THE ECONOMIC BUREAU

المكتب الاقتصادي

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

INDUSTRIAL SOLID WASTE IN SAUDI ARABIA

A SECTOR PROFILE

Prepared By:

The Economic Bureau
Riyadh, Saudi Arabia

May 1999

مبنى مؤسسة الملك فيصل الخيرية - ص.ب ٨٦٦١٩ الرياض ١١٦٣٢ - ترخيص رقم ٨٨ - هاتف ٤٦٤ ٨٢٩٥ / ٤٦٤ ٣٩٣٨ - فاكس ٤٦٥ ٤٦٦٩ - المملكة العربية السعودية
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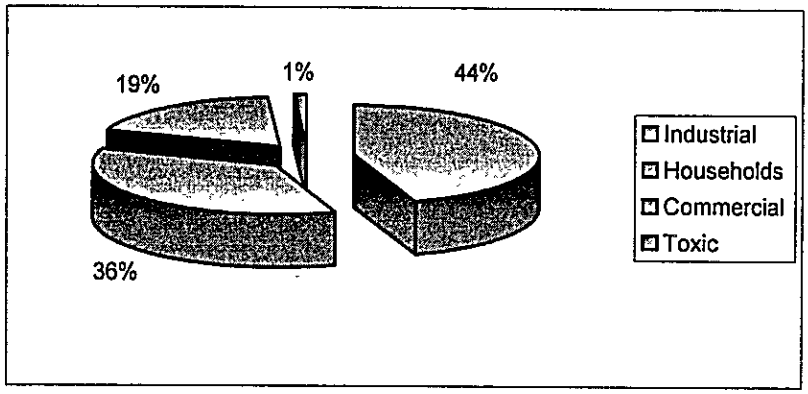
INTRODUCTION

The Environmental Regulations Consultation Document of the Royal Commission for Jubail and Yabu (1996) defines **Non-Hazardous Industrial Wastes** as any solid, semi-solid, liquid, gaseous materials, or any other wastes, which result from industrial, agriculture, mining, water supply treatment, wastewater treatment, or air pollution control facilities, provided that they are not hazardous, municipal or inert wastes. This document also defines the **Hazardous Wastes** as any solid, semi-solid, liquid, or contained gaseous wastes, which depending on their quality, concentration, physical or chemical characteristics, may pose a hazard or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. These hazardous wastes shall also include chemical wastes identified as discarded commercial chemical products, off specification products / chemicals, containers residues and spill residues. This profile document focuses only on the **Industrial Solid Wastes.**

Industrial wastes account for 44 percent of all wastes generated in the Kingdom **(Figure 1-1)**. The industrial sector, the main source of the solid industrial wastes in the Kingdom, has been growing rapidly. The total number of factories grew by almost 58 percent over the 10 year period from 1988 to 1997 **(Table 1-1)**. This implies that the industrial sector grew at an average annual rate of 5.8 percent. Thus, the industrial sector grew faster than the Kingdom's population during the period. The table also shows that industrial activities are concentrated in Riyadh, Makkah, and the Eastern Regions, whose share of the total factories of the Kingdom was 85 percent in 1988, and also 85 percent in 1997 **(Figures 1-2 & 1-3)**. Also, most of the growth, which occurred in the number of factories,

concentrated in these three regions. Thus, it is obvious that the three regions generate the bulk of all industrial solid wastes in the Kingdom.

Figure (1-1)
Percent of Various Types of Wastes in the Kingdom



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

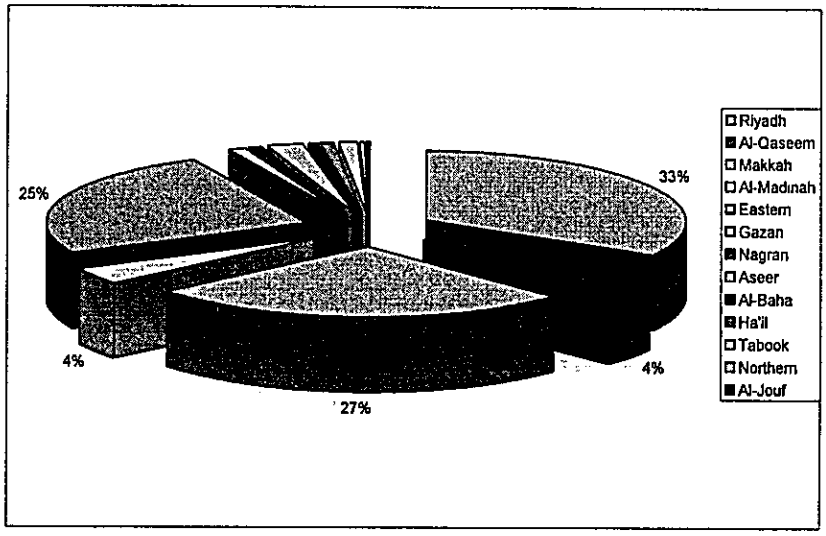
Table (1-1)

Number of Licenced and Producing Factories in the Kingdom's Regions (1988-97)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Average Ann. Growth Rate (%)
Riyadh	562	609	643	670	712	765	810	861	890	924	64.4
Al-Qaseem	70	75	79	80	85	91	96	101	105	113	61.4
Makkah	455	483	501	526	550	586	620	660	711	728	60.0
Al-Madinah	70	72	74	78	80	88	95	94	98	99	41.4
Eastern	426	453	473	497	525	556	580	600	632	651	52.8
Gazan	18	20	20	21	21	22	22	24	24	28	55.6
Najran	13	13	13	13	13	14	14	15	15	15	15.4
Aseer	39	39	40	41	42	46	50	50	53	58	48.7
Al-Baha	9	9	10	10	11	11	11	11	11	12	33.3
Ha'il	15	17	18	20	20	21	21	22	22	22	46.7
Tabook	16	16	16	16	18	18	19	21	21	23	43.8
Northern	4	4	4	4	4	5	5	5	5	5	25.0
Al-Jouf	7	8	9	10	10	11	12	12	11	11	57.1
Total	**1704**	**1818**	**1900**	**1986**	**2091**	**2234**	**2355**	**2476**	**2598**	**2689**	57.8

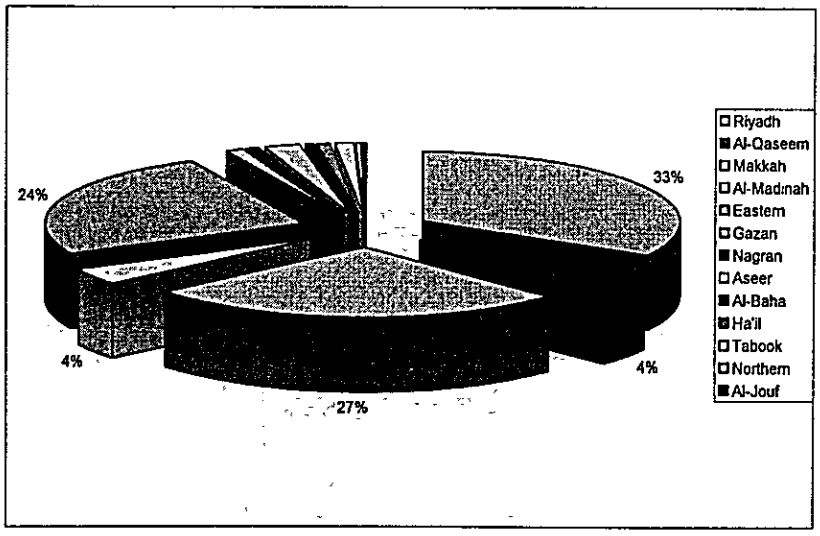
Source: Ministry of Industry & Electricity, 1998. Industrial Development Over 100 Years.

Figure (1-2)
Percent of Licensed Producing Factories by Regions in the Kingdom in 1988



Source: Ministry of Industry & Electricity, 1998.
Industrial Development Over 100 Years.

Figure (1-3)
Percent of Licensed Producing Factories by Regions in the Kingdom in 1997

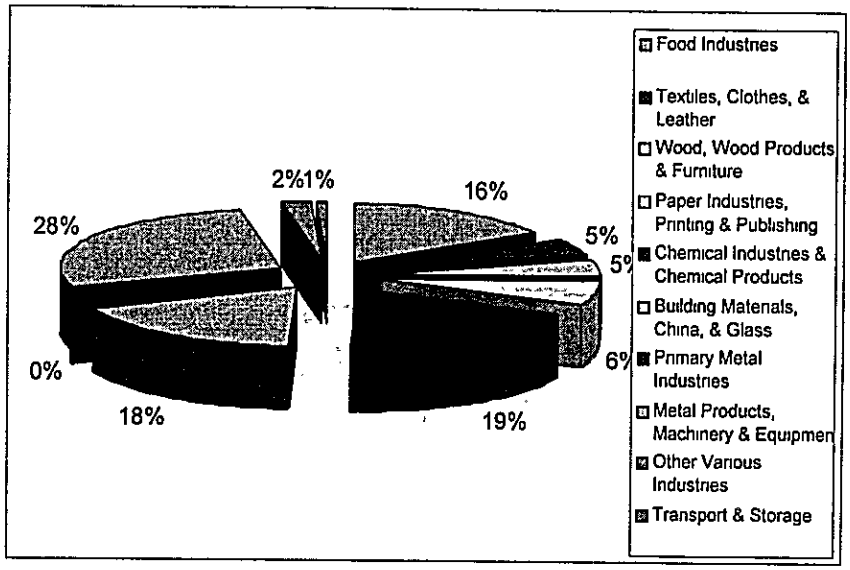


Source: Ministry of Industry & Electricity, 1998.
Industrial Development Over 100 Years.

Figure 1-4 shows the percent of licensed producing factories by industry type. and it is obvious that 81 percent of these factories are concentrated in the four industries Metal Products, Machinery and Equipment; Chemical Industries and Chemical Products: Building Materials, China and Glass: and Food industries. It is imperative to mention that the nature of these industries makes them the primary generators of industrial solid wastes. **Table 1-2** shows the number of licensed producing factories by industrial type in various region of the Kingdom were the concentration of these four industries are in the Riyadh, Makkah, and the Eastern Regions. Also, **Table 1-3** highlights the industrial cities of Saudi Arabia with their implementation status and their corresponding number of factories covered.

Figures 1-5, 1-6, and 1-7 show the percent distribution of the factories by the type of industry in Riyadh. Makkah. and the Eastern Regions. **Figure 1-5** shows that the percentages of factories in the four dominant industries Metal Products. Machinery and Equipment: Chemical Industries and Chemical Products: Building Materials, China & Glass: and Food Industries in the Riyadh region are 30, 18. 17. and 13 percent. respectively. **Figure 1-6** shows that the percentages of factories in the four dominant industries. in the Makkah region are 27. 19, 18. and 13 percent. respectively. **Figure 1-7** shows that the percentages of factories in the four dominant industries in the Makkah region are 28. 23, 18, and 13 percent. respectively. **Figure 1-8** shows that 61. 49, and 38 percent of the licensed producing factories are concentrated in the industrial cities of the Riyadh, Makkah, and the Eastern Region. respectively. Thus. Riyadh. Makkah, and the Eastern Region are the primary generators of industrial waste in general and of the solid industrial waste in particular. Also based on the distribution of factories. it is logical to assume that the industrial cities in the three regions generate more than half of the total industrial and solid wastes in the three regions.

Figure (1-4)
Percent of Licensed Producing Factories by Type of Industry in the Kingdom in 1997



Source: Ministry of Industry & Electricity, 1998.
Industrial Development Over 100 Years.

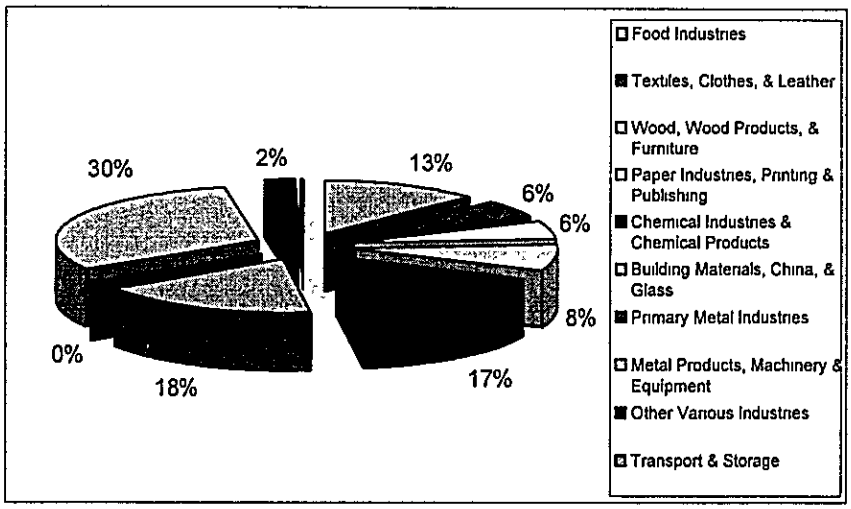
Table (1-2)

Number of Licensed and Producing Factories by Industry Types in the Kingdom's Regions (1988-97)

	Riyadh	Al-Qaseem	Makkah	Al-Madinah	Eastern	Jazan	Najran	Aseer	Al-Baha	Ha'il	Tabook	Northern	Al-Jouf	Total
Food Industries	117	29	135	25	83	7	1	8	2	7	8	0	4	426
Textiles Clothes, & Leather	51	4	34	10	21	0	0	0	0	0	0	0	1	121
Wood, Wood Products & Furniture	51	5	27	6	33	0	0	1	0	2	0	0	0	125
Paper Industries, Printing & Publishing	70	3	56	1	36	1	0	1	3	2	0	0	1	174
Chemical Industries & Chemical Products	153	18	146	17	157	2	3	5	1	1	8	1	3	515
Building Materials, China & Glass	166	21	92	23	116	14	9	33	5	5	4	3	2	493
Primary Metal Industries	3	0	6	0	4	0	0	0	0	0	0	0	0	13
Metal Products, Machinery & Equipment	287	30	201	10	186	3	2	10	0	5	2	1	0	737
Other Various Industries	23	2	26	4	10	0	0	0	0	0	0	0	0	65
Transport & Storage	3	1	5	3	5	1	0	0	0	0	1	0	0	19
Total	924	113	728	99	651	28	15	58	11	22	23	5	11	2688

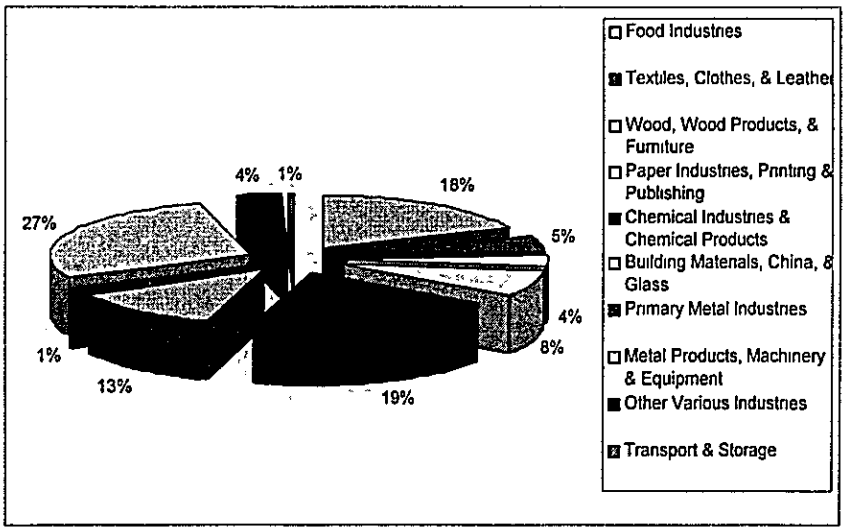
Source: Ministry of Industry & Electricity, 1998. Industrial Development Over 100 Year

Figure (1-5)
Percent of Licensed Producing Factories by Type of Industry in Riyadh Region in 1997



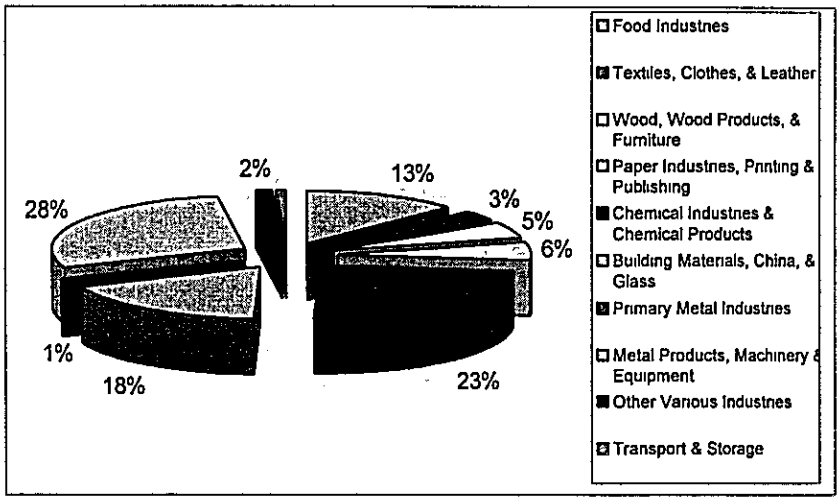
Source: Ministry of Industry & Electricity, 1998.
Industrial Development Over 100 Years.

Figure (1-6)
Percent of Licensed Producing Factories by Type of Industry in Makkah Region in 1997



Source: Ministry of Industry & Electricity, 1998.
Industrial Development Over 100 Years.

Figure 1-7
Percent of Licensed Producing Factories by Type of Industry in the Eastern Region in 1997



Source: Ministry of Industry & Electricity, 1998.
Industrial Development Over 100 Years.

Table (1-3)
Licensed Producing Factories in the Kingdom's Industrial Cities 1997

	Industrial City	Phase	Total Area (000m2)	Number of Factories	Implementation Status
Riyadh				567	
	First	One	451	51	Developed
	Second			516	
		First	5.600		Developed
		Second	64		Developed
		Third	3.786		Partially Developed
		Fourth	3.000		Not developed
		Housing	3.000		Not developed
Jeddah				338	
		First	498		Developed
		Second	1.044		Developed
		Third	3.228		Developed
		Fourth	4.412		Developed
		Fifth	2.664		Being Developed
		Housing	942		Not Developed
Dammam				250	
	First			123	Developed
		One	2.704		
	Second			127	
		First	3.100		Developed
		Second	3.600		Developed
		Third	4.000		Not Developed
		Others	12.076		Not Developed
	Housing				
		First	150		Developed
		Second	445		Only Utilities
		Others	628		Partially Developed
Al-Ihssa				24	
		First	538		Developed
		Second	515		Developed
		Third	447		Partially Developed
AlQaseem				33	
		First	675		Developed
		Second	478		Developed
		Third	347		Partially Developed
Makkah				20	
		One	758		Developed

Source: Ministry of Industry & Electricity, 1998. Industrial Development Over 100 Years.

Figure (1-8a)
Percent of Factories in the Industrial Cities in Riyadh Region (1997)

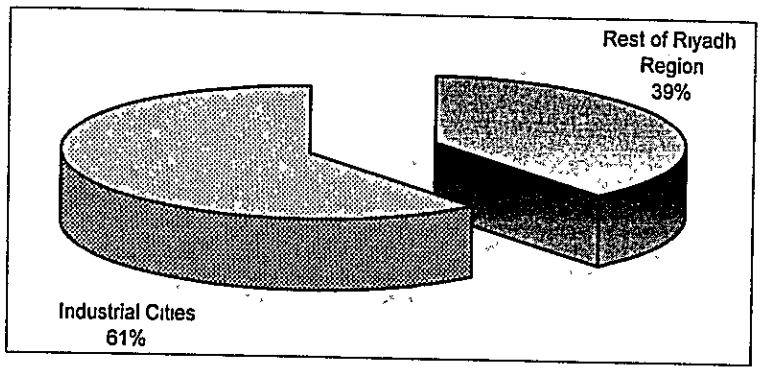


Figure (1-8b)
Percent of factories in the Industrial Cities in Makkah Region (1997)

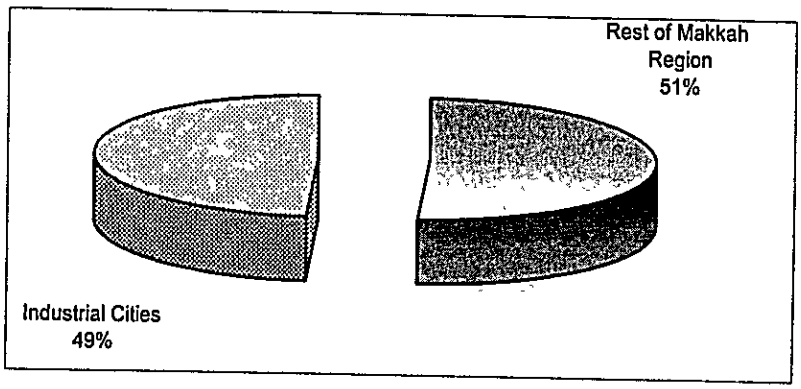
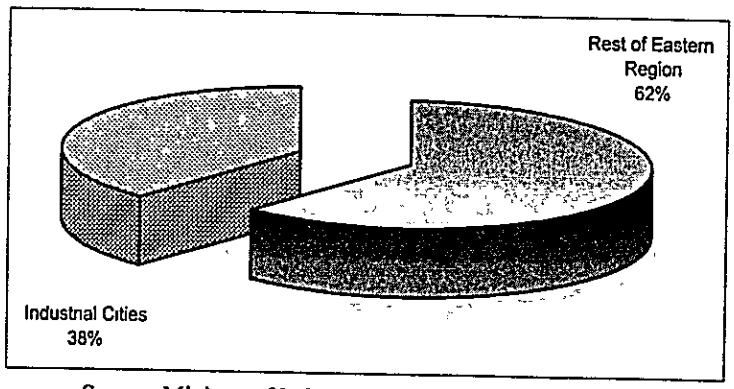


Figure (1-8c)
Percent of factories in the Industrial Cities in the Eastern Region (1997)



Source: Ministry of Industry & Electricity, 1998.
Industrial Development Over 100 Years.

Section 2

COMPOSITION & VOLUME

Section 2

COMPOSITION & VOLUME

COMPOSITION

The distribution of the factories by the type of industries showed that the Metal Production and Equipment manufacturing; and Building Materials. China and Glass are among the dominant industries in the Kingdom. This implies a large percentage of solid waste of all industrial waste generated. Also the high standards of living enjoyed by the majority of the Kingdom's population has been associated by a high rate of car ownership, and other metal equipment such as appliances. Analysis of solid waste in the Kingdom shows that it contains large quantities of the following solid wastes. which have a significant resale value:

IRON AND STEEL WASTES AND WRECKAGE

This type of wastes may take the following forms:

- Iron remains and wreckage pieces. generated from cutting and shaping iron parts. and may be in the form of scraps of different sizes and shapes.

- Defected. damaged, or used. iron parts. which are not usable. and this may include wreckage from cars, equipment, and all metal wastes generated by the public utilities and the oil industry sectors.

- Scraps generated from the manufacturing process of the iron and steel industry.

ALUMINUM WASTES AND WRECKAGE

This type of wastes may take the following forms:

- Aluminum remains and wreckage pieces. generated from cutting. punching. and shaping aluminum parts, and may be in the form of scraps of different sizes and shapes.

- Defected, damaged, or used, aluminum parts, which are no longer usable.

Aluminum wreckage are melted and then used as a primary raw material and a component in the production of recycled aluminum.

LEAD

Lead wastes are found in the following sources:

- Car wreckage
- Heavy equipment and trucks.
- Machines and power generators
- Military equipments
- Computers
- Protection and control systems

PLASTICS & GLASS

Plastic wastes are generated during the manufacturing operations of plastics and glass and from the old and unusable plastics and glass products.

VOLUME

There is a large sector of metal industries who depends on the above solid waste materials as primary raw materials in their industrial operations. The percentages of the recycled materials from the total ingredients range from 50 to 70 percent. Thus, rough figures on the annual volume of such solid waste materials may be estimated based on the information in **Section 6.**

Section 3

COLLECTION

Section 3

COLLECTION

COLLECTION

The actual collection, transporting and dumping of all industrial solid wastes in the designated sites are the responsibilities of the generator of that waste. However, managing such activities is the responsibility of the Ministry of Industry and Electricity (MOIE), which issue the rules and the regulations. The generators of the wastes have to follow these rules and regulations in accomplishing such tasks. **Please see the next Section "Dumping & Disposal", for detailed sample of transport and disposal regulations.**

Section 4

DUMPING & DISPOSAL

Section 4

DUMPING & DISPOSAL

MOIE owns and operates some waste sites. However. the private sector also participates in owning some waste collection sites. particularly for recyclable solid waste. provided that they follow the following rules and regulations.

WASTE MANIFEST REGULATIONS

The following are the manifest regulations of the Royal Commission of Jubail and Yanbu for transporting all types of industrial wastes. This manifest may serve as standard guidelines for private contractors throughout the Kingdom. Thus. all collection. transport. and disposal operations of industrial wastes may be subject to the following regulations.

1. Before transporting of hazardous and non-hazardous industrial wastes away from a generator's facility. either for disposal. recycle. or reuse. the generator shall produce a waste manifest containing. as a minimum. the following information.
    - A unique. sequential manifest number.
    - The generator's name. mailing address. telephone number, and contact name.
    - The name. the telephone number of the licensed waste transporter
    - The name and the telephone number of the designated disposal facility.
    - For non-hazardous industrial waste. a description of the waste including compositional data.
    - For hazardous waste a detailed chemical and physical anlaysis, safety and hazardous material handling precautions, and hazard class consistent with which regulations.

- The total quantity of waste being transported, and the number and type of containers being transported to the designated disposal facility.

2. The generator shall sign the manifest certifying that the waste is properly classified, described, packaged, marked and labeled according to the requirements of the regulations.

3. The generator shall provide a manifest with sufficient copies to provide the generator, each transporter, and the designated disposal facility with one copy plus one additional copy to be returned to the generator.

4. The generator shall retain a copy of the original manifest and the returned copy from the designated disposal facility for a period of time not less than three years from the date of transportation of the waste from the facility.

5. The generator shall, prior to transporting the waste, obtain the signature of the waste transporter on the manifest acknowledging acceptance of the waste at all times until such time as possession of the waste passes to either another transporter or to the permitted waste disposal facility.

6. Upon delivery of the waste to a treatment disposal facility the transporter shall obtain the date of delivery and signature of the responsible individual at the designated disposal facility. After the transporter receives this information, the transporter shall retain a copy of the manifest for its records. The transporter shall maintain such records for a period of time not less than three years from the date of delivery of the hazardous waste to the designated facility.

7. Any disposal facility designated on the manifest for acceptance of hazardous and non-hazardous industrial waste shall adhere to the waste manifest procedures as follows:

- Upon arrival at the disposal facility. the disposer shall certify that the wastes as delivered are consistent with the description of the accompanying manifest documentation.
- If any discrepancies exist between the wastes described to the manifests and those to be received. they shall be noted on the manifest documentation.
- The disposer shall return a completed copy of the manifest to the generator within thirty days of receipt of delivery of the waste material.
- The disposer shall retain a signed copy of the manifest for a time period not less than three years from the date of receipt of the waste shipment at their facility..

8. In the event that the facility cannot accept the waste. a separate report shall be made to the responsible agency which should include:
   - A legible copy of the manifest
   - The date and time of the wastes received at the disposal facility; the transporter identification number and license number of the vehicle involved.
   - A detailed description of the justification of the non-acceptance of the waste
   - A statement to the effect as to why the disposal facility did not accept this waste and the disposal method which would have been applied to the waste.

9. If the generator has not received a completed manifest from the designated disposal facility within thirty days of initial report, the generator shall contact the disposal facility to determine the waste disposition.

10. The generator of the hazardous waste shall contact the responsible authority and file a report documenting the waste transport and waste disposition if a completed manifest is not provided to the generator by the

designated disposal facility within forty-five days of the initial transport of waste from the generators facility.

NON-HAZARDOUS WASTE DISPOSAL REGULATIONS

The following are the regulations of the Royal Commission of Jubail and Yanbu for Non-Hazardous Waste Disposal. which may serve as standard guidelines for private contractors throughout the Kingdom. Thus. all such disposal operations 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:

    - The landfill cells are lined with an impervious material to prevent direct contact of the 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 the fill sites are collected and treated before being allowed to leave the boundary limits of the site. The treated leachate runoff effluent shall meet the relevant water quality criteria given in section **Water Environment** dependent upon the final point of discharge.
    - The disposal site to have 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 meters 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 and a daily cover of inert materials is applied to the 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 fire 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 to the 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 the 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

Section 5

RECYCLING

Recycling industrial solid waste has been grown rapidly. A 1995 study by the Saudi Consulting House found that the demand for metal waste has risen to the degree that exports of metal waste have been declining. **Tables 5-1 to 5-5** indicate a list of various factories with their annual production capacity and their corresponding number of workers. These factories make use of metal and plastic wastes as raw materials in their manufacturing operations to produce certain products.

Table 5-1
Factories Which Use Iron and Steel Wastes as Raw Material

Factory Name	City	Products	Annual Production Capacity (ton)	Capital (Million SR)	Number of Workers
Saudi Company for Iron & Steel	Jubail	Iron Mass Reinforcing Iron Bars Reinforcing Iron Rods	4,000,000	3,566	1,900
Saudi Arabian Company for Manufacturing Ductile Iron Tubes	Dammam	Sewer Cast Iron Tubes	100,000	280	375
Industrial Company for Sanitary Products & Fittings	Riyadh	Iron & Steel tube Fitting, Steel Manhole Covers	1,300 3,800	11	120
Riyadh Factory for Forgering & Shaping Metals	Riyadh	Cast Iron Alloys	4700	4.64	38
Al-Itkan for Alloys	Jeddah	Cast Iron Forgeries Hard Iron Forgeries Soft Iron Forgeries	2,500 1,000 1,500	27.8	73
National Factory for Cast Iron Products	Jeddah	Cast Iron tubes & fittings Cost Iron Manhole Covers	350 1,150	7.4	47
Salem for Manufacturing Metals	Jeddah	Plumbing Fixtures	704	14.92	76
Al-Fahd for Manufacturing Spare Parts for Heavy Equipments	Enezza	Manhole Covers	218	3.28	34

Table 5-1 (Cont'd..)

Factories Which Use Iron and Steel Wastes as Raw Material

Factory Name	City	Products	Annual Production Capacity (ton)	Capital (Million SR)	Number of Workers
Al-Oda Industrial & Commercial Limited	Skaka	Mechanical Equipment Spare Parts Water Pump Spare Parts	1000	501	38
National Forgery for Agricultural Pumps & their Spare Parts	Riyadh	Cast Iron Forgeries Agricultural Pumps Parts Spare Parts	150 1700 420	13	100
Tiba for Metal & Forgery Forms	Riyadh	Metal Forgeries Spare Parts Metal Forms	500 500	1.22	25
Al-Dekhiel for Forging & Shaping Metals	Riyadh	Manhole Covers	375	1.98	14
Modern Factory Pouring & Sanitary Fixtures	Riyadh	Iron Plumping fittings Manhole Covers	2000 4000	7.86	30
Hamza Khasheem & Mohamed Gamal Ltd.	Dammam	Cast Iron Forgeries	750	1	27
Al-Dahman for Cast Iron Connections & Valves	Ahad Al-Hsaraba	Valves & Fittings for Water Network	263	11.23	40
Al-Shaheen for Metal Manufacturing	Riyadh	Cast Iron Forgeries	160	2.8	62

Table 5-1 (Cont'd..)
Factories Which Use Iron and Steel Wastes as Raw Material

Factory Name	City	Products	Annual Production Capacity (ton)	Capital (Million SR)	Number of Workers
Al-Dahman for Forging Metals	Riyadh	Valves & Fittings Steel Spare Parts	1500 300	4.84	53
Al-Roudah for Forgeries	Riyadh	Cast Iron Forgeries	150	13.6	65
Al-Haweesh for Metal Forgeries	Jeddah	Steel Blocks & Forms	1800	16.5	28
Al-Seheeny for Forging Metal	Jeddah	Cast Iron Forgeries	1200	5.1	36
Masabek	Dammam	Cast Iron & Steel Forgeries	12060	117.16	237
Al-Harby for Mixing Metals	Riyadh	Cast Iron Forgeries	1500	6.1	33
Al-Memary for Iron Forgeries	Riyadh	Cast Iron Forgeries Cast Iron Tubes	400 2000	5	21
Ben - Taha for Forgeries	Makkah	Cars & Furniture Accessories	300	1.8	16

Table 5-1 (Cont'd ..)
Factories Which Use Iron and Steel Wastes as Raw Material

Factory Name	City	Products	Annual Production Capacity (ton)	Capital (Million SR)	Number of Workers
Al-Khaleeg for Metal Alloys	Hail	Agricultural Pumps Spare Parts Mech. Equip. Spare Parts	450 150	6.4	33
Mohamed Taher for Melting & Mixing Metals	Jeddah	Manhole Covers Pumps Spare Parts	110 200	1.3	31
Al-Helaly for Mixing Metals	Al-Madinah	Manhole Covers Pumps Spare Parts Mechanical Spare Parts	50 250 250	4.4	33
Al-Hegaz for Metals	Makkah	Metal Forgeries	2	16.8	120
Al-Helaly for Forging Metals	Al-Madinah	Manhole Covers Pumps Spare Parts Mechanical Spare Parts	50 250 250	4.4	33
Gad for Cast Iron Products	Jeddah	Cast Iron tubes Cast fittings	800 400	4.4	19
Jeddah for Mechanical Spare - Parts	Jeddah	Cast & Steel Forgeries Mechanical Spare Parts Metal Forms	500 780 100	11.2	40

Table 5-2

Factories Which Prepare Iron and Steel Wastes for Use in Metal Products

Factory Name	City	Products	Annual Production (ton)	Capital (Million SR)	Number of Workers
Al-Dress for Iron Wrecks	Riyadh		23,617	11	68
The Company for Iron Collection Ltd.	Jeddah		17,843	1	19
Factory for Extruding & Separating Wrecks	Enezza		810,000	16.7	66
Metals Company	Jeddah		8,090	36.68	31
Al-Drees for Iron Wrecks	Jeddah		100,000	11	11
National Company for Metal Collection Ltd.	Dammam		110,000	28	36
Heckt Saudi Arabia Ltd.	Jubail		591,000	32.3	29

Table 5-3

Factories Which Use Aluminum Wastes as Raw Material

Factory Name	City	Products	Production Capacity (tons)	Capital (Million SR)	Number of Workers
Shaheen for Metal Manufacturing	Riyadh	Aluminum Forgeries	20	2.8	62
Riyadh Factory for Forging & Shaping Metals	Riyadh	Aluminum Forgeries	150	4.64	38
National Factory For Agricultural	Riyadh	Aluminum Forgeries	12	12	100
Al-Oda Industrial Commercial Ltd.	Sakaka	Spare Parts for Mechanical Equipments	1000	5.1	38
Al-Shahrany for Cars Frames	Jeddah	Aluminum Forgeries	20	7.2	37
Al-Dahman for Forging Metal	Riyadh	Spare Parts from Aluminum Forgeries	45	4.84	53
Al-Roudah for Forgeries	Riyadh	Aluminum Forgeries Products	500	13.6	65

Table 5-3 (Cont'd..)

Factories Which Use Aluminum Wastes as Raw Material

Factory Name	City	Products	Production Capacity (tons)	Capital (Million SR)	Number of Workers
Al-Bectar Factory	Riyadh	Aluminum Forging	200	6.1	33
Al-Khaleej for Forging Metals	Hail	Mechanical Equipment Spare Parts	300	6.4	33
The Factory for Collecting Iron Ltd.	Jeddah	Scrap Aluminum	135	1	19
Al-Haweesh for Metal Forgeries	Jeddah	Aluminum Blocks & Forgeries	1,110	16.5	28
Al-Harby for Forging Metals	Riyadh	Aluminum Forgeries Products	200	6.1	33

Table 5-4

Factories Which Manufacture And Extract Lead From Solid Wastes

Factory Name	City	Products	Annual Production Capacity (ton)	Capital (Million SR)	Number of Workers
National Company for Forging Lead Ltd	Dammam	Lead Sodium Sulphate Poly-Propylene	18000 3029 1256	80	78
Al-Jazirah for Recovering Lead	Riyadh	Pure Lead & Pure Aluminum Forgeries	7000	17.6	24
Al-Motawei for Forging & Lead	Dammam	Forged Lead	10500	22.2	47
Al-Jadwal for Forging & Purifying Lead	Jeddah	Blocks from Pure Lead forgeries	9000	4.6	27

Table 5-5

Factories Which Manufacture Plastics From Plastic Wastes

Factory Name	City	Products	Annual Production Capacity (ton)	Capital (Million SR)	Number of Workers
Al-Hoshany for Treatment of Plastics Wastes	Riyadh	Low Density Polyethylene High Density Polyethylene	1000 800	3	20
Arabian Factory for Plastic Materials	Jeddah	Re-Manufactured Plastic Material	3000	4	40
Al-Jubail Factory for Treating Plastics	Jubail	Re-Manufactured Plastic Wastes	5000	10.5	22
Ben Saeed for Plastics	Riyadh	Polyethylene Resins Polystyrene Resins	500 500	5.5	40
Falcon for Industries	Riyadh	Polyethylene Resins PVC Resins	1500 1600	25.8	236
Al-Zamel for Plastics	Damman	Re-Manufactured Plastics Waste Materials	12000	85.65	228
National Factory for Polystyrene Packages	Jeddah	Polystyrene Sheets	150	31	85
Dan for Plastic Products	Riyadh	Re-Manufactured Plastics Materials from Plastic Waste	600	4.2	42

Table 5-5 (Cont'd..)

Factories Which Manufacture Plastics From Plastic Wastes

Factory Name	City	Products	Annual Production Capacity (ton)	Capital (Million SR)	Number of Workers
Al-Wasty for Plastics	Bredah	Plastic Particles	1,900	19.3	54
Al-Amal for Plastics	Jeddah	Raw Plastics from Waste	400	12.9	83
Al-Wataniah Plastics	Riyadh	Re-Manufacturing of Plastic Wastes	1,000	257	349

Section 6

PRIVATIZATION PRIORITY

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PRIVATIZATION PRIORITY

This sector is considered private. Most of the collection. dumping, and disposal operations are handled by private contractors. In addition to that, the full cost is fully paid by the generator of the waste. In many cases factories that use metal wastes as primary raw materials buy their needs directly from the source. The MOIE may provide subsidized land for certain private contractors to operate in one of the industrial cities. Other than that, the MOIE role is limited to supervising the dumping sites and junk-yards except for some dumping sites that MIOIE may own and operate. Thus. further expansion in that sector will depend on the expansion of the economy in general and on the expansion of the industrial sector in particular.