services	Bredah	38,400	32.3	31
The Arabic Factory for Organic Fertilizers	Dammam	25,000	39.0	59
Al-Bostan Factory for Organic Fertilizers	Riyadh	24,333	6.6	41
Fertilizers Company for Western Region	Jeddah	16,790	13.3	30
Al-Sami Factory for Organic Fertilizers	Jeddah	16,500	20.0	22
Al-Ghadeer for Dry Fertilizers	Al-Ihsaa	9,400	6.2	14



**Appendix A (Cont'd)**

**Factories Which Produce Organic Fertilizers From Household and Commercial Waste**

<b>Factory Name</b>	<b>City</b>	<b>Annual Production (tons)</b>	<b>Capital (million SR)</b>	<b>Number of Workers</b>
Arabian Company for Manufacturing Organic Fertilizers from Waste	Jeddah	90,000	89.8	81
Makkah for Organic Fertilizers & Industrial Services	Makkah	75,600	43.3	45
Al-Dammam for Organic Fertilizers & Industrial Services	Dammam	75,600	43.3	45
Jeddah for Organic Fertilizers & Industrial Services	Jeddah	75,600	43.3	45
Al-Riyadh for Organic Fertilizers & Industrial Services	Riyadh	75,000	43.3	45
Al-Madinah Al-Monawiah for Organic Fertilizers & Industrial Services	Al-Madinah	38,400	32.3	31
Al-Jubail for Organic Fertilizers & Industrial Services	Jubail	38,400	32.3	31

**Appendix A (Cont'd)**

**Factories Which Produce Organic Fertilizers From Household and Commercial Waste**

<b>Factory Name</b>	<b>City</b>	<b>Annual Production (tons)</b>	<b>Capital (million SR)</b>	<b>Number of Workers</b>
Abha for Organic Fertilizers & Industrial Services	Abha	38,400	32.3	31
Hail for Organic Fertilizers & Industrial Services	Hail	38,400	32.3	31
Tabuk for Organic Fertilizers & Industrial Services	Tabuk	38,400	32.3	31
Al-Taif for Organic Fertilizers & Industrial Services	Taif	38,400	32.3	45
Tam for Organic Fertilizers	Riyadh	30,000	4.0	45
The Modern Factory for Organic Fertilizers	Riyadh	30,000	5.5	30
Al-Anani for Organic Fertilizers Production	Jeddah	30,000	38.0	48
Saudi Factory for Organic Fertilizers & Soil Additives	Riyadh	15,000	5.1	52
Add for Organic Fertilizers	Al-Ihsaa	10,500	5.4	22

## **APPENDIX - B**

**Appendix B**

**Factories Which Produce Paper From Paper Waste**

<b>Factory Name</b>	<b>City</b>	<b>Annual Production (ton)</b>	<b>Capital (Million SR)</b>	<b>Number of Workers</b>
Mashar for Producing Cardboard from Paper Waste	Hail	70,000	111.50	210
Al-Ghadeer for Egg Trays	Al-Houfoof	60 Million Units	7.78	44
Injaz Saudi International for Paper Ltd.	Jeddah	38,550	10.70	27
Saudi Factory for Recycling Paper	Jeddah	18,000	17.00	



