

**Solid Waste Management  
Privatization Procedural Manual**

**INDUSTRIAL WASTE  
COLLECTION AND  
DISPOSAL**



**SOLID WASTE TECHNICAL ASSISTANCE**



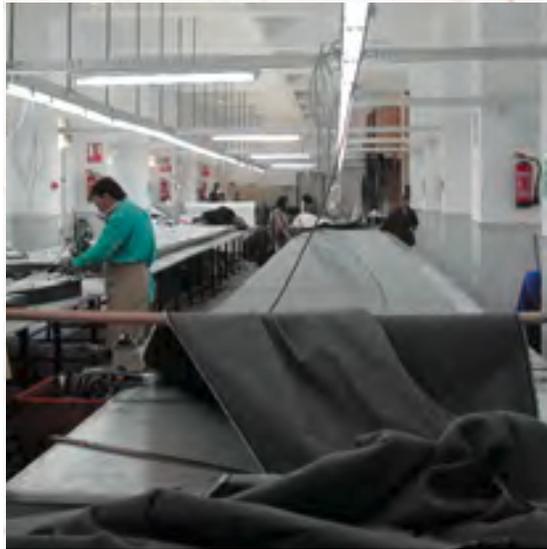
Ministry of State for Environmental Affairs



U.S. Agency for International Development



Egyptian Environmental Policy Program



# SOLID WASTE TECHNICAL ASSISTANCE



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**Egyptian Environmental Policy Program  
Solid Waste Technical Assistance Program  
Solid Waste Management Privatization Procedural Manual**

**CHAPTER 10**  
**INDUSTRIAL**  
**WASTE**  
**COLLECTION**  
**AND DISPOSAL**

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# INTRODUCTION

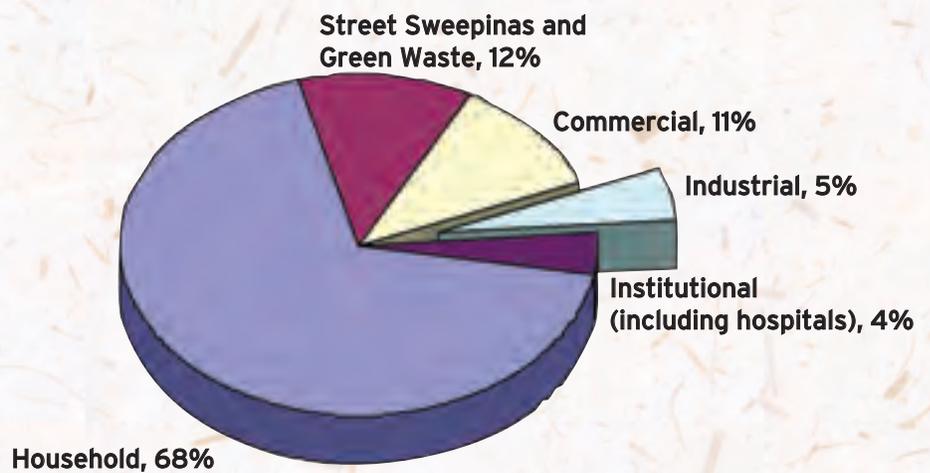
An effective integrated solid waste management program must be capable of managing all types of solid waste. The Egyptian National Environmental Action Plan defines the following five broad categories of solid waste:

1. Municipal waste from urban and rural areas.
2. Hazardous waste from hospitals.
3. Industrial non-hazardous waste.
4. Industrial hazardous waste.
5. Agricultural waste.

Two of the above solid waste categories are derived from Egyptian industrial plants that manufacture all types of goods for domestic use or export to other countries.

Total solid waste generation in Egypt is estimated to be 60 million tons/year. The approximate proportion of the various types of solid waste generated in Egypt is shown in Figure 10.1.

**Figure 10.1: PROPORTIONS OF TYPES OF SOLID WASTE IN EGYPT**



Egyptian industries produce between 3 and 6 million tons per year of waste. Hazardous industrial waste is estimated to be between 150 and 175 thousand tons per year. This broad range demonstrates the general lack of information available on the actual amount of industrial waste generated in Egypt.

Most industrial waste in Egypt comes from important industries such as cement, metallurgical, petrochemicals, textiles, food, and chemical and pharmaceutical industries. Although these and other industries are major contributors to Egypt's economy, they are also a major contributor to the country's solid waste problem. Any contract established for an integrated solid waste management service must attempt to incorporate as much of this industrial solid waste as possible.

Industrial wastes are generated from approximately 24,500 manufacturing facilities located throughout Egypt. Some estimates have indicated that close to 50 percent of all industrial activity is concentrated in the Greater Cairo area and approximately 40 percent in Alexandria. The rest is in the Delta and Upper Egypt, and new cities such as 10<sup>th</sup> of Ramadan. Industrial hazardous waste generation in the Greater Cairo Metropolitan area is estimated to be between 77,000 and 84,000 tons per year.

Many industries in Egypt have little or no pollution control. Old technology production processes result in the inefficient utilization (and depletion) of natural resources and raw materials and are a significant source of pollution in Egypt. Large scale industries are not the only generators of industrial waste. Small-scale industry, small workshops, garages, and very small production units collectively produce large quantities of industrial wastes. Some of the common industrial waste sources in Egypt include:

- Electric power generation.
- Fertilizer and agricultural chemical production.
- Food production and related by-products.
- Chemical production.
- Iron and steel manufacturing.
- Leather and leather product manufacturing.
- Nonferrous metal manufacturing and foundries.
- Plastics and resin manufacturing.
- Pulp and paper manufacturing.
- Rubber and miscellaneous rubber products manufacturing.
- Stone, glass, clay, and concrete products production.
- Textile manufacturing.

Manufacturing processes commonly generate all forms of waste including liquid and solid wastes. Some of these waste products have particularly dangerous properties and can negatively impact human health and the environment. This has created a focus on the effective management of industrial waste in many countries including Egypt.

***Clearly, the requirements for managing liquid industrial waste differ from those required for solid waste. In this chapter, the focus will be on solid waste generated by industry.***

There is considerable diversity in the characteristics and composition of industrial solid waste since it can be generated from many different types of manufacturing. The processes and technologies used in manufacturing are dependent on the nature of the products produced. In many countries, industrial solid waste is classified as either hazardous or non-hazardous depending on the inherent dangers associated with its physical and chemical properties. This is a very important regulatory issue in those countries because of the higher costs usually associated with hazardous waste management. In this chapter, the focus is on the management of non-hazardous industrial solid waste. However, understanding the general characteristics of hazardous solid waste and the manner in which it is identified and classified is important if they are to be successfully excluded from the contracted industrial waste management service.



**Uncontrolled industrial waste dump site.**



**Mechanical processing of industrial waste with lime slurry stabilization.**

The immense diversity of manufacturing processes and products across all industries in Egypt results in an industrial solid waste stream with a huge variety of physical and chemical characteristics. A program aimed at collection, treatment, or disposal of industrial solid waste must be capable of managing the full spectrum of these characteristics. This will require detailed knowledge of the industrial base within the desired service area. In developing a credible and detailed Request for Tender (RFT), a large amount of quality data will need to be gathered to provide prospective contractors with enough information to write their proposals.

Since the industrial waste portion of a comprehensive solid waste management service contract may be limited to only the management of non-hazardous solid waste, it is important to understand the differences between the classifications of industrial solid waste.

### **Environmental Legislation and Initiatives Affecting Industrial Solid Waste**

The government of Egypt has passed more than 400 separate laws and decrees pertaining to the environment. Many of the past environmental laws of Egypt have not led to significant environmental improvement due to the fact that many of them presented a statement of goals rather than the means for controlling environmental issues.

A national environmental protection law was passed in 1982 and a water pollution control law was enacted in 1986. These were aimed at addressing widespread pollution issues in Egypt. Subsequent to these laws, the government of Egypt invested significantly on efforts to reduce pollution. These investments, unfortunately, were not able to keep up with the pace of increasing population and industrialization. This situation led to the need for a new law for the environment (Law 4/1994), which was adopted by the People's Assembly in February 1994 and followed by executive implementing regulations issued in 1995.

Through Law 4/1994, the Egyptian Environmental Affairs Agency (EEAA) was given the responsibility for the protection of the environment. The law defined the EEAA as the overall coordinating authority for environmental protection. It gives the EEAA specific responsibilities in setting environmental standards, ensuring compliance with adopted standards, preparing master plans for environmental management in cooperation with other relevant authorities, establishing and operating a national monitoring network, implementing pilot projects, and creating an environmental information database.

The law specifies legal and economic enforcement instruments including permitting procedures and the establishment of an Environmental Fund. It also requires a constructive cooperation between the EEAA and a number of line ministries and the necessary building of enforcement capacity in the relevant agencies. Through this cooperation and as a result of the directed requirements of Law 4/1994, the Egyptian Ministry of Industry established a listing of hazardous waste characteristics in 1997.

Law 4/1994, as a catalyst for comprehensive environmental impact mitigation, required that six administrative authorities (Ministries of Agriculture, Electricity, Health, Industry, Interior, and Petroleum) develop a list of hazardous materials within their area of jurisdiction. The ministerial decree from the Ministry of Industry forms the basis for Egypt's current industrial waste classification system.

Law 4/1994 requires all public and private companies in Egypt to come into compliance with a number of environmental standards. An initial grace period of 3 years for existing companies expired in February 1998. This period



Wood waste sorting conveyor.

expired without significant results because of a lack of implementing resources and enforcement. According to the law, establishments that are not in compliance with the terms of the law face fines, penalties, and the possibility of being shut down.

A number of programs have been developed that focus on potential pollution from wastes (liquid and solid) derived from industries. Hazardous waste management is being given a high priority in current national waste management planning efforts. This high priority is warranted given the high risks associated with current practices. Some recent and ongoing activities and initiatives include the following:

- **Industrial Inspection Survey.** During 1999, special attention was given to inspection of industries based on their pollution loads. For example, a survey was conducted for the industrial pollution loading of Kutchner drainage canal in Gharbeya and Kafr El Sheikh.
- **Establish Greater Cairo Inspection Plan.** An inspection plan for the Greater Cairo Region was developed in 1999-2000. This plan was developed in collaboration with the EEAA's Fayoum and Greater Cairo Regional Branch Offices and targeted all industrial establishments in the region.
- **Environmentally Friendly Industrial Cities Program.** This program was initiated to create an example for the promotion of environmentally friendly industrial practices and sustainable investments in cleaner technology. The program included the industrial zones of five new cities.
- **Central Inspection Unit.** A central inspection unit has been established within the EEAA, supported by several capacity building projects such as Egyptian Environmental information System, the Egyptian Environmental Policy Program, and the Egyptian Pollution Abatement Project (EPAP).
- **Environmental Laboratory.** An authorization system for environmental laboratories has been developed by EPAP in collaboration with the central laboratory at EEAA.
- **Elimination and Reduction of Ozone Depleting Substances.** Three industrial sectors (foam production, refrigeration, insulation, and solvent users) were targeted for improvements regarding the use of ozone-depleting substances.
- **Establishment of the Industrial Hazardous Waste Database.** A database is being constructed to establish baseline information about the hazardous wastes generated by Egyptian industry.
- **Integrated Management of Industrial Wastes in Alexandria.** The system includes, among its other components, the construction and operation of an industrial waste treatment and landfill facility.
- **Site Selection of the Appropriate Site for a Landfill for Hazardous Waste.** Areas throughout Egypt are being evaluated using Geographic Information System (GIS) and other technologies for development of hazardous waste treatment and disposal facilities.
- **Integrated Environmental Management Systems.** An integrated management system focusing on industrial waste is being devel-

oped in industrial areas in Sharkeya Governorate (10th of Ramadan City) and in Giza Governorate (6th of October).

Each of the above are intended to foster more effective management of all forms of industrial waste. Unfortunately, safe hazardous waste management is not currently fully practiced in Egypt. Industrial waste of all types is commonly mixed with municipal solid waste (MSW). This is due to a lack of sufficient and appropriate facilities such as landfill and treatment sites that are capable of handling hazardous solid wastes. Because of this, hazardous industrial waste has often been disposed in the vicinity of the plants where the waste is generated, or in nearby desert areas, or transported to public dump sites and mixed with municipal waste.

A critical issue that industries in Egypt will eventually need to address is the classification of their solid waste materials as either hazardous or non-hazardous. Because of the significance of this issue in defining the industrial solid waste that the contractor will collect, it is important to understand the basis by which industrial solid waste in Egypt will be characterized and classified.

*Hazardous wastes should be independently managed and segregated from the non-hazardous waste generated at manufacturing plants. This chapter assumes that this will be the case. While the characteristics of typical hazardous industrial solid waste will be described, the focus will be on the private contractor management of the non-hazardous portion of the generated waste stream.*

### **Industrial Waste Characterization and Classification**

Understanding the enormous diversity of characteristics of the solid waste generated by industry is important for the following reasons:

- They define the potential hazards of handling the material.
- They define the design of transportation, treatment, and disposal systems incorporated into a solid waste management program to handle them.
- They define the procedures and precautions that must be used in collection and disposal.
- They determine how the material will be classified under Egyptian environmental regulations.
- They may determine which of the industrial solid waste generated in any particular industry is actually managed in a private sector integrated solid waste management program.



**"White goods" are large household appliances that are often included in industrial waste categories.**

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*The United States classification program has been in place for a number of years and, through effective enforcement, has been quite successful in segregating hazardous from non-hazardous waste. This has led to greater regulatory assurance that hazardous waste is appropriately managed. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal also adopted hazardous waste standards in March 1989. These standards have been the basis by which many countries have passed laws and adopted regulations affecting the proper disposition of industrial solid waste.*

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In many countries, industrial solid waste is classified as either hazardous or non-hazardous. The integrated solid waste management program will more than likely only deal with the non-hazardous industrial solid waste.

All participants should be familiar with the general characteristics of both hazardous and non-hazardous industrial solid waste to prevent inadvertent introduction of hazardous solid waste into the non-hazardous waste management system.

A number of different classification systems have evolved throughout the world aimed at establishing criteria by which waste forms can be classified as either hazardous or non-hazardous. Table 10.1 presents a summary of three such classification systems.

Each of the classification systems shown in Table 10.1 apply to both liquid and solid waste and use the same basic approach. Industrial waste can be classified as hazardous based on its presence on a list of materials with documented dangerous properties. These waste materials are commonly called listed waste. Industrial wastes can also be classified as hazardous if they demonstrate dangerous properties or characteristics. These are commonly called characteristic waste. The types of characteristics that are used to differentiate hazardous waste in different countries vary as illustrated in Table 10.1.



**Stabilized ash used for daily cover.**

**Table 10.1: SUMMARY OF TYPICAL HAZARDOUS WASTE CLASSIFICATION SYSTEMS**

| CLASSIFICATION SYSTEM                                   | DESCRIPTION  |
|---|--|
| <p><b>U.S. System<sup>1</sup></b></p>                   | <p>Solid and liquid hazardous wastes are classified into two overall groups - Listed Waste and Characteristic Waste. Wastes would be classified as hazardous if it meets the criteria for either of the two groups.</p> <ol style="list-style-type: none"> <li>1. <b>Listed Waste</b> - There are four lists: <ul style="list-style-type: none"> <li>• F List - Wastes from non-specific sources.</li> <li>• K List - Wastes from specific industrial processes.</li> <li>• P List - Off-spec or discarded chemicals and container residues, with acute toxicity.</li> <li>• U List - Off-spec or discarded chemicals with toxicity.</li> </ul> </li> <li>2. <b>Characteristic Waste</b> - There are four characteristics: <ul style="list-style-type: none"> <li>• Ignitability - liquid with a flash point of less than 60°C; non-liquid capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes; or is an oxidizer.</li> <li>• Corrosivity - aqueous with a pH of less than or equal to 2 or greater than 12.5; liquid which corrodes steel at a rate greater than 6.35 cm/yr.</li> <li>• Reactivity - normally unstable, reacts violently and also potentially forms explosive mixtures with water including generation of toxic gases; is a cyanide or sulfide-bearing waste; capable of detonation, and is a forbidden explosive.</li> <li>• Toxicity - extract of a sample generated using a Toxicity Characteristic Leaching Procedure (TCLP) standard test contain specific contaminants at a concentration exceeding a specified limit.</li> </ul> </li> </ol> |
| <p><b>Egyptian Ministry of Industry<sup>2</sup></b></p> | <p>There are three elements to the proposed draft classification system:</p> <ol style="list-style-type: none"> <li>1. A general list of different types of wastes designated as hazardous waste from non-specific sources.</li> <li>2. A specific list of 20 industry categories with types of hazardous wastes identified as being generated from specific industrial processes.</li> <li>3. A description of 12 properties that would cause wastes to be hazardous. These characteristic properties are explosive, oxidizing, flammable, irritant, corrosive, harmful, toxic, carcinogenic, teratogenic, mutagenic, infectious, and ecotoxic.</li> </ol> <p>In addition to the above system, there are two lists of hazardous materials, one being those materials that can be handled without a license from the Ministry of Industry, and the other requires a license.</p>   |
| <p><b>Basel Convention<sup>3</sup></b></p>              | <p>Overall, there are two categories of hazardous wastes:</p> <ol style="list-style-type: none"> <li>1. <b>Listed Waste</b> - There are two lists, one based on non-specific sources of hazardous waste (Appendix VIII of the Convention) and the other is from specific industry sources (Appendix IX of the Convention).</li> <li>2. <b>Characteristic Waste</b> - There are 14 properties of wastes that would identify them to be hazardous (explosive, flammable solids, flammable liquids, substances liable to spontaneous combustion, substances which, in contact with water, emit flammable gases, oxidizing, organic peroxides, poisonous (acute), infectious, corrosive, substances liberating toxic gases in contact with water, toxic (delayed or chronic), ecotoxic, and substances yielding material exhibiting characteristics listed.</li> </ol>   |

**NOTES:**

1. U.S. System - Code of Federal Regulations Title 40, Section 261
2. Egyptian Ministry of Industry Draft Hazardous Waste Lists (1997), and List of Hazardous Materials.
3. Basel Convention - Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (March 1989).



**Roll-off container.**

The Egyptian Ministry of Industry hazardous waste classification system defines these two groupings as follows:

**1. Listed Waste:**

- General list of types of wastes designated as hazardous waste from non-specific sources.
- Specific list of 20 industry categories with types of hazardous wastes identified as being generated from specific industrial processes.

**2. Characteristic Waste (based on the following 12 properties):**

- Explosive.
- Oxidizing.
- Flammable.
- Irritant.
- Corrosive.
- Harmful.
- Toxic.
- Carcinogenic.
- Teratogenic.
- Mutagenic.
- Infectious.
- Ecotoxic.

Successful hazardous waste management programs such as those in the United States and the European Union place the responsibility for the proper classification of industrial waste on the generator. The generator's responsibility also includes the control and effective management of the hazardous waste from its point of generation until final disposal. Significant penalties exist for hazardous waste generators who do not assure that their hazardous wastes are managed in the prescribed manner. This approach only works if there is stringent enforcement of the regulations that assure that generators properly classify and manage their hazardous waste.

The proper management of hazardous waste is critical to the industrial waste component of a privatized integrated solid waste management program. For segregation of industrial waste into hazardous and non-hazardous to be practical, industrial waste generators must have alternatives available to them that can handle both kinds. If there are no available treatment or disposal facilities for hazardous solid waste, the segregation process will more than likely fail. As a result, waste that is classified as hazardous under Egyptian law may end up in the normal service area disposal facility, and the contractor operating this facility needs to give special consideration to this possibility.

Personnel health and safety procedures may also be affected because of the inherent dangers associated with hazardous wasteforms. If hazardous waste, as classified through the Ministry of Industry classification system, is not segregated from the non-hazardous industrial solid waste, one of two things will happen:

1. The contractor will design the program (equipment, health and safety procedures, etc.) based on the fact that hazardous waste may be present in the waste stream that they must handle. This will, more than likely, have a major effect on the overall cost of their contracted program.
2. The contractor's program, if designed solely of the non-hazardous fraction of the industrial solid waste in the service area, may lead to inadvertent exposure of their workers and the public to hazardous solid waste mixed in with the non-hazardous waste collected by the contractor.

Either of the two scenarios demonstrates the need for establishing and enforcing a reliable program of hazardous waste classification and segregation. This is one of the important responsibilities that government may not be able to give to the contractor. As a result, it will need to be considered in defining the scope of services and performance standards (as well as penalties) inherent to the RFT.

### Generation of Industrial Waste

Egyptian industry is facing major challenges that have slowed environmental compliance. Older polluting technologies are still being used, especially in public sector industries. The huge investment needed for upgrading these industries while facing severe competition adds to the difficulty in improving environmental performance. The three main obstacles to improving the environmental performance of industry in Egypt include:

1. A lack of cleaner technologies.
2. Insufficient financial resources to modernize production and incorporate effective pollution control.
3. Insufficient awareness of the industrial sector regarding cleaner production and pollution production techniques.

The service area may include industrial waste generators of all sizes and types. A key decision is what level of industrial waste collection service will be provided by the contractor. Depending on the quantity and physical characteristics of the industrial solid waste from small generators, a combined waste stream may be collected as part of the MSW collection program. Small generators whose waste would be collected under the industrial or MSW collection program must be made to conform to the collection requirements inherent to either program.

Developing an effective RFT requires an assessment of industrial solid waste generated in the service area. This should be accompanied with an effort to increase the awareness of service area industries on the ways that they can reduce the quantity of solid waste that they generate.

Figure 10.2 illustrates a simple industrial solid waste management model. As illustrated, many of the steps in the management model are in the control of the industry that generates the waste. These are shown in the shaded area on the schematic. Key processes in the model include the following:

1. **Source Reduction:** Source reduction means any practice that reduces the amount of any substance, pollutant, or contaminant entering the waste stream or otherwise released into the environment, prior to recycling, treatment, or disposal and to reduce the risk to public health and the environment associated with their release. From a solid waste management standpoint, source reduction means that a generator will attempt to decrease the quantity or toxic characteristics of their waste materials through some process change or activity that occurs prior to waste generation.
2. **Recycling:** Recycling requires an examination of waste streams and production processes to identify opportunities of reusing solid waste materials or components. Recycling and beneficially reusing waste can help reduce disposal costs while leading to the reuse of recycled materials. They can be used as substitutes for feedstock that reduce raw material costs to the industry reusing the material.

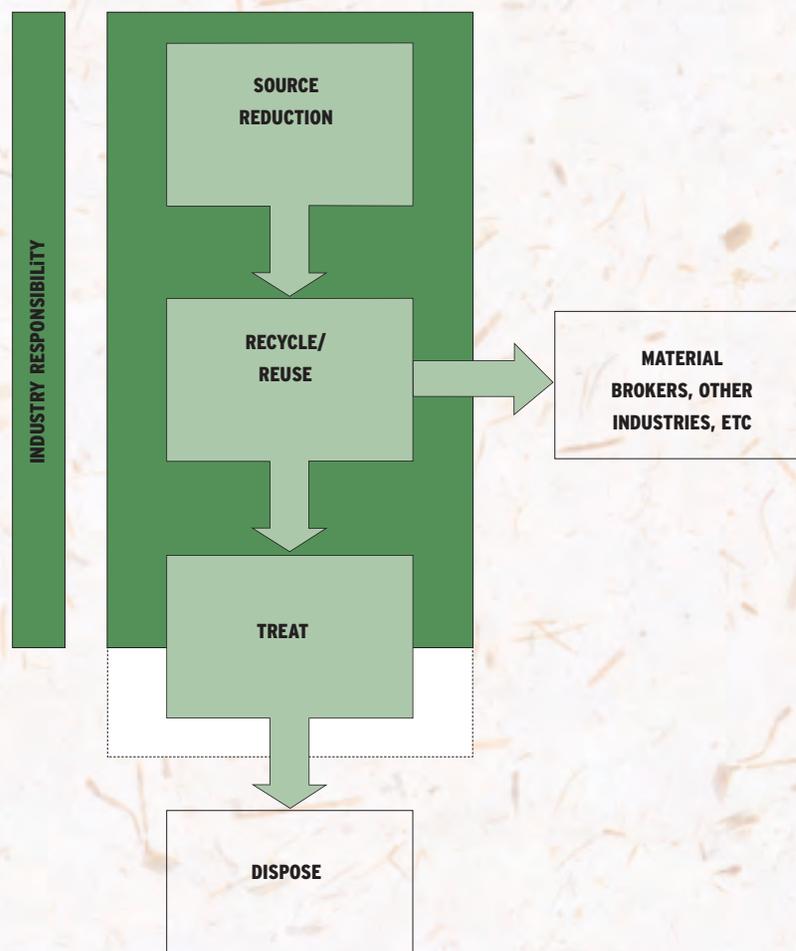


Roll-off collection vehicle.

3. **Waste Exchange Programs:** Waste exchange programs assist in finding uses for a recycled material and in identifying effective substitutes for raw materials. A significant portion of the industrial solid waste stream in Egypt is recycled either by the industry or small-scale private contractors or brokers that provide waste management services to the industry.
4. **Treatment:** Treatment can reduce the volume and toxicity of waste. Reducing waste volume and toxicity prior to final disposal can result in long-term cost savings. There is a considerable number of levels and types of treatment from which to choose. Selecting the right treatment option can help simplify disposal options and limit future liability. Treatment can occur at either the industrial plant or at a contractor-developed facility.

**Figure 10.2: INDUSTRIAL SOLID WASTE MANAGEMENT MODEL**

*The higher the cost of disposal, the greater the incentive for an industry to reduce the amount of waste that they send to disposal facilities.*



If the costs of disposal increase according to the level of toxicity of their waste, industrial waste generators have an increased incentive to treat the waste to reduce its toxic effects and, thereby, save money. This has been clearly demonstrated in a number of industrialized countries including the United States, where the high cost of disposal for hazardous wastes has led to major efforts on the part of generators to reduce the quantity of waste generated.

## Industrial Waste Recycle and Reuse

In many countries, industrial solid waste generators are often leaders in establishing source reduction, recycling, and reuse programs. The common principles behind this include the following:

1. Reducing the quantity of solid waste generated through source reduction often improves the efficiency and profitability of an industrial plant.
2. One industry's waste material may be feedstock for another industry. The ability to sell or "give away" industrial solid waste can also aid in the profitability of either industry.
3. In regions where industrial solid waste disposal costs are high, the ability to recycle or reuse derived waste products can significantly decrease costs.

An industrial waste component of an integrated solid waste management program should seek to accomplish two critical goals where recycle and reuse are concerned. First, it must not displace existing relationships between industrial waste generators and those that collect or reuse their solid waste unless there are strong environmental or health reasons for doing so. Secondly, the program should seek to educate industrial solid waste generators as to what reuse and recycle opportunities may exist within the service area. This educational component on reuse and recycling as well as pollution prevention for industrial waste generators is an integral part of the solid waste management program.

## Pollution Prevention

Pollution prevention will help to reduce the waste disposal needs of industries in the service area and potentially minimize environmental impacts by reducing the volume and toxicity of waste streams.

Pollution prevention describes a variety of practices that go beyond traditional environmental compliance. In countries where industrial waste disposal costs are high, industry usually takes the lead and works hard to reduce the amount of solid waste that it discharges. This is driven by an economic incentive to save money on transportation, treatment, and disposal costs.

Government agencies have carried out programs aimed at educating industries on how they can reduce the quantity or toxicity of their waste materials.



Industrial waste disposal.

Such a program should be an ongoing part of the government's solid waste management programs as well as a part of the awareness program included in the contractor's industrial solid waste service once the contract is implemented.

Proper waste characterization by industries into hazardous and non-hazardous is an important component of pollution reduction. Waste products should be analyzed to determine reuse or recycling possibilities, such as being appropriate feedstock for another industry.

There are a number of benefits associated with pollution prevention including the following:

1. Protecting human health and the environment by reducing the quantity and toxicity of industrial solid waste.
2. Cost savings especially in areas where disposal costs are high.
3. Simpler design and operating conditions that reduce the quantity or toxicity of a waste. These can help to decrease the level of effort required to manage the material.
4. Improved worker safety through the generation of less toxic or less physically dangerous materials. This can improve worker safety by reducing work-related injuries and illnesses. It can also help strengthen morale with subsequent increases in production efficiency and performance.
5. Lower liability as environmental and solid waste management regulations evolve in Egypt.
6. Higher product quality. Experience has shown in many industrialized countries that companies have often discovered means of deriving a higher product quality from some pollution prevention efforts. For example, part of the industrial solid waste stream can include materials that do not pass quality control inspections and must therefore be disposed. Reducing the amount of this type of industrial waste can have the effect of improving the overall quality of the production process.
7. Building community relations. Public knowledge that an industry is implementing a pollution prevention program can strengthen the credibility between industries, communities, and regulatory agencies.

A number of programs are being implemented in Egypt to foster pollution prevention in industry including the following:

1. The government of Egypt has worked to promote cleaner industrial production. For example, the EEAA administers the National Industrial Pollution Prevention Program (NIPPP) to promote low cost pollution prevention measures and cleaner production technologies that will yield environmental and economic benefits for industry. This program has attempted to demonstrate replicable projects in the various industrial sectors.
2. A national program for an Environmental Management System (EMS) was established to promote ISO 14000 certification in industry.

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***Experience has shown that many industries have realized savings by closely analyzing and reducing the amount of solid waste that they produce through increases in efficiency that have other impacts.***

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3. Egypt is currently preparing a National Program for the Promotion of Environmentally Sound Technologies (EST). To facilitate the transfer of EST to small- and medium-sized businesses, the government has developed a program to strengthen the industrial capability to manage its environmental responsibilities. Through this program, the EEAA will prepare mitigation plans for each category of generators of small quantities of waste such as photo-processing laboratories, dry-cleaning plants, gasoline stations, etc.
4. The EEAA will also prepare specific action plans for medium-quantity generators in such areas as metal foundries, lead smelters, tanneries, and the electroplating industry.

### Source Reduction

Source reduction usually involves equipment or technology modifications, process or procedure modifications, reformulation or redesigned products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control. In making improvements to manufacturing technologies, industry has often looked toward technologies that reduce the quantity of waste generated. Process changes can also be considered. An example of this approach is the reuse of materials such as cutting scraps as inputs into the same process from which they were produced or for other purposes within the industrial facility. This accomplishes the pollution prevention goal of reducing the amount of waste generated for disposal.

Good housekeeping procedures can help decrease the overall amount of industrial waste generated. Good housekeeping techniques can also reduce the likelihood of accidents and spills, and can improve general working conditions thereby leading to greater morale and productivity.

### Waste Exchange Programs

A waste exchange is a program that promotes the use of waste items from one company as a raw material for another company. The waste exchange lists materials which are available for use and assists industries in seeking materials that they want. Examples of materials that are exchanged include acids, alkalis, solvents, inorganic and organic chemicals, plastic and rubber, wood and paper, metals, textiles, and leather. Many local governments in other countries have established material waste exchange programs to facilitate transactions between waste generators and industries that can use wastes as raw materials. These programs can be applied to all forms of waste including both liquid and solid waste. Material exchanges are an effective and inexpensive way to find new uses for a waste. In countries where such programs have been used they are usually publicly funded or organized by non-profit organizations. In some cases, a nominal fee is charged for listing a waste product or getting access to a database of products that are available. Some of the existing waste exchanges across the world sponsor workshops and conferences to discuss waste related issues and to exchange information about opportunities that exist within their area of jurisdiction.

### Recycling

Recycling involves collecting, processing, and reusing materials that would otherwise be handled as waste. You can help to improve opportunities for recycling industrial solid waste by sponsoring activities such as waste exchange programs.

### Beneficial Use

Beneficial use involves substituting a waste material for another material with similar properties. For example, utility companies often use coal combustion ash as a construction material, road base, or soil stabilizer. This not only avoids disposal costs but in some cases can also generate revenue. Another example



**Tanning waste landfill.**

of using a solid waste product for beneficial use is the use of industrial sludge as a soil amendment or the use of foundry sand in asphalt, concrete, and road construction.

### **Treatment**

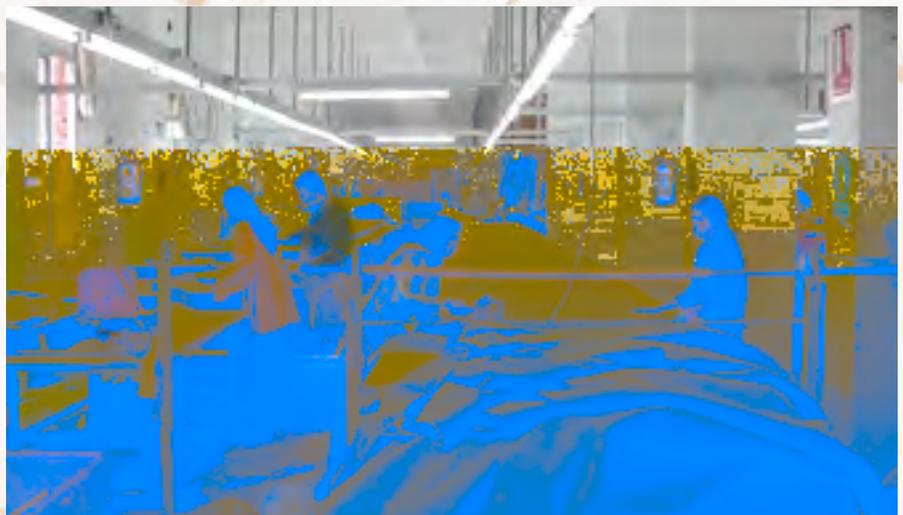
The treatment of non-hazardous industrial waste is not often a regulatory requirement. However, it can help to reduce the amount and toxicity of waste prior to disposal. The common incentive for doing this is dependent on the actual cost of disposal. Another incentive for treatment may be to make the waste amenable for reuse, exchange, or recycling thereby increasing its value or decreasing the cost of its disposal. Treatment involves changing a waste's physical, chemical, or biological characteristics or composition. The three primary categories of treatment include physical, chemical, and biological processes. Physical treatment involves changing the wastes physical properties such as its size, shape, density, or state (i.e., gas, liquid, and solid). Physical treatment does not change the chemical composition of a waste. Some of the common physical treatment methods that can be applied to industrial solid wastes include grinding, shredding, or compacting. The advantages of any treatment process must be measured by comparing the cost of treatment against the benefits derived from it.

### **Industrial Waste Storage**

One of the key objectives of gathering information about each generator in your service area is the need to define the industrial waste collection point. This is the location at each industry where the contractor will pick up and take possession of the industrial waste. Depending on the industrial facility, the point of collection may be different than the storage location the industry currently uses for its waste materials.

The primary means of collecting industrial waste from generators will be through the use of bins that will be distributed to industrial waste generators by the contractor. The number, size, and design of the bins distributed to individual industries will depend on the physical characteristics (quantity, physical state, etc) of the industrial waste to be collected. Generally, these bins will be used in the following manner:

1. Bins will be distributed to the industrial waste generators by the contractor.
2. The generator will fill the bins as the solid waste is generated at the industry.



**Textile industry.**

3. The contractor will remove the filled bins from the industry and replace it with an empty one on a regular schedule or as needed.
4. The frequency of the contractor's bin service will depend on the size of the bins and the amount of waste generated by the industry.
5. Some roll-off type bins will be used for direct haul to the disposal area. Depending on the nature of the waste stream at some industries, bins may also be used that can be emptied at the collection point into larger capacity truck cargo areas for transport.

### **Industrial Waste Collection and Transportation**

The contractor in most cases will be responsible for collection and transport of acceptable industrial waste within the service area to the disposal site. Each industry will have its own unique point or points of collection. These will serve as the interface between the industry's internal waste management program and the contractor's service. The points of collection will generally be locations on the industry property where contractor-supplied bins will be placed. Industry personnel responsible for waste management will place waste into these bins prior to collection by the contractor. Important criteria for establishing effective collection points at each industry include the following:

1. Collection points will need to be accessible for the contractor's collection equipment. Accessibility will need to include the ability of a collection vehicle to be maneuvered sufficiently to pick up filled bins and transport them to the treatment or disposal location. Depending on the amount and type of waste collection, bins may simply be emptied into a truck cargo area at the collection location. Once empty, bins are returned to their original position.
2. Collection points should be sheltered so as to prevent industrial waste from being scattered during high winds.
3. Collection points should be actively managed and isolated from scavengers. They should not be located on public streets where anyone can access them.
4. Sufficient space should be available at the collection point to place an empty bin prior to the pick-up of a full one in the case where roll-off containers are used.

The bins that the contractor provides to each industry will be an important element in the success of collection and transport activities. The minimum technical requirements and standards contained in the RFT technical specifications should define the minimum acceptable criteria for these containers. Example specifications are shown in Appendix A to this chapter. The decision of what type of containers the contractor will procure and use depends on a number of factors including:

1. The operating environment where the containers will be placed.
2. The physical constraints of the locations where the operation will occur.
3. The types and quantity of materials to be hauled.

Depending on the types of containers placed at each industry, the contractor may actually have two different collection route configurations to service industries in the service area. If small bins that are emptied directly into a truck at the collection point are used, a more formal collection route may be established. In this scenario, a collection vehicle may travel from collection point to collection point collecting waste until the vehicle is filled. At that point, the truck will travel to the treatment or disposal location to dis-

charge its payload and return to the collection route. To service industries that generate large quantities of industrial waste, roll-off collection bins may be used. The collection process in these instances consists of bringing an empty container to the point of collection, off loading it, and loading a filled container onto the truck for transport to the disposal location.

There are two primary lifting configurations available for transporting large roll-off bins: the tilt frame and the hook-lift configurations. The majority of roll-off operations use the tilt frame consisting of two fixed rails that are elevated by a hydraulic ram. A cable winch attaches to a hook on the container, which is pulled onto the inclined rails. The cable pulls the container up the rails until it reaches the balance point on the rails. The rails are lowered, and the cable pulls the container along the lowered rails until it is fully seated on the truck. In a hook-lift configuration, a fixed boom pivots on an axis located at the rear of the truck chassis. The boom extends out to the rear of the truck through a low-angle hydraulic cylinder. The boom hooks onto the container and pulls it onto the bed of the truck.

Trucks used for bin transport can be equipped with a number of features such as automated tarp covers. Automated tarp covers allow more efficient covering of loads to be transported as well as allowing the tarping process to be done safely.

*With proper maintenance, a roll-off container can last for 15 to 20 years, although the industry standard is 5 to 10 years. Moisture and abuse are the two things that can quickly destroy a container. Through the RFT technical specifications, you should specify the minimum technical requirements for containers and the procedures that the contractor will follow to use and maintain them.*

## Containers

Roll-off containers are available in two basic styles including tub or box configurations. They can range in sizes from 10 to 50 cubic meters ( $m^3$ ). The tub-style container came into the marketplace some years after the rectangular box configuration. As its name implies, the sides of the container are vertical with a bottom half that has an octagonal configuration. This container configuration does not have any 90-degree areas at the floor and wall area, so it dumps cleaner, preventing the buildup of waste in the corners and making it easier to clean. One other advantage of this configuration is that the containers are nestable, meaning multiple containers can be transported together at one time.

In general, the use of the container will also dictate the volume of the container. In most cases, smaller roll-off containers are used for more dense materials such as construction and demolition materials. The most common general service containers are in the 30 to 40  $m^3$  capacity range and are used for lighter materials. The size of the container for any particular industry will be a function of the amount of industrial solid waste collected; the density of the material that establishes the weight of material transported per unit of volume; the total weight that can be transported at any one time may be a function of road limits and; the physical configuration of the collection point that may limit the size of the container that can be used.

## Industrial Waste Disposal

Any industrial waste that remains after application of all reuse and recycle opportunities will need to be disposed of in an environmentally sound manner. The contractor may also be responsible for the operation of the disposal area as would be the case in an integrated solid waste management contract. If this is the case, close coordination will be required between the contractor's industrial waste collection personnel and landfill operations staff. Key coordination considerations include the following:

1. Some forms of industrial waste will require special procedures for placement at the disposal area to prevent environmental or health related impacts. This may include industrial waste forms

with high liquid content, dry waste forms that may cause excessive airborne dust, etc.

2. Some forms of industrial solid waste may be used for beneficial purposes at disposal sites such as daily cover use to isolate other waste forms. Foundry waste may be a good example of waste that can be used for this purpose.
3. The success of implementing hazardous and non-hazardous solid waste segregation at each industry will determine if additional precautions should be taken at the disposal location in receiving industrial waste.
4. Certain industrial waste forms that may cause odor or attract vectors (rodents, insects, birds, etc.) should be covered as soon as possible after receipt at the disposal area.



**Industrial process waste.**

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***The following steps are necessary to develop the industrial waste component of a contracted solid waste service:***

***Step 1. Define Current Industrial Waste Management Practices.***

***Step 2. Identify and Assess Industrial Waste Management Improvement Options.***

***Step 3. Compile Findings in an Assessment Report.***

***Step 4. Evaluate Industrial Waste Program Scenarios.***

***Step 5. Select Preferred Industrial Waste Program.***

***Step 6. Implement the Selected Program.***

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# STEP 1: DEFINE CURRENT INDUSTRIAL WASTE MANAGEMENT PRACTICES

**B**eing able to define existing industrial waste management conditions and practices within the service area will form the basis for much of the information necessary to make informed decisions as to the type and level of service desired. It will also be the basis for providing information to prospective contractors so that they can submit detailed proposals in response to the RFT. Typical technical document contents for the industrial solid waste management component of an effective RFT is presented in Appendix A.

## Review the Legal, Policy, and Regulatory Framework for Industrial Waste Management

Industrial solid waste, like any other form of solid waste, must be managed within the context of the laws and regulations that exist at the national, governorate, or local level. One of your initial planning activities will be to review the current requirements of laws and regulations governing industrial waste management. This review will be important in defining planning activities as well as in defining the regulatory process that the contractor will have to follow in putting all elements of their program into place. When preparing the RFT, the level of enforcement in regards to segregation of hazardous solid waste by industries should be considered.

The basic foundation for the laws and regulations that affect solid waste management in general in Egypt is Law 4/1994 and its Executive Regulations. Law 4/1994 establishes the legal framework for the development of an effective means for safely managing waste materials with hazardous properties including the various forms of industrial waste. As a result of Law 4/1994, the Ministry of Industry developed criteria by which industrial waste in Egypt can be classified as either hazardous or non-hazardous. A summary of the legal basis governing industrial waste management in Egypt is presented in Appendix B.

Another important element of the review of existing laws and regulations pertaining to industrial waste management is the basis by which industries will be compelled to participate in the contracted service and to properly segregate their waste. If industry has a definite economic incentive (lower costs, etc.) to participate, they, more than likely, will. However, if the cost or convenience advantage is not well defined, a regulatory means for assuring their participation may be necessary. This will be a crucial issue in the contractor's program if only non-hazardous solid waste is to be managed by the contractor's program.



Small industrial waste.

## **Define the Industrial Waste Management Service Area**

In some governorates or urban areas, a service area will consist of an entire governorate while in others it may consist of various districts with common characteristics. Some urban areas may have designated industrial areas where industrial plants are concentrated. This will help to define appropriate service areas and may provide the concise locations where industrial waste inventories will need to be carried out.

Service areas may be consistent with those already established for residential collection services or other elements of an integrated solid waste management program. The RFT will need to define the service area in which the contractor will provide its services. This will be very important since the RFT should require contractors to provide detailed information on how industrial solid waste will be collected throughout the service area. Any information that may be available on the future expansion of industrial areas should be provided to the contractor in the technical specifications to assist the contractor in planning their activities

*The RFT should place the responsibility for knowing and meeting all of the regulatory requirements on the contractor, but the governorate should supply enough information in the RFT for prospective contractors to understand the level of work that they will have to undertake to secure all permission for their work. Mention of legislation in the works that could influence the contract during the procurement process or during its operational term should also be made.*

## **Determine and Categorize Industrial Waste Stream Composition**

The service area will most likely include different types of industrial facilities. Since each of these is apt to be a collection point for industrial waste, you should develop a detailed inventory of industrial waste generators to gather core data by which the active elements of the industrial solid waste management program will be designed and implemented. For example, the location of various industries within the service area will determine the design and routing of the vehicles involved in the industrial waste collection program. If possible, the RFT technical specifications should include a map of the service area that shows the location of the industries that will be serviced. This inventory will help in determining the desired level of service for small industrial waste generators.

To conduct a proper inventory, complete the following tasks:

1. Assign the responsibility for developing the inventory data form to one individual or department.
2. Develop an initial listing of industries and industrial categories within the defined service area. The Ministry of Industry and Technological Development - General Organization for Industrialization (GOFI) database may be used as an initial screening and listing tool.
3. Distribute the inventory data form to prospective industries with requested responses by a specified date.
4. Receive completed inventory data forms.
5. Follow up on delinquent submittal.
6. Develop the initial industrial facility database.
7. Follow up on specific questions or to verify the accuracy of the information submitted and gather more information if required.
8. Use the inventory information to define the level of service that will be provided in providing service to small industrial solid waste generators.
9. Finalize the industry database for inclusion in the RFT.

## **Determine Potential Hazardous Solid Waste Sources in Service Area**

Based on the results of the service area inventory, perform an analysis of the type and quantity of industrial solid waste that will be generated and which must be managed by the contractor. Collect data concerning the type and quantity of industrial solid waste through the inventory process outlined above. The contractor will use this data in preparing their tender and to do

preliminary design of industrial waste individual collection routes as well as key program elements.

Follow-up work with the various industries may be warranted in exploring their generation and disposition of solid waste that would be classified as hazardous in accordance with Ministry of Industry and EEAA criteria. While the hazardous waste will most likely not be the responsibility of the contractor, information on its existence should be provided. This will be important in allowing the contractor to develop their procedures specific to each industry within the service area.

The existence and management of hazardous waste in the service area will be one of the important elements of coordination between the governorate industrial waste management planners and the contractor during the development and administration of the contract. Effective segregation of hazardous solid waste by industry may require better enforcement of rules and regulations applicable to that material.

*A particular emphasis should be placed on identifying markets for the various industrial wastes generated in the service area. This will be important in enhancing the process of reducing the amount of industrial solid waste that will enter the contractor's system.*

### **Define Current Management Practices in the Service Area**

Based on the inventory, you should also complete an evaluation of current industrial waste management practices in the service area. This will be important in determining the degree of improvement that can be accomplished through the contractor's program. Knowledge of existing practices will be important in designing the public education and awareness elements of the program. It will help in explaining what improvements will occur as a result of the contracted service.

Important questions that will help define current practices include:

1. Do the industries segregate their various industrial waste forms? If so, how?
2. Does the industry segregate its solid waste into hazardous and non-hazardous streams in accordance with the Ministry of Industry classification format?
3. Do various industries treat their waste at their sites? If so, how?
4. Is a portion or all of the industrial waste generated recycled or reused? If so, how and to whom is the material sold or given?
5. How is industrial waste transported from the industries in the service area to recycle/reuse and disposal locations?
6. How do the industries dispose of their various types of waste materials?

### **Identify Current Private Sector Participants in Service Area**

Within the service area, there may already be a number of private sector entities that perform some function in industrial solid waste management. These participants need to be identified and their services defined to determine whether the new contracted industrial waste management service will displace them, and what kind of competition they may pose to the contractor.



## STEP 2:

# IDENTIFY AND ASSESS INDUSTRIAL WASTE MANAGEMENT IMPROVEMENT OPTIONS

**A**fter developing an understanding of the current industrial solid waste management situation in the service area through Step 1, it is now possible to define the opportunities for service improvement. Answering the following questions will facilitate this process:

1. How can public exposure to the dangerous properties of some forms of industrial waste be decreased?
2. Are there benefits to be derived from involving a private contractor in the management of industrial waste in the service area?
3. How can a collection and disposal service be provided to industries that will be convenient and cost effective?
4. Can small industrial waste generators be included in a contracted service and, if so, how can this be accomplished?
5. What level of contractor performance will be required as a result of evolving laws and regulations governing the management of industrial waste?
6. What is the best manner to get industry to segregate their waste stream into its non-hazardous and hazardous segments as defined by Ministry of Industry criteria?
7. How can existing recycling or exchange programs be enhanced to further reduce the amount of industrial solid waste that the contractor must manage?

An improved industrial waste management system should be developed to:

- Prevent and minimize waste production.
- Reuse and recycle the industrial waste to the extent possible.
- Treat waste, if necessary, by safe and environmentally sound methods.
- Dispose of non-hazardous industrial solid waste by landfill in confined or carefully designed sites.

*The level of service improvements that can be achieved through privatizing industrial waste management services will also serve as the justification for issuing the RFT and undertaking the work required to develop the contracted service.*

The first two principles apply particularly to industrial waste generators who have a major role in defining the type and amount of industry waste they generate and that the contractor will have to collect. Because of their importance to the overall success of the industrial waste management program, it is important that industries understand what they can do to help. This should be an important part of the awareness program. The industry awareness and training program must emphasize the proper segregation of their waste to assure that only acceptable non-hazardous industrial waste is collected by the contractor.

The manner in which industrial solid waste will be collected, transported, and disposed will be the responsibility of the contractor. The RFT should provide sufficient detail to define how the contractor is expected to accomplish these activities. This detail should include specifications on the equipment and procedures to be used and the performance standards to be met. The content of the stipulated service specification should be based on the level of desired service that will be paid for. Examples of service specifications are shown in Appendix A.

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*Consider establishing a formal Waste Exchange Program for industries within the service area. Numerous examples exist in other countries for such programs. These can serve as a model for developing an effective program. Information gathered during the industrial waste inventory may serve as the foundation of this program.*

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## **STEP 3: COMPILE FINDINGS IN AN ASSESSMENT REPORT**

**A** detailed assessment report of findings from the first two steps should be prepared. Include a definition and evaluation of the service area regarding industrial solid waste management. Sufficient detail should be provided in the report so that decisions can be made as to the best ways to improve industrial waste management in the service area. The assessment report should, at a minimum, include the following sections:

1. Summary of the existing industrial solid waste sources in the service area including both hazardous and non-hazardous waste sources as defined by the Ministry of Industry's criteria.
2. Summary of current industrial waste management practices.
3. Explanation of problems and gaps in the current service.
4. Identified opportunities for improved services.
5. Preliminary recommendations of potentially viable industrial waste management scenarios that appear worthy of consideration by governorate planners.

Each scenario is comprised of the various elements identified in previous steps including:

- Waste reduction, pollution reduction, and industrial recycling options.
- Waste storage options.
- Waste collection and transportation options.
- Disposal options.

The highlights of the report should be presented to the mass media for public review as well as to industries and government officials for feedback.



**Dumping industrial waste at the landfill.**

## **STEP 4:**

# **EVALUATE INDUSTRIAL WASTE PROGRAM SCENARIOS**

**S**tep 4 involves evaluating the individual scenarios identified as potentially viable in the previous step for industrial waste management service improvements.

Each scenario should be evaluated by subjecting it to the following criteria:

- Cost effectiveness and affordability.
- Health and safety.
- Environmental compatibility.
- Diversion effectiveness.
- Industry and public acceptance and participation.
- Efficiency.

### **Develop Preliminary Cost Estimates**

In many cases, an improved level of service or greater compliance to environmental performance limits will result in an increase in the direct cost of solid waste management programs. Unfortunately, the indirect cost of health effects and environmental damage due to poor practices are not always factored into an evaluation of cost. An economic model showing the way industrial waste management services are paid for under the existing system will help clarify how they will be handled under the new system.

If individual industries will be charged for industrial waste management services based on what they generate, current costs need to be understood to see how they compare to the cost of an improved service.

This economic model should include an assessment of current recycling opportunities in the service area. The revenues that can be realized from the recycling of industrial waste may help to create more involvement by industries that do not currently recycle their waste materials.

Once scenarios have been compiled, full cost accounting techniques described in Chapter 3 should be applied to each to facilitate the evaluation process.

### **Summarize Results**

The estimated cost and the compatibility of each scenario with the criteria should be summarized in a table to make comparison easier. A brief narrative report should accompany this table and the entire summary should be distributed to stakeholders and governorate decision-makers to serve as the basis for a final decision.



## **STEP 5:**

# **SELECT PREFERRED INDUSTRIAL WASTE PROGRAM**

**T**he preferred option or development scenario for industrial waste management in the service area will be a function of the characteristics of the service area and its industrial facilities. The selection of the preferred approach may be specific to the manner that industrial waste is collected, transported, or disposed of. A range of suitable options may also be acceptable. Presenting a range of options in the RFT will allow the contractor some flexibility in achieving the service specifications and performance standards. Whatever approach is selected to achieve the desired results, it should be clearly defined in detail in the RFT. This will prevent the contractor from basing their proposal on technical options that are deemed unacceptable or less desirable by the planners and decision-makers.

The final decision-making process consists of the following tasks:

- Calculate rates/tariffs and evaluate cost recovery methods.
- Solicit final round of stakeholder input.
- Governorate officials select the preferred program that is most compatible with reaching the desired service levels in each category.

### **Calculate Rates/Tariffs and Evaluate Cost Recovery Methods**

The governorate needs to know if and how it will be able to pay for the improved industrial waste management program. The planning team should use the full cost accounting methods described in Chapter 3 to evaluate the cost-related issues that apply to each of the scenarios under consideration. The results will include proposed fee schedules and the pros and cons associated with each of the cost recovery methods of each scenario.

### **Solicit Final Stakeholder Input**

It is essential that ample time be allocated for the stakeholders and end-users of the program to be able to review the proposed industrial waste management plan and provide feedback. Governorate officials may find it useful to hold general meetings with industry managers.

### **Governorate Officials Select Preferred Industrial Waste Management Program**

Internal deliberation on the input received from stakeholders and the planning team can now occur among the decision makers. A system with the highest probability of achieving the desired service levels can be selected. In the event that officials choose to change one or more elements of the proposed system, the scenario should be rewritten and subjected to the process described in Step 4 before finalization.



**Large industrial waste.**

## **STEP 6:**

# **IMPLEMENT THE SELECTED PROGRAM**

**T**he selected program can now be implemented. If the governorate has decided to contract with the private sector to provide industrial waste management services, then the following tasks are necessary:

- Establish program funding mechanism.
- Procure a contractor.
- Develop and implement a means of contract administration and monitoring.
- Develop and implement a public awareness and communications program.

### **Establish Program Funding Mechanism**

Before any new service is implemented, the governorate must know how the services will be paid for and how the money will be collected. Chapter 3 provides further information on an approach to funding solid waste management services.

### **Procure a Contractor**

The competitive procurement or bidding process requires the preparation of two major documents by the contracting agency:

- A Request for Qualifications (RFQ).
- A Request for Tender (RFT).

Both of these documents are prepared by a technical or tender committee.

The RFQ is used to pre-qualify contractors who then will be allowed to submit bids or tenders in response to the RFT. Generally, it provides the contractor with an overview of the project and outlines the disciplines and level of expertise needed to perform the services. The RFQ provides guidance on how the contractors should respond and how their responses will be evaluated.

The RFT is the document the pre-qualified bidders use to prepare their tenders. The RFT provides great detail about the required services and typically becomes a part of the contract between the governorate and the selected contractor. It is extremely important to prepare this document carefully to ensure that the long-term contract relationship is properly formulated and that the responsibilities and risks are appropriately assigned.

An RFT generally consists of the following:

- An invitation for bidders.
- A draft contract.
- General contract conditions.
- Appendices to the general contract conditions, containing the technical specifications.
- Bidder's price form schedules.
- Tender offer form letter.
- Other documents as appropriate.

Comprehensive instructions on how to prepare an RFT and how to execute a contract with the successful bidder are provided in Chapter 5. Specific instructions on preparing the technical specifications for the appendices of an RFT for industrial waste management services are discussed in Appendix A to this chapter.

### **Define and Implement Means of Contract Administration and Monitoring**

An effective contract monitoring program must be established to maintain the performance standards that will be stipulated in the contract. Chapter 6

defines how to establish a Contract Monitoring Unit (CMU). Contract monitoring is extremely important for the ongoing effectiveness of the program. The CMU will provide the basis for maintaining industrial waste management services at the level specified in the contract. The CMU also explains how service issues can be addressed and rectified to maintain the contracted level of service.

CMU staff should receive detailed training on a number of issues because of the specialized aspects of industrial waste management. This training should, at a minimum include:

1. Understanding of the characteristics of various kinds of industrial waste.
2. Contract terms and specifications as they pertain to the contractor's performance.
3. Procedures to take in the event of failure of the contractor or industrial facilities to follow program rules.
4. Monitoring reporting.
5. Health and safety.

### **Develop Public Awareness and Communications Program**

A public awareness and education program should be developed once the desired industrial waste management program has been defined. The awareness program should provide information to industry on the ways that they can influence the effectiveness of the solid waste management program. Some of the elements of an awareness program may include the following educational elements:



**Small closed bin.**

1. **Waste Audits:** Industry should be presented information concerning the procedures and benefits associated with performance of a detailed waste audit. The intent of an industrial solid waste audit is to:
  - Define sources, quantities, and types of wastes generated.
  - Identify where, when, how, and why these wastes are produced.
  - Identify areas of wastage and waste problems.
  - Establish targets and priorities for waste reduction.

The initial waste audit may be the inventory process that you use to quantify the industrial solid waste stream in the service area. Industry should be urged through the awareness program to keep their waste audit current. The waste audit can be used to:

- Ensure better external regulatory compliance.
  - Develop baseline data concerning the industry's environmental performance.
  - Evaluate alternatives to minimize wastage of resources.
2. **Cleaner Production:** Your awareness program should also focus on Cleaner Production principles. The term "Cleaner Production" was coined by the United Nations Environment Program (UNEP) when it launched the Cleaner Production Program in 1989. Cleaner Production is the continuous application of an integrated preventive environmental strategy applied to processes, products, and services to increase overall efficiency and reduce risks to humans and the environment. Strategic approaches for such a program include:

- **For production processes:** Conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes.
- **For products:** Reducing negative impacts along the life cycle of a product, from raw materials extraction to its ultimate disposal.
- **For services:** Incorporating environmental concerns into designing and delivering services.

Cleaner Production requires changing attitudes, responsible environmental management, and evaluating technology options. The benefits of Cleaner Production programs include:

- **Economic benefits:** including increased profits; improved marketability; lower expenditure on materials, resources, waste disposal and transport; additional sources of income; increased quality, and greater productivity; better customer service; and increased goodwill from being seen as a responsible member of the community.
- **Environmental benefits:** including less pollution; reduced production of waste; more efficient use of resources; less waste going to landfill; and less effluent to sewage or discharges to water bodies.

A public awareness and communications campaign is critical to the successful implementation of any policy decision. Chapter 7 contains more in-depth information on setting up a Public Awareness and Communications Team (PACT) and implementing a public awareness campaign.





# APPENDIX A: INSTRUCTIONS AND EXAMPLES FOR TECHNICAL SPECIFICATIONS

Technical specifications are part of the appendices to the contract general conditions of the RFT. They should provide a comprehensive description of the services desired and define the specific requirements related to the provision of those services. The technical specifications should provide the following information, typically organized as follows:

- Definitions.
- General Description of Services.
- Service Specifications.
- Minimum Technical Requirements.
- Performance Standards.
- Performance Monitoring.
- Measurement and Payment.
- Penalties.

Detailed instructions on how to prepare all of these sections in general is provided in Chapter 5. Information specific to an industrial waste management program is included in this appendix.

## General Description of Services

### Scope of Services

The scope of services should begin the process of defining for the contractor the services that they will need to provide if they are successful in getting the contract. The scope of services should state that the contractor will furnish all labor, supervision, materials and supplies, permits, licenses, insurance, and equipment necessary for the collection of all industrial wastes generated from industrial waste generators located in your service area. All collected industrial waste should be transported to the designated disposal facility. The contractor may divert industrial waste to beneficial use subject to your review and approval on a case-by-case basis. The contractor should perform these services in conformance with the specifications and requirements contained in the RFT.

### Information on Industries in Your Service Area

To submit a responsive proposal, the contractor needs information concerning the sources of industrial waste in the service area. This information should include the distribution of public and private industries for the various industrial sectors. This may include a reference to potential sources of industrial information including the GOFI database that can provide specific information regarding industrial establishments (name and location) in the service area.

### Preparation Period

The contractor should be presented with a stipulated preparation time period to implement services. For example, a stipulated 9-month preparation period following the contract signing date may be specified to provide the contractor with sufficient time to complete the following tasks:

1. Finalize field data collection (Industrial waste types and quantities, bin size requirements, etc.).
2. Order, receive, and mobilize equipment and vehicles.
3. Recruit and train management and operations personnel.
4. Prepare necessary routing maps and schedules.
5. Establish/build facilities for housing and maintaining collection equipment.
6. Secure required service agreements with vendors.
7. Develop and implement an information program specifically for industrial waste generators.

In conjunction with the preparation period, the contractor should be required to prepare and submit a preparation work plan (PWP) and monthly preparation reports (MPR) describing in detail the progress made on the PWP and any potential impediments to implementation within the specified time period.

## Service Specifications

Service Specifications begin the process of providing detailed information concerning the service that will be covered by the contract. Service specifications for industrial waste programs should specify the types of service to be provided and address the following strategic elements of the desired service:

- Types of waste to be managed.
- Source of waste.
- Quantities of waste to be managed.
- Collection.
- Diversion requirements.
- Disposal.
- Site location requirements.

Service specifications also tell the bidders what work plans are required from them as part of their technical proposal, as well as the work plan requirements for the successful bidder. Typically, a draft work plan, preparation work plan, and final work plan are required.

## Draft Work Plan

The contractor should be required to submit a draft work plan (DWP) as part of their technical offer as prescribed in the RFT Information and Instructions for the industrial waste collection service. Essential issues to be addressed in the DWP should include, but not be limited to, the following:

1. Description of how the contractor will comply with each of the service specifications and minimum technical requirements.
2. Maps of proposed industrial waste collection routes, including a description of factors used in their development.
3. Descriptions of the number and type of personnel and equipment to be deployed including job descriptions and performance specifications.
4. Performance guidelines for waste collection vehicle operators.
5. Manufacturer's literature for each type of waste collection vehicle, other equipment, and industrial waste bins.
6. Description of administration and management plan including an organization chart.
7. Description of job training program for waste collection vehicle operators.
8. Description of record keeping and reporting systems for all information and data required to be submitted with the monthly operations report.
9. Proposed procedures for communicating with governorate project administration personnel and industrial waste generators.
10. Description of the industrial waste generator information program.
11. Proposed sanitation and preventative maintenance program and schedule.

## Final Work Plan

The contractor should then submit a final work plan (FWP) within 45 days following the contract signing date. The FWP should incorporate refinements and modifications discussed and agreed upon between you and the contractor prior to execution of the contract.

The FWP should include a preparation work plan (PWP) that describes in detail the contractor activities and schedules during the preparation period including, but not necessarily limited to, the following:

1. Recruiting and training labor and supervisory personnel.
2. Procurement of supplies and equipment.
3. Rehabilitation of old facilities.
4. Construction of new facilities.
5. Implementation of project management structure.

## Example Summary of Intent Statement

*This is a general statement that clearly presents your intent in seeking a contractor for this service. An example of such a summary follows:*

*The intent of the government as prescribed in this RFT is to provide industrial waste generators with industrial waste collection service at the best price and with the highest quality of service. To this end, the government has provided some information to all in order to assist them to compute fair and reasonable financial offers. However, it is the sole responsibility of pre-qualified bidders to exercise due diligence in assessing all existing work conditions and to ultimately rely on their own assessments in the calculation of prices submitted in the tender offer.*

6. Implementation of information database and record keeping systems.
7. Plan for contacting each industrial waste generator, arranging service schedule and delivering bins.

In addition to the above work plans, the technical specifications should also define the minimum standards associated with the proposed service.

## Minimum Technical Requirements

Minimum technical requirements define the minimum standards that the contractor must meet in the equipment, personnel, and processes used in providing the contracted service. Some of the key minimum technical requirements for industrial waste services that should be addressed in the RFT are provided in the following sections.

### Industrial Waste Collection Vehicles

The following are recommended minimum technical requirements that pertain to industrial waste collection vehicles:

1. **Ancillary Equipment:** Each waste collection vehicle should be equipped with:
  - A fire extinguisher.
  - A shovel and broom for the collection of any spillage of waste.
  - An audible backup warning device that is activated when the vehicle is backing up.
  - Two-way communication with the field supervisor and contractor's dispatch/maintenance office.
  - Flares, flags, and wheel chock blocks for use when breakdowns occur on public streets.
2. **Changes in Equipment Inventory:** The contractor should be required to report changes in the industrial waste collection vehicle inventory during the operations period in writing to your project administrator within 24 hours of the effective date of the change.
3. **Collection Vehicle Appearance:** Collection vehicles should be repainted at least once every 3 years.
4. **Collection Vehicle Inventory:** All waste collection vehicles should be new and uniformly painted at the beginning of the operations period. Thirty days prior to the beginning of the operations period, and annually thereafter, the contractor should provide, in a form that you deem acceptable, a list of the equipment to be used for industrial waste collection. This will become the industrial waste collection vehicle inventory by which the contractor will provide industrial waste collection services.
5. **Collection Vehicle Licensing and Inspection:** All collection vehicles operated by the contractor should be registered, inspected, insured, and comply with all local ordinances and national laws pertaining to motor vehicle ownership and operation.
6. **Collection Vehicle Loading:** Industrial waste collection vehicles should not be loaded in excess of the manufacturer's Gross Vehicle Weight (GVW) rating or in excess of the maximum weight specified by the Egyptian Roads and Bridges Authority.
7. **Collection Vehicle Maintenance:** The contractor should be required to maintain all waste collection vehicles in a safe and operable condition, to minimize the threat to worker and public health and safety, and to reduce their impact on the surrounding environment. The contractor should submit accurate records of repair in the monthly operations report, which should include, the vehicle identification number, the repair date and mileage reading, nature of repair, compliance with preventative maintenance schedules submitted as part of the contractor's FWP and the signature of the maintenance supervisor that the repair has been properly performed.
8. **Collection Vehicle Maintenance and Parking Location:** The minimum technical requirements should stipulate that industrial waste collection vehicles should not be stored on any public street or other public property in the service area. All waste collection vehicles, if

kept within the boundaries of the service area, should at all times be parked and maintained on private property with the proper zoning either within a building or fenced yard when not in use. The contractor should provide written notification to the project administrator as to the parking location of all waste collection vehicles used in the provision of waste collection services at least 30 days prior to the first day of service and annually thereafter.

9. **Collection Vehicle Markings and Identification:** All vehicles used in either the supervision or provision of any type of waste collection service should have highly visible 10 centimeter (cm) high or greater lettering on each side of the vehicle body indicating the name and customer service telephone number of the contractor, identification of the government agency serving as the contracting agent, and vehicle identification numbers (numbered consecutively). The contractor should not use a name containing words or other words that imply public ownership. All waste carrying vehicles should also have the carrying capacity, in cubic meters (m<sup>3</sup>) and GVW, of the vehicle identified in numbers at least 12 cm in height displayed in the upper front corner of the left and right sides of the body.
10. **Collection Vehicle Operation:** Only personnel specifically trained in the safe and efficient operation of the industrial waste collection vehicles should operate these vehicles. All vehicle operators should have all required permits and licenses. The contractor should provide documentation to the project administrator no later than ten days prior to commencement of collection operations that all waste collection vehicle operators have been provided vehicle operation and safety training and have passed a written examination and driving test.
11. **Collection Vehicle Sanitation:** The minimum technical requirements should include a provision for collection vehicle sanitation. At a minimum, the interior of the waste carrying area of all vehicles used for the purpose of collecting and transporting industrial wastes should be washed with water and a disinfecting/deodorizing cleaning agent according to the schedule submitted as part of the FWP, and a minimum of twice weekly. All exterior surfaces of the waste collection vehicle chassis and body should be washed with water and a degreasing cleaning agent at least once a week.
12. **Daily Collection Vehicle Inspection:** The contractor should be required to inspect each collection vehicle daily to ensure that all equipment is operating properly. A provision should be included that states that vehicles that do not pass inspection should be taken out of service until they can pass inspection and operate properly.
13. **Daily Collection Vehicle Inspection Reports:** The contractor should be required to maintain accurate daily collection vehicle inspection reports that should be made available to project monitors immediately upon request for review and approval of collection vehicle usage.
14. **Reserve Equipment:** The contractor should be required to have available at all times, reserve equipment which can be put in service within 2 hours of any breakdown so that no interruption in regularly scheduled industrial waste collection service occurs. This reserve equipment should correspond in size and capacity to the equipment normally used by the contractor to perform the industrial waste collection service.
15. **Use of Collection Vehicles without Hydraulic Compaction:** You may allow industrial wastes to be collected using vehicles without hydraulic compaction provided that:
  - All waste should be enclosed and covered when the distance between collection points exceeds 100 meters (m) or the speed of the vehicle exceeds 30 kilometers (km) per hour (hr).
  - Such vehicles should be equipped with a mechanical dumping mechanism.
16. **Waste Containment:** The industrial waste storage bins and the area of waste collection vehicles used to hold industrial waste should be watertight and prohibit spillage of any solids or liquid waste materials onto any exterior surface or the surrounding ground.

## Industrial Waste Bin Requirements

The following are recommended minimum technical requirements for industrial waste collection bins:

1. **Distribution:** The contractor should be required to establish the location of bins in cooperation with the industrial waste generators during the preparation period. The contractor should distribute bins no later than 10 days before the start of the operations period.
2. **Maintenance:** The contractor should be held responsible for monitoring, controlling, washing, sterilizing, and maintaining all bins. The contractor's FWP should include provisions for washing/sterilizing bins at least once every 3 months or more frequently if required.
3. **Non-Collection Notice:** In the event of non-collection due to failure of a customer to place waste in accordance with the program conditions, the contractor should attach a non-collection notice to the appropriate bin explaining why collection service was not provided. The contractor should notify the project administrator of the location and nature of any non-collection occurrences within 8 hours.
4. **Ownership:** The minimum technical requirements should state that ownership of industrial waste bins will remain with the contractor.
5. **Placement and Usage:** The contractor should be advised that industrial waste generators will be responsible for placing industrial waste into the bins provided by the contractor. The contractor should not be required to collect any industrial waste that is not placed in a bin, provided that the contractor leaves a non-collection notice.
6. **Repair:** Contractor should be responsible for repair of bins including lids and hinges, wheels and axles, and all parts essential for the safe and efficient dumping of industrial waste stored in the bin. The contractor should be required to repair or remove and deliver a replacement bin within 5 workdays of notification by the Industrial waste generator of the need for repair.
7. **Replacement of Damaged Bins:** The contractor at its expense should replace any bin damaged beyond repair by the contractor, within 2 workdays at no cost or inconvenience to the industrial waste generator.
8. **Technical Specifications:** The bidder should be required to submit with their technical offer, manufacturer's literature that verifies that the provided bins will meet or exceed the following minimum technical specifications:
  - Material of Construction: bins should be manufactured from steel or aluminum.
  - Volumetric Capacity: a minimum capacity of 1 m<sup>3</sup> and a maximum capacity of 30 m<sup>3</sup>.
  - Compatibility: bins should be compatible with commercially available mechanical rear-loading, front loading or tilt-frame (for roll-off bins) waste collection vehicles.
  - Standards of Design: Designed to meet all relevant sections of American National Standards Institute (ANSI) Z245.30 –1999 and Z245.60 –1999, or equivalent.
  - Color: Green (or as decided by governorate).
  - Drain: Each bin should include a drain hole with watertight plug.
  - Identification and Marking: bins should meet all relevant clauses of ANSI 245.30-1999, or equivalent, and have a ribless, seamless decal area on the front of a size not less than 15 cm by 25 cm for affixing the governorate logo and the customer service telephone number of the contractor. In addition, each container should be labeled stating materials to be contained, prominently in both Arabic and English letters a minimum of 8 cm in height.
9. **Warranty:** Should be a minimum of 5 years on materials and workmanship on all Container parts (not prorated).

### Waste Collection Personnel

The following are recommended minimum technical requirements regarding industrial waste collection personnel:

1. **Access to Private Property:** The contractor's employees should not enter private property without the written consent of the owner.
2. **Competence and Skills:** All employees and subcontractors employed by the contractor should be competent and possess skills in their respective trades. Only personnel specifically trained in the safe and efficient operation of such vehicles should operate industrial waste collection vehicles.
3. **Demeanor:** The contractor should require all employees to conduct themselves in a courteous and helpful manner and refrain from using loud or profane language.
4. **Driving Licenses:** Drivers of waste collection vehicles should at all times carry a valid Egyptian driver's license and all other required permits for operating equipment or vehicles.
5. **Fees and Gratuities:** The contractor should not permit any employee or subcontractor to offer any service beyond the scope of this contract, or to solicit or accept, either directly or indirectly, any compensation or gratuity for services that are included in the scope of this contract.
6. **Field Supervision:** The contractor should assign a qualified field supervisor for industrial waste collection service and should provide the name of that person in writing to the project administrator. The field supervisor should be on duty at all times the crews are working, and have radio communication with the contractor's office and all industrial waste collection vehicles under his or her supervision.
7. **Uniforms:** The contractor should provide all employees with uniforms, hats, gloves, work boots, reflective vests and other protective clothing as necessary to maintain their appearance and safety.

### Manner of Collection

The following are recommended minimum technical requirements that pertain to the manner in which industrial solid waste is collected:

1. **Disturbance:** The contractor should take all reasonable steps to minimize disturbance to customers when performing industrial waste collection services.
2. **Property Damage:** The contractor should be responsible for all costs for the repair and/or replacement of any property damaged by the contractor's equipment, employees, or agents. Collection crews should report any incident that might have caused damage to customer or other property to the field supervisor, who should inform you within eight hours of any such incident.
3. **Noise:** The contractor should minimize noise from waste collection vehicles and the activities of collection personnel.
4. **Public Safety and Convenience:** The contractor should perform the required work in a manner that minimizes safety hazards, inconvenience, and annoyance to industrial waste generators and the general public.
5. **Spillage:** The contractor should not be responsible for cleaning up loose waste around the industrial waste bins where such loose waste is caused by the carelessness of the industrial waste generator. The contractor should be responsible for removing any spillage that occurs due to insufficient service frequency or the actions of contractor collection equipment and/or personnel.
6. **Scavenging:** The contractor should not permit its employees and sub-contractors to scavenge any waste from the industrial waste bins or collection vehicles.
7. **Compliance with National Laws and Local Ordinances:** The contractor should comply with all national laws and local ordinances including, but not limited to, those relating to

obstructing streets, keeping passageways open, and regulation of waste collection and transportation.

## Customer Service and Complaint Handling

The following are recommended minimum technical requirements that pertain to the manner in which customer service and complaints are handled:

1. **Complaint Records:** The contractor should make a record of all complaints in a bound complaint record, noting the name and address of complainant, date and time of complaint, nature of complaint, and nature and date of resolution. The complaint record should be available for inspection by contract monitors at any time during normal operating hours, and a copy should be submitted to the project administrator with the monthly operations report.
2. **Complaint Resolution:** The contractor should respond to all customer complaints within twelve hours, Fridays and holidays excluded. In particular, if a complaint involves a failure to collect from a customer as required in the contract, the contractor should be required to collect the industrial waste in question within 12 hours of notification, provided it has been properly prepared for collection.
3. **Office Staffing and Hours of Operation:** The office should be staffed twenty-four hours per day, seven days per week with an adequate number of trained personnel to ensure that telephone callers are able to reach the office and a qualified customer service representative within 3 minutes.
4. **Telephone Lines:** The contractor should maintain a minimum of one telephone line designated solely for calls from project monitors or industrial waste generators regarding industrial waste collection service.
5. **Unresolved Complaints:** In the event that any project monitor or customer reports a complaint that has not been resolved to the customer's satisfaction, the contractor should be required to submit a detailed report outlining the nature of the complaint and the proposed resolution or actions taken to resolve the complaint. If, in the opinion of the project administrator, the proposed resolution or actions taken are insufficient to satisfactorily resolve the claim, the Project Administrator may dictate procedures to satisfactorily resolve the complaint.

## Reporting Requirements

The following are recommended minimum technical requirements that pertain to reporting by the contractor.

1. **Annual Operations Reports:** The contractor should submit an annual operation report (AOR) to the project administrator summarizing the performance and results associated with each type of industrial waste collection service. The annual operations reports should be submitted to the project administrator within a period of 30 days following the end of the preceding contract year.
2. **Misreporting:** The minimum technical requirements should also clearly state that inclusion of any materially false or misleading statement or representation of such in any report submitted by the contractor may result in the termination of the contract, and the imposition of penalties.
3. **Monthly Operations Report:** The monthly operations report (MOR) should include, but not be limited to, the following information:
  - Total number of industrial waste collection vehicles and personnel used daily.
  - The average number of industrial waste generators and the number of new industrial waste generators added during the month.

- Total tons of industrial waste collected each day.
- Total tons of industrial waste offloaded at designated processing, transfer and disposal facilities each month.
- Total tons of industrial waste diverted.
- Number of notices of non-collection left and name of industrial waste generators where notices were left.
- Number of complaints received monthly summarized by type and source.
- Resolution for each complaint.
- An updated list of names of all supervisory personnel assigned to industrial waste collection services.
- Description of problems encountered by the contractor and proposals for increasing service performance and achievement of service objectives.
- A description of all cases of public and private property damage and personal injury that have occurred while providing industrial waste collection services, including a copy of the accident or incident report filed with the contractor or with the appropriate authority.
- A description of any violations of applicable laws and ordinances and their dispositions.

**4. Timing of Monthly Operations Reports:** Monthly operations reports should be submitted to the project administrator within 15 days from the ending date of the month.

# APPENDIX B: LEGAL FRAMEWORK FOR INDUSTRIAL SOLID WASTE MANAGEMENT IN EGYPT

This appendix provides a brief summary of Egyptian Law 4/1994 and its Executive Regulations pertaining to the management of industrial waste.

## Chapter 1 - Section 2: Hazardous Substances and Waste

**Article 29** - No handling of hazardous substances and waste without a license from the Competent Administrative Authorities (CAAs). Each CAA issues a ministerial decree with a hazardous substances and waste list in coordination with EEAA and Minister of Health.

**Article 30** - Hazardous waste management would be regulated as prescribed in the Executive Regulations to this law.

**Article 31** - No facilities for treatment of hazardous waste without a license from the respective CAAs, as prescribed in the executive regulations. Locations and conditions for licenses for these facilities should be identified by the Minister of Housing after consulting with EEAA, Ministries of Health and Industry.

**Article 32** - Importation into Egypt of any hazardous waste is prohibited by law.

**Article 33** - Generators of hazardous waste should keep a hazardous waste record keeping all relevant data on amounts generated, disposal methods and the contractors receiving these wastes.

## Executive Regulations (ER)

Chapter 1 - Section 2: Hazardous Substances and Waste (Articles 25, 26, 27, 28, 29, 30, 31, 32, 33)

### Ministry of Industry Decree 65/2002

As Law 4/1994 requires, six competent administrative authorities (Ministries of Agriculture, Electricity, Health, Industry, Interior, and Petroleum) are to issue their lists of hazardous waste. The following presents key points of the decree from the Ministry of Industry.

**Article 1** - Importation of listed substances is prohibited.

**Article 2** - The Industrial record under which the facility is functioning is a license under which usage, storage, transport, handling, and reuse of any of these substances-within the premises of the facility (i.e., on-site)- in case its generation is a result of the activity under which the generator is licensed.

**Article 3** - Handling and Transport of these substances off-site should be under a license.

**Article 4** - Review and amendments to this list should be done biannually conjunctionally between the General Organization of Industrialization (GOFI) and EEAA.

**Article 5** - This decree should be published in the official papers.

Types of wastes on the list (55 items in total): Inorganic wastes and the wastes including inorganic metals (16 items).

- Wastes from inorganic elements with metals and organic substances (4 items).
- Organic wastes that include metals (13 items).
- Wastes that include organic or inorganic elements (22 items).

## Hazardous Wastes Sections

**Article 1** - In the application of the provisions of this Law, the following words and expressions shall have the meanings hereby assigned to them:

- Hazardous Substances - Substances having dangerous properties which are hazardous to human health or which adversely affect the environment, such as contagious, toxic, explosive, or flammable substances or those with ionizing radiation.

- Hazardous Waste - Waste of activities and processes or its ashes which retain the properties of hazardous substances and have no subsequent original or alternative uses, like clinical waste from medical treatments or the waste resulting from the manufacture of any pharmaceutical products, drugs, organic solvents, printing fluid, dyes, and painting materials.
- Substance Handling - Anything that leads to the displacement of substances for the purpose of assembling, transporting, storing, treating, or using them.
- Waste Management - Collecting, transporting, recycling, and disposing of waste.
- Waste Disposal - Processes which do not extract or recycle waste such as composting, deep subterranean injection, discharge to surface water, biological treatment, physical-chemical treatment, permanent storage, or incineration.
- Waste Recycling - Processes which allow the extraction or recycling of waste, such as using it as fuel, or extracting metals and organic materials, or soil treatment or oil re-refining.

**Article 5** - For the fulfillment of its objects, the Agency may coordinate with other competent authorities in connection with regulating and setting safety standards for the conveyance of hazardous materials.

**Article 29** - It is forbidden to displace hazardous substances and waste without a license from the competent administrative authority. The executive regulations of this Law shall determine the procedures and conditions for granting such a license and the authority competent to issue same.

The ministers shall, each in his or her field of competence, issue in coordination with the Minister of Health and EEAA a table of the hazardous substances and waste referred to in paragraph 1 of this article.

**Article 30** - Management of hazardous waste shall be subject to the rules and procedures laid down in the executive regulations of this Law. The executive regulations shall designate the competent authority, which, after consulting EEAA, will issue the table of hazardous waste to which the provisions of this Law shall apply.

**Article 31** - It is forbidden to construct any establishment for the treatment of hazardous waste without a license issued by the competent administrative authority after consulting the EEAA. Disposal of hazardous waste shall be in accordance with the conditions and criteria set forth in the executive regulations of this Law. The Minister of Housing shall, after consulting with the Ministries of Health and Industry and the EEAA, designate the disposal sites and determine the conditions of the license to dispose of hazardous waste.

**Article 32** - It is forbidden to import hazardous waste or to allow its introduction into or its passage through Egyptian territories. It is forbidden without a permit from the competent authority to allow the passage of ships carrying hazardous waste in territorial seas or in the exclusive maritime economic zone of Egypt.

**Article 33** - Those engaged in the production or circulation of hazardous materials, either in gas, liquid or solid form, are held to take all precautions to ensure that no environmental damage shall occur.

The owner of an establishment whose activities produce hazardous waste pursuant to the provisions of this Law shall be held to keep a register of such waste indicating the method of disposing thereof, and the agencies contracted with to receive the hazardous waste. The executive regulations shall determine the data to be recorded in the said register and the EEAA shall be responsible for following up the register to ensure its conformity with the facts.

**Article 85** - Whoever violates the provisions of Articles 30, 31, and 33 of this Law shall be imprisoned for a period of not less than 1 year and/or fined 10,000 to 20,000 Egyptian Pounds.

**Article 88** - Any person who violates the provisions of Articles 29, 32, and 47 of the present Law shall be punished by imprisonment for a term of not less than 5 years and a fine of 20,000 to 40,000 Egyptian Pounds. Whoever violates the provisions of Article 32 shall be held to re-export the hazardous wastes subject of the crime at his or her own expense.

**Article 95** - Whoever intentionally violates the provisions of this Law shall be punished by imprisonment for a term of not more than 10 years if such violation results in causing a permanent incurable disability to an individual. The penalty shall be imprisonment if the violation results in causing this infirmity to three or more persons.

If the violation results in the death of a person, the penalty shall be temporary hard labor, and if it results in the death of three persons or more the penalty shall be permanent hard labor.

**Article 99** - Jurisdiction over the crimes referred to in this Law shall lie with the court within the circumscription of which any such crime is committed, if it is committed by the ships referred to in article 97 within the territorial waters of Egypt or in the exclusive economic zone. The court shall rule on the case expeditiously.

Jurisdiction over the crimes committed outside the two areas mentioned in this article shall lie with the court within the circumscription of which the port in which the ship flying the Egyptian flag is registered.

Prime Minister's Decree No. 338/1995.

## **Chapter 2 - Hazardous Substances and Waste**

**Article 25** - It is forbidden to displace and use hazardous substances and waste without a license from the competent authority indicated for each as herein below:

1. Hazardous agricultural substances and waste, including pesticides and fertilizers - Ministry of Agriculture.
2. Hazardous industrial substances and waste - Ministry of Industry.
3. Hazardous pharmaceutical, hospital and laboratory substances and waste and domestic insecticides - Ministry of Health.
4. Hazardous petroleum substances and waste - Ministry of Petroleum.
5. Hazardous substances and waste from which ionizing radiation is emitted - Ministry of Electricity - Nuclear Energy Authority.
6. Hazardous inflammable and explosive substances and waste - Ministry of Interior.

In respect of other hazardous substances and waste, the respective bodies competent to issue a license for their displacement shall be designated by a decree of the Minister for Environmental Affairs on the basis of a proposal by the CEO of the EEAA.

The ministers heading the ministries mentioned in this Article shall, each within his or her scope of competence and in coordination with the Minister of Health and the EEAA, issue a table of hazardous substances and waste specifying the following:

1. The types of hazardous substances and waste falling within his or her ministry scope of competence and their respective degrees of danger.
2. The constraints to be observed in the displacement of each.
3. The means of disposing of the empty containers of such substances after their displacement.
4. Any other constraints or conditions the Minister deems important to add.

**Article 26** - The applicant for a license shall submit his or her application in writing to the competent authority as defined in Article (25) of these Executive Regulations in accordance with the following procedures and conditions:

1. Procedures for granting a license:
  - The license to handle hazardous substances and waste shall have a maximum validity period of 5 years unless an event entailing its review occurs. The competent administrative authority may, pursuant to the provisions of Article (40) hereof, grant temporary licenses for short periods as necessity dictates.
  - The body or individual wishing to obtain a license for the displacement of hazardous substances or waste shall submit an application containing the following data:
2. Handler of hazardous substances and waste:
  - Name of establishment.
  - Address and telephone number.

- Site and area of establishment.
  - Contour maps of the site.
  - Level of underground water.
  - Safety equipment in the establishment.
  - Information concerning insurance.
  - Program for monitoring the environment in the area surrounding the establishment.
3. Producer of hazardous substances and waste (full name, address, telephone and fax numbers).
  4. A complete description of the hazardous substances and waste intended to be handled and the nature and concentration of the dangerous elements contained therein.
  5. The amount of hazardous substances and waste intended to be handled annually and a description of the method of packing to be used (barrels - tanks - loose).
  6. The means to be used in storing hazardous substances and waste and the storage period for each, as well as an undertaking to place a clear written description on the container indicating its contents, the degree of danger thereof and how to act in an emergency.
  7. The available means of transport (by land - rail - sea - air - internal waterways), their routings and schedules.
  8. A complete statement of the method intended to be used for the treatment and disposal of the hazardous substances and waste for the displacement of which a license is sought.
  9. A commitment not to mix hazardous substances and waste with any other type of waste produced by social and production activities.
  10. A commitment to keep registers containing detailed accounts of the sources, quantities and types of hazardous substances and waste, the rates and periods of their collection and storage and the means of their transport and treatment, to furnish such data on request, and not to destroy the registers for a period of 5 years running from the date they are first opened.
  11. A commitment to take all procedures as are necessary to ensure the proper packing of hazardous substances and waste during the collection, transportation, and storage phases.
  12. A detailed description of the emergency plan for confronting all unforeseen circumstances which guarantees the protection of human beings and the environment.
  13. A certificate of previous experience in the field of handling hazardous substances and waste.
  14. A declaration of the veracity of data stated in such document.
  15. Conditions for granting a license:
    - Completion of all required data.
    - Availability of personnel trained in the handling of hazardous substances and waste.
    - Availability of means, resources and systems required for the safe handling of these substances.
    - Availability of requirements to confront the risks which may result from accidents occurring during the handling of these substances.
    - That no harmful effects to the environment and public health shall result from the activity for which a license is sought.

**Article 27** - The license to handle hazardous substances and waste shall be issued in consideration of a cash payment to be determined by a decree from the competent minister. The license shall be valid for a maximum period of 5 years subject to renewal.

The licensing authority may revoke the license or suspend the activity by a reasoned decision in the following cases:

1. If the license was issued as a result (of the submission) of incorrect data.
2. If the license violates the conditions of the license.
3. If the performance of the activity results in dangerous environmental effects which were unforeseen at the time the license was issued.
4. The emergence of sophisticated technology which may, with minor modifications, be applied, and the use of which would lead to a marked improvement in the environment and the health of the workers.
5. If the EEAA concludes that it is unsafe to handle any of the substances and wastes.

The licensing authority in coordination with the EEAA and the Ministry of Health may request the applicant to fulfill such other conditions as it deems necessary to ensure the safe handling of these substances. In all cases, the applicant for a license may not handle hazardous substances and waste before obtaining the license made out on the relevant form which must be kept by the person in charge of the handling to be presented on request.

**Article 28** - The management of hazardous wastes shall be subject to the following rules and procedures:

1. Engendering Hazardous Waste - The establishment which engenders hazardous waste shall be held to do the following:
  - Try hard to reduce the rate at which such waste is produced, both quantitatively and qualitatively, by developing the technology used, employing clean technology and selecting alternatives for the primary product or the raw material which are less harmful to the environment and public health.
  - Categorize the waste produced, in terms of both quantity and quality, and register same.
  - Establish and operate units to treat waste at source, provided the EEAA approves the treatment system as well as the technical specifications of these units and their operational programs. In case of difficulty of treatment or disposal of hazardous waste at source, the establishment producing such waste shall be held to collect and transport it to the disposal sites determined by the local authorities and the competent administrative and environmental bodies. The displacement of such waste shall be subject to all the conditions and provisions prescribed in this respect by these Executive Regulations.
2. Stage of Collecting and Storing Hazardous Waste:
  - Determine specific locations for the storage of hazardous waste meeting safety conditions to prevent the occurrence of any harm to the public or to those persons exposed to such waste.
  - Store hazardous waste in special containers made of a solid, non-porous, leak-proof material. These containers are to be hermetically sealed and their capacity must be commensurate with the quantity of hazardous waste stored therein or conform to the standards set for the storage of such waste according to type.
  - Place a clear sign on the hazardous waste containers indicating their contents and warning of the dangers which may result from handling them imprudently.
  - Lay down a schedule for the collection of hazardous waste so that it is not left for long periods in the storage containers.
  - Producers of hazardous waste shall be held to provide the above-mentioned containers, wash them after each use and not place them in public places.
3. Stage of Transporting Hazardous Waste: It is prohibited to transport hazardous waste by other than the means of transport run by the establishments licensed to manage hazardous waste. Those means of transport must meet the following conditions:
  - Transport trucks shall be fitted with all safety equipment and shall be in good working condition.
  - The capacity of such trucks and their shift schedule shall be commensurate with the quantities of hazardous waste.
  - They shall be driven by trained drivers capable of taking independent initiatives, particularly in emergencies.
  - They shall bear clear signs indicating the dangerous nature of their cargo and the best manner of dealing with emergencies.
  - Routing of trucks transporting hazardous waste shall be determined and civil defense bodies shall be immediately notified of any changes therein, so as to enable them to act rapidly and decisively in emergencies.
  - Trucks transporting hazardous waste shall be prohibited from passing through residential and other populated areas and through the city center during daytime.
  - The address of the garages where hazardous waste trucks are parked, as well as the number and date of their license, must be notified to the competent authority.
  - Trucks transporting hazardous waste must be washed and sterilized after each use in accordance with the directives issued by the Ministry of Health in coordination with the competent administrative body designated in Article (40) of these Executive Regulations.
4. Ships carrying hazardous waste:
  - Prior notification is a requisite. The competent administrative body shall be entitled to withhold authorization if there is a risk of environmental pollution.
  - In case of authorization, all necessary precautions as prescribed in international conventions must be taken, and the ship must have the guarantee certificate referred to in Law No. 4 of 1994.

5. Stage of Treatment and Disposal of Hazardous Waste: The sites selected to house utilities for the treatment and disposal of hazardous waste shall lie at a distance of at least 3 km from populated and residential areas, and shall be held to meet the conditions and provide the equipment and installations set forth below:
  - The area of the site must be proportionate to the quantity of hazardous waste so that such waste does not remain in storage for extended periods.
  - The site shall be encircled with a brick wall standing at least 2.5 m high.
  - The site shall be provided with more than one gate of suitable width, allowing the easy entry of trucks transporting hazardous waste.
  - The site shall be provided with a water source and W.C. facilities.
  - The site shall be provided with all the protection and safety requirements prescribed in labor and vocational health laws, as well as with a telephone line.
  - The site shall be provided with all the mechanical equipment which can facilitate the work process.
  - The site shall be provided with warehouses equipped to preserve hazardous waste pending its treatment and disposal. Equipment shall differ according to the type of hazardous waste received by each utility.
  - The utility shall be provided with an incinerator for burning certain type of hazardous waste.
  - The utility shall be provided with the necessary equipment and installations for sorting and classifying certain types of hazardous waste with the intention of reutilizing and recycling them.
  - The site shall have a sanitary ditch of an adequate capacity for burying the incinerated remains.
6. Processes for the treatment of hazardous waste which may be reused and recycled shall be carried out within the following framework:
  - Reutilization of some hazardous waste as fuel to generate energy.
  - Recovery of organic solvents and their reutilization in extraction processes.
  - Recycling and reusing some organic substances from hazardous waste.
  - Reusing ferrous and non-ferrous metals and their compounds.
  - Recycling and reusing certain non-organic substances from hazardous waste.
  - Recovery and recycling of acids or alkalines.
  - Recovery of substances used in reducing pollution.
  - Recovery of certain components of ancillary elements.
  - Recovery of used oil and reutilizing it after its refinement, with due consideration to the relationship between environmental and economic returns.
7. Processes for the treatment of hazardous waste which cannot be reutilized and recycled shall be carried out within the following framework:
  - Injecting hazardous waste amenable to pumping into salt mines, wells and natural reservoirs in areas far from residential and populated areas.
  - Burying hazardous waste in pits specially prepared for this purpose and isolated from the other components of the environmental system.
  - Treating hazardous waste biologically by using certain types of living microorganisms to bring about its decomposition.
  - Treating hazardous waste physically or chemically by evaporation, dilution, calcification, assimilation, sedimentation, etc.
  - Incineration in special incinerators designed to prevent the emission of gases and fumes into the surrounding environment.
  - Permanent storage (such as placing hazardous waste containers inside a mine).
8. Taking all procedures which guarantee limiting and reducing the production of hazardous waste through:
  - Developing and generalizing the use of clean technology.
  - Developing suitable systems for the management of hazardous waste.
  - Expanding the reutilization and recycling of hazardous waste after treatment whenever possible.

9. Setting a periodic program to monitor the various components of the environmental system (organic and non-organic) in the sites of utilities and their surroundings for the treatment and disposal of hazardous waste. Licenses shall be withdrawn and work in the utility suspended upon the appearance of any indications of damage to the eco-systems surrounding the utility.
10. Establishments licensed to handle and manage hazardous substances and waste shall be responsible for any damage caused to third parties as a result of non-compliance with the provisions of these Executive Regulations.

The EEAA shall be competent to review the hazardous waste schedules, which are subject to the provisions of the Law, with the cooperation of the ministries concerned in regard to the schedules issued by them in this connection.

**Article 29** - It is prohibited to construct any establishment for the purpose of treating hazardous waste except with a license issued by the competent governorate after consulting the EEAA, the Ministry of Health, the Ministry of Labor and Manpower, and the ministry concerned with the type of waste according to the provisions of Article (25) of these Executive Regulations, after ensuring that such establishment satisfies all the conditions which guarantee the safety of the environment and the staff employed thereat.

Disposal of hazardous waste shall be effected in accordance with the conditions and criteria prescribed in Article (28) of these Executive Regulations.

The Minister of Housing, after consulting the ministries of Health and Industry and the EEAA, shall determine the locations and conditions for the disposal of hazardous waste.

**Article 30** - It is prohibited to import hazardous waste or to allow its entry into or passage through the territory of the Arab Republic of Egypt.

It is prohibited, without a license from the competent administrative department in the Ministry of Maritime Transport or in the Suez Canal Authority, each within the scope of its competence, to allow the passage of ships carrying hazardous waste, in the Territorial Sea or the Exclusive Economic Zone of the Arab Republic of Egypt, and the EEAA must be notified.

**Article 31** - Those in charge of the production or displacement of hazardous substances, whether in their gaseous, liquid or solid states, shall take all due precautions to ensure the non occurrence of any environmental damage, and shall be held in particular to observe the following:

1. That the site on which such substances are to be produced or stored is selected with due regard to the conditions prescribed according to the type and quantity of those substances.
2. That the design of the buildings inside which hazardous substances are to be produced or stored conforms to the engineering standards to be observed for each type of such substances, as determined by a decree to be issued by the Minister of Housing after consulting the EEAA. The said buildings shall be subject to periodic inspections by the licensing administrative body.
3. That the conditions prescribed in respect of the means of transport or the storage sites of such substances are provided so as to guarantee that no harm shall come to the environment or to the health of employees or citizens.
4. That the technology and equipment used in the production of such substances shall not result in damage to the establishment, the environment or harm to the staff.
5. That buildings shall be adequately fitted out with safety, alarm, protection, combat, fire-fighting and first aid systems and equipment, in the numbers and quantities determined by the Minister of Labor and Manpower after consulting the EEAA, the Ministry of Health and the Civil Defense Department in coordination with the competent administrative authority.
6. That an emergency plan is in place to confront any potential accidents which may occur during the production, storage, transportation or handling of such substances, provided the plan is reviewed and approved by the licensing authority after consulting the EEAA and the Civil Defense Department.
7. That staff in these establishments are subjected to periodic medical checkups and that they are treated for any vocational diseases at the expense of the establishment by which they are employed.

8. That establishments producing hazardous substances insure their workers for the amounts to be determined by a decree from the Minister of Manpower in coordination with the Ministry of Insurance and Social Affairs, after consulting the EEAA and the Ministry of Health, provided the amounts of the insurance take into account the degree of danger to which each category of workers is exposed inside each productive unit.
9. That workers handling such substances are informed of the dangers involved and of the necessary precautions to be taken when handling them, that they are fully aware of all this information and that they have received adequate training in this regard.
10. That the inhabitants of the regions surrounding the sites where hazardous substances are produced or handled are informed of the possible dangers of these substances and the method of facing such dangers, and that they are familiar with the alarm systems to be used in case of an accident and with the procedures to be followed on its occurrence.
11. Establishments producing and handling hazardous substances are held to compensate citizens injured in the locations surrounding the production or storage sites for injuries caused by accidents resulting from these activities or from harmful emissions or leakages therefrom. Those assigned to the production and handling of hazardous substances shall submit an annual report on the extent of their commitment in implementing the necessary precautions.

**Article 32** - Establishments engaged in the production or importation of hazardous substances shall, when producing or importing such substances, observe the following conditions:

1. Container specifications:
  - The type of container in which these substances are placed must be suitable for the type of substance therein, tightly closed and difficult to damage.
  - The capacity of the container must be easy to lift or transportation without exposing it to damage or harm.
  - The inner lining of the container must be made of a material that is not affected by storage throughout the period when the substances contained therein are active.
2. Container information:
  - Contents of container, their active substance, and the degree of its concentration.
  - Total and net weight.
  - Name of producer, date of production and production number.
  - Nature of danger and symptoms of toxicity.
  - First aid procedures to be taken in case of exposure.
  - Safe method of opening, emptying and using container.
  - Safe storage method.
  - Methods of disposal of empty containers.

All the information shall be written in Arabic in a style that is easy for an ordinary person to read and understand, and the words must be legible and prominently displayed on the container. They must be accompanied by diagrams indicating the method of opening, emptying, storing and disposing of the containers as well as by the international symbols for danger and toxicity.

**Article 33** - The owner of an establishment whose activity results in hazardous waste pursuant to the provisions of these Executive Regulations shall be held to keep a register of such waste and the method of its disposal, as well as of the names of the parties contracted with to receive the said waste, as follows:

1. Name and address of the establishment.
2. Name and job title of the person responsible for filling in the register.
3. The period covered by the current data.
4. The special conditions issued for the establishment by the EEAA.
5. A list of the types and quantities of hazardous waste resulting from the establishment activity.
6. Method of disposal thereof.
7. The parties contracted with to receive the hazardous waste.
8. Date on which the form is filled.
9. Signature of the officer in charge.

The EEAA shall follow up the information in the register to ensure its conformity with reality.