5.5 Waste Management

(1) Current Condition

It is estimated that 60 million tons of solid wastes are generated every year in Egypt. The following Table 5.27 shows the breakdown of solid wastes. The municipal wastes generation unit is within 0.3-1.0kg/capita day.

Table 5.27: Breakdown of Waste Stream of Egypt

Types of Waste	Generation (Million ton /year)
Municipal Waste from Major Cities	9.3
Municipal Waste from Rural areas	5.6
Agricultural Wastes	3.5
Hospital Wastes (Hazardous and Non-hazardous)	0.13
Construction Wastes	4.0
Non-Hazardous Industrial Wastes	5.9
Hazardous Industrial Wastes	0.3
Dredged sludges from canals	29.4
Sludges from Municipal Wastewater treatment	2.0

Source: National Solid Waste Management Programme, December 2000

Only 30-60 % of wastes are collected and many wastes are scattering throughout towns and streets without being treated. In rural area, especially the Delta area has a flourishing agriculture since old age, and lands are mostly owned by individuals for farm land, then, there are not enough public land for waste treatment. In this are, plenty of wastes are dumped into vacant ground or agricultural drainage and such problem is getting serious. Governorates of the Delta areas are concerning to dispose collected wastes in desert area.

Photo 5.20: Scatting of Wastes at the Delta Area

Table 5.28: Scatted Amount of Solid Waste, 1999

Governorates	Scatted Solid Wastes Amount (m^3)
Cairo	2,2236,500
Giza	447,050
Qualubyia	504,395
Gharbyia	1,235,000
Aswan	386,350
Red Sea	107,022
Kafr El Sheik	225,500
Qena	251,700

Source: National Solid Waste Management Programme, December 2000

In Cairo and Giza, the traditional system called Zaballeen sorts, recycle and dispose the wastes. Also private enterprises provide solid waste management services but not in main stream yet. There are currently 56 composting plants distributed in all governorates and the number of plants seems to be growing but there are not so many successful cases.

On the other hand, privatization movement of municipal waste management with foreign support is getting really active. Received contracts from governorates, international enterprises have been operating their services of collecting and treating wastes in big cities such as Cairo, Giza and Alexandria. In some of small cities, local businesses undertake waste treatment services but they are taking open dumping as a main method. Seen smoking and ignition always from waste treatment facilities, it seems that wastes are not treated appropriately.

Photo 5.21: Wastes Management by Private Sector (FCC: Covers Giza and Cairo)

Except newly established 10th of Ramadan City, there are no waste treatment and disposal facilities for industrial wastes so that industrial wastes are treated with municipal wastes. There is only one treatment plant for hazardous waste in Alexandria. Reduction of the total amount of wastes and development of recycle plan will be the urgent issues of the Solid Waste

Management Strategy developed by EEAA in order to implement the 3Rs aspects of the strategy. .

(2) Municipal Waste

Table 5.29: Roles of Governmental Institutions in Municipal Waste Management

Organizations	Roles
National Government through EEAA	● Establishes the institutional and legal frameworks for MSW ● Provides local governments with guidelines and /or capacity building measures in the field of financial management, technical systems. ● Coordinates with the local units to identify the sites for waste disposal and treatment
Local Government	● Local government is divided into four levels: governorates, markaz, districts (sub-divisions of the major cities) and local units (at the village level). A governorate is made up of a number of markaz. In each markaz, there is a main city and a number of mother villages. Each mother village has associated satellite villages and (ezab) hamlets. ● Governorates approve the budget and investment plans for MSW management and distribute the budgets to the districts and local units who are responsible for executing MSW management. The local authorities (districts or units) are also responsible for the collection of street waste and waste from public spaces, operating existing composting plants and supervising the landfill and dumpsite operation. In case to contract private companies to carry out these survives, local authorities remain responsible for regulating and controlling the activities and the performance of these enterprises. The local authorities are charged with monitoring the adherence to article 39 of the executive regulations to Law 4/ 1994, which stipulates that collectors of garbage and solid waste shall be held to maintain the cleanliness of garbage bins and vehicles ● At districts and local units, the provision of MSW management services is the responsibility of the "Cleansing Department" or what is currently known as the "Environmental Improvements and Cleansing Department". ● In coordination with EEAA, the local authority specifies the site of solid waste treatment, burning or disposal facilities. ● Issuing the licenses related to the transport and disposal of these MSW.
MWRI	● Protection of the River Nile, its branches (Rosetta and Damietta) and waterways from pollution caused by municipal wastes. ● Fine violators with the aid of Waterways Police.

Source: EcoConServ, 'Study on Status of the Environment and Relevant Policies/Measures in Egypt', Feb. 2005

The main legislation relating to solid waste management in Egypt is the Law 38 for 1967 as amended by the Law 31 for 1976. The law regulates the collection and disposal of solid waste

from residential areas, commercial and industrial establishments, and public places. It prohibits the placement of wastes or wastewaters in areas other than those specified by the local council. It is important to note that the law only applies to cities and villages that have designated by a Governor's decree. A summary of the most significant articles of the relevant solid waste management laws is provided in the following Table 5.29.

Table 5.30: MSW Management Relevant Legislation

Law and Article	Description
Law 38/1967, Article 6	Requires that the local council issue a license for all workers employed as waste collectors.
Law 38/1967, Article 8	Stipulates that local councils may impose a cleanliness tax on all housing units. The money collected from this tax enters a fund for public cleanliness.
Law 38/1967, Article 10	States that the rules of this law are applicable to cities and the villages that are specified by a decree by the governor.
Ministry of Housing Decree # 134/1968	Implements Law 38/1967 and declares specifications and locations of dumping places, and methods of treatment.
Law 31/1976	Defines "garbage and solid wastes" as including domestic and industrial waste. It also specifies garbage containers, means of transportation, and the periodicity of solid waste collection.
Ministry of Justice Decree (MoJ 3137/1976)	Identifies local government employees as having authority to enforce Law 38/1967
Law 4/1994, Article 37	Requires EIA of new developments, including municipal solid waste related establishments. Prohibits the burning, disposal or treatment of solid waste except in designated areas far away from housing or industrial or agricultural areas as well as from waterways. The local units, in agreement with EEAA, assign the sites for dumping, treatment, or burning solid waste according to the requirements of this article.
Prime Minister's Decree No. 338/1995, Article 38	Promulgates the Executive Regulations of the Law 4/1994. Prohibits the burning, disposal or treatment of solid waste except in designated areas far away from housing or industrial or agricultural areas as well as from waterways. Permits the incineration of infectious waste generated by medical care in hospitals and health centers, with certain provisions.
Prime Minister's Decree No. 338/1995, Article 39	States that collectors of garbage and solid waste shall maintain their garbage bins and vehicles in a clean state

Source: EcoConServ, 'Study on Status of the Environment and Relevant Policies/Measures in Egypt', Feb. 2005

A Ministerial Solid Waste Management Committee co-chaired by the Minister of Environment and the Minister of Local Development was established. In December 2000, the committee, with the participation and input from the relevant ministries, prepared the "National Program for Waste Management." The following Table 5.31 gives an idea of the main elements of the program and their estimated costs.

Table 5.31: Waste Category, Participating Ministry and Management Costs

Waste Category	Participating Ministry	Estimated Cost LE million
Municipal solid waste	Ministry of Local Development (governorates), EEAA	145
Agricultural Waste	Ministry of Agriculture and Land Reclamation	25
Hospital Waste	Ministry of Health and Population	365
Waste from Cleaning Waterways	Ministry of Water Resources and Irrigation	473
Municipal Sludge	Ministry of Housing, Utilities and Urban Committees	273.5

Source: Tarek M. Genena, 'A consultant report on the country environmental analysis', Dec. 2003

The Government of Egypt planned to privatize MSW services and gave priority to governorates that have large cities and tourist areas. In 1999, severe air pollution in Greater Cairo caused by open burning of municipal solid wastes received close public attention.

Two important and long awaited policy decisions were taken. The first was a Cabinet decree allowing collection of the solid waste management fee on the electricity bill in proportion to the electricity consumption, with the range between LE 1 to LE 12 per household. However, implementation of this measure still requires the approval of the local popular council of the Governorates. Currently a number of Governorates have already started to collect the solid waste management fee

The other important policy was to introduce economic incentives for the MSW management services. These include a tax break for at least 5 years, as well as exemption of the equipment used in waste management services from custom duties.

Alexandria Governorate was the first body issued an international tender for integrated solid waste management services of municipal wastes, hospital wastes and hazardous wastes. The composting plant, which was built by grant aid from Japan, is also operated by French based operation/maintenance enterprise, issued by Alexandria Governorate. (See Photo 5.22)

Table 5.32 provides data concerning Governorates that have completed their privatization.

Photo 5.22: Compost Plant in Alexandria

Table 5.32: Outline of Completed Privatizations

Governorate		Total Quantity of Waste Tons/day	Operator N; National R; Regional I; International	Annual Contract Value LE million	Average cost LE/ton
Alexandria		2,700	I (French)	85	86
Cairo	North	NA	I	52	NA
	East	NA	I	59.5	NA
	West	NA	I	55	NA
Giza	Urban Northern	1,400	I (Spanish)	36	70
	Urban Southern	1,600	I (Spanish)	44.9	77
Suez		325	R	9	75
Aswan		435	Consortium N&I	12	75

Source: Tarek M. Genena, 'A consultant report on the country environmental analysis', Dec. 2003

Many Governorates followed the exact footsteps of Alexandria Governorate. However, some governorates did not fully understand the process of municipal waste service privatization and sometimes international tender were suspended. The following problems are noted to date.

- Governorates tender on the basis of insufficient and unreliable information with regard to quantities of waste generated and the composition of waste. In addition, tender documents did not always reflect the conditions and requirements.
- In some cases, financial resources and collective methods were not shown.
- Governorates and Districts are incapable to evaluate the performance of the international private operators.
- In general, no properly sited landfills and/or areas designated for landfills were available.

- The modalities of co-operation between operators, local NGOs, Zabbaleen[1] and small private operators are uncertain.
- Given extended nature of the contracting period of services (10-15 years), clear mechanisms were not identified in the contract to address unforeseen inflation rates as well as changes in exchange rates of foreign currencies.
- There is a general lack of SWM expertise in the Egypt, especially outside the major cities. Support provided by central government was insufficient.

The above mentioned problems have resulted in a situation that some Governorates have decided to cancel tenders or re-tender, postpone or freeze the services.

(3) National Integrated Solid Waste Management Strategy

A national strategy addressing solid waste management in the period of 2000-2010 has been developed. The National Strategy defines a planning framework for the establishment of an integrated municipal solid waste management system. The outline of the strategy includes:

- Central government shall be the facilitator for the establishment and implementation of the National Strategy.
- Implementation of the National Strategy shall be the responsibility of the governorates.
- Operations of the solid waste management system shall be the responsibility of the governorates/ local governments either by direct ownership and operation or through contracting services to capable private companies.
- Central government and governorates planning shall be integrated and shall foster a "Government-Public-Private-Community Partnership"
- The "Polluter Pays Principle" and full cost recovery shall be applied as being essential for private-sector entrance and system sustainability.
- Adherence to the "reduce, reuse, recycle and recover" hierarchy will be required.
- The public shall be fully involved in and made aware of all steps of the planning, development and implementation of the Strategy.
- The strategy stresses the need for the establishment of local solid waste management data collection and reporting system, which can be connected to a national network.

In Egypt, there is no law defining the "Industrial Waste". The word "Waste" means wastes collected and treated by Governorates but also include industrial waste generated from factories. The term 'waste' used in the strategy means accordingly.

The targeted values of the strategy are below.

[1] Zabbaleen is a person or businesses, which collect or recycle wastes in Informal Sector.

Table 5.33: Targeted Value of the SWM National Strategy

Target	Performance Indicator	Targeted value	
		5 years	10 years
Minimum collection coverage: Large cities Capital of governorate Provincial towns Large villages	Collective Efficiency	 90% 80% 70% 60%	 99% 90% 80% 70%
Sanitary landfill disposal	% of landfill vs. total generated	80%	90%
Recovery Composting Recycling	% of landfill vs. total generated	 50% 40%	-
Source separation	% of separated vs. total generated	40%	50%
Source reduction	% of reduction referred to normal growth		5%
Cost recovery		100%	NA
Funding	% of GDP	0.35%	-

Source: EcoConServ, 'Study on Status of the Environment and Relevant Policies/Measures in Egypt', Feb. 2005

Based on the national strategy, Local Governorates are expected to develop action plans that include objectives related to:

- Coverage level of collection and transfer of the daily-generated waste in urban and rural areas.
- Coverage level of treatment and final disposal
- Minimization of the amount of waste to be treated and disposed.
- Increasing of re-use and recycle
- Institutional set-up
- Participation of NGOs
- Removal of existing accumulations

Table 5.34: Supports from Donor Agencies and Foreign Government for Municipal Waste Management

Donor Agencies	Contents
USAID	Support of privatization of Qualubyia Governorate in Cairo (South zone)
KFW, GTZ (Germany)	Provided F/S studies to support the privatization efforts of Qena and/or Kafr El Sheikh Governorate.
Netherlands	Conducted integrated solid waste management projects for tow districts in the Fayoum Governorate
DFID (Denmark)	As a part of SEAM, provided SMW relating technical support for many governorates
Finland	Support for Beni-Suef city
EU	Identifying the possible site for landfill for some Governorates

(4) Municipal Waste Management in Rural Area

For the rural areas, the National Strategy for Integrated Solid Waste Management sets an ambitious target of 60% collection rate in larger villages by the year 2005. However, rural areas are subject to a set of limiting conditions and constraints, which necessitate that innovative municipal solid waste management systems and financing schemes.

- Geographically scattered rural communities, each containing relatively small populations and relatively large distances separating them
- Poor accessibility within the villages, due to their unpaved, narrow streets;
- The limited availability of land that can be used for disposal has led to the waste being dumped into agricultural drains and irrigation canals;
- Being low-income areas, the ability and willingness of the residents to pay for solid waste management services is limited;
- Limited technical capacity in rural municipalities areas about sound municipal solid waste management practices;
- Insufficient profitability making it unattractive to private sector companies

Photo 5.23: Condition of Waste Disposal Site in the Delta Area, Tanta

(5) Hazardous Waste

The framework of hazardous waste management in Egypt is regulated by the Law 4/1994.

- It is forbidden to displace hazardous substances and waste without a license from the competent administrative authority. (Article 29)

- Management of hazardous waste shall be subject to the rules and procedures laid down in the executive regulations of this law. (Article 30)

Hazardous substances and competent administrative authorities are below.

Ministry of Agriculture	: Agricultural Wastes
Ministry of Industry	: Industrial Wastes
Ministry of Healthcare	: Healthcare Wastes, laboratory wastes, domestic insecticide wastes
Ministry of Petroleum	: Petroleum Wastes
Nuclear Energy Agency of Energy Ministry of Electricity and Energy	: Radioactive Waste
Ministry of Interior	: Combustible and explosive wastes

Handling of hazardous substances can only be carried out after concerned authorities, which are six ministries mentioned above, issue permits. An Egyptian Hazardous Substances Information and Management System have been developed and provide basic guidelines and information.

According to the National Environmental Action Plan of 2002, Egyptian industries produce an estimated 4 to 4.5 million tons of solid wastes per year. Of this amount, hazardous industrial wastes form an estimated 100-150 thousand tons per year. The competent authorities involved in hazardous waste control and licensing include EEAA (and its regional branch offices), six line ministries, and the Governorate Environmental Management Units (EMU). However, EMUs are small institutions and not qualified enough, therefore, actual law enforcement system of hazardous waste is still weak in Egypt.

Photo 5.24: Hospital Wastes Dumping

Photo 5.25: Wastes Mixed with Hospital Wastes

The Hazardous Wastes Management Program of Alexandria, with the support of Finland, can be seen as a successful example of hazardous waste management. The project's second phase is currently undertaking. The controlled type landfill site of hazardous wastes was constructed by this project, and service was started in the winter of 2004. The detail about this site is described in page 98. Although, hospitals generate 25 thousands tons of hazardous wastes, Egypt has only one hazardous waste management facility in Alexandria. Generally, these hazardous wastes are dumped mixed with municipal wastes; therefore, in the Nile Delta area, where the groundwater level is high, risk on groundwater contamination is inevitably great. In addition, EEAA realized the seriousness of agro-chemical containers are dumped with municipal wastes.

The next section mentions about hazardous and non-hazardous waste management at industrial complex citing the examples of the 10th of Ramadan Industrial City.

The 10th Ramadan Industrial City

The 10th of Ramadan Industrial City is the oldest and largest industrial city in Egypt at the time of 2000.

This industrial city was established as an industrial development measure of the government. The Government of Egypt promulgated Law No. 59 of 1979 for Establishing New Communities. The law created the New Communities Authority in the Ministry of Housing, Construction and New Communities (MHCNC) to administer a City Development Agency for each new industrial city. The law provided land and utilities for industrial and residential purposes at subsidized prices. It also gave a 10-year tax exemption for all types of projects established in the new cities. By mid-1999, there were 11 new industrial cities under development with 2,352 production factories, providing about 2.7 million jobs.

The construction of the city began in 1978. The current plan is to build the city through four development phases. The first two phases have been completed. Work is proceeding on the third phase of the city and the fourth phase of the development process should be completed by 2017. By mid-1999, the number of producing industrial plants in the 10th of Ramadan reached 961 with 144,000 workers. The full-time residential population of the city is about 50,000. The other workers commute to the city daily from Cairo and Sharkia. From 1997 through 1998, USAID sponsored an initiative to design an Integrated Environmental Management System (IEMS) for the 10th of Ramadan Industrial City. As such, each city is managed by a City Development Agency (CDA) established by and reporting to the New Communities Authority in the MHCNC.

The 10th of Ramadan CDA is the responsible agency for managing solid waste in the city. Since there are 50,000 residents in this city, municipal waste and industrial waste are big issue of waste management. Recently, CDA privatized waste collecting and transfer

services and collected wastes are transferred to the existing public dumpsite, located six kilometers south to the City. In addition, much of illegally disposed garbage is seen on streets. CDA is planning to allocate budget to change above dumping site to sanitary landfill.

In this city, hazardous wastes and non-hazardous wastes are treated by the same method without separation and it means that hazardous wastes are dumped into the municipal wastes dumping site mentioned above.

In Egypt, the classification system of hazardous wastes, which is described below, follows the classification of the Basel Convention.

Egyptian Ministry of Industry Draft Hazardous Waste List (1997) and List of Hazardous Materials	1) Listed Wastes ● General hazardous waste generated from non point emission sources ● Hazardous Wasted generated from point emission sources （20 industries） 2) Hazardous Wastes which contain noxious matter 12 character include explosively Following two lists are added: Hazardous wastes which do not need permission from the Ministry of Industry and a list of hazardous wastes which required permission

According to the survey of 1999, 67 facilities in the 10th of Ramadan Industrial City had been identified as hazardous waste generators, with a total production of approximately 850 tons of hazardous waste per month. Seventeen of the facilities generate at least one ton of hazardous waste per month, representing 88 percent of the total hazardous waste generation. Two companies generate 750 tons of the total hazardous waste: Arabi for Steel, and Al Ezz Steel, which are reported as generating iron furnace slag. Other factors, nonferrous metal powder, waste oil, insulating firebrick waste of furnace, pharmaceutical waste, and asbestos are also generated.

The 10th Ramadan Industrial City has plans on separation of non-hazardous wastes include municipal wastes, recycling, final disposal facility, storage of hazardous wastes and construction of final disposal facility, however the Waste Research Group of USAID proposes the following concept which includes non-hazardous wastes from outside of the industrial city.

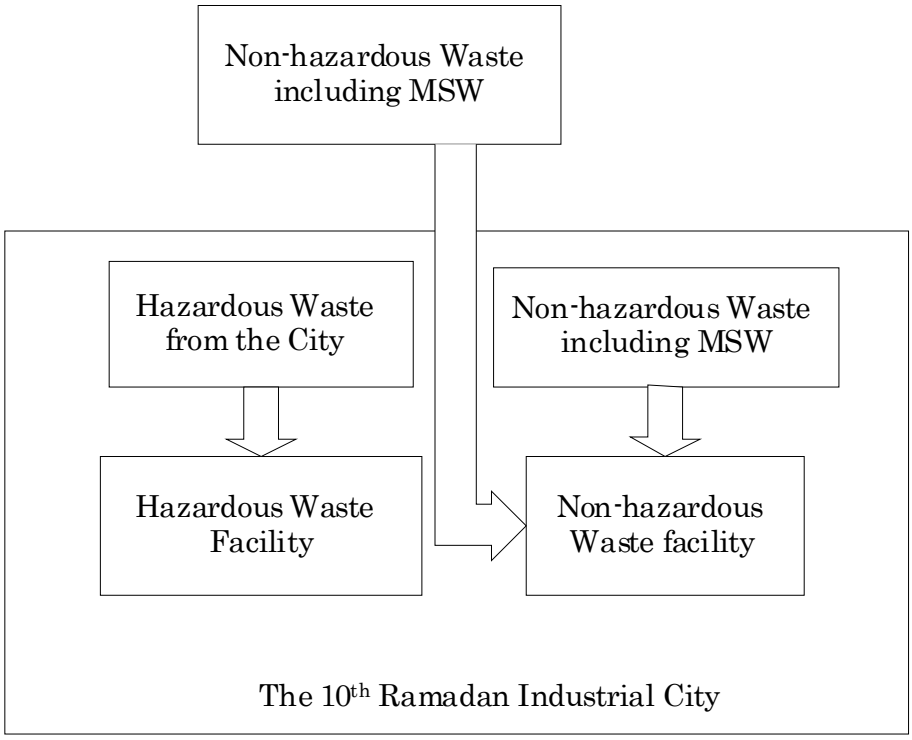


Figure 5.11: Planned Waste Management at the Ramadan Industrial City

The following Table 5.35 explains outline of the hazardous wastes landfill plan of the 10th of Ramadan Industrial City.

Table 5.35: The Outline and Costs of the Hazardous Waste Management Facility in The 10th of Ramadan Industrial City

Outline	Treatment amount of hazardous wastes; 1,000 t/month Operating life; 5 years Hazardous wastes weights 1.2 t/m3 Final cover soil is 10% of wastes The depth of the landfill 5.5m Final cover will be Ground level Occupation; 10,000m^2	
Capital cost (000L.E)	Landfill	3,500
	Building and Associated Equipment	152
	Vehicles and Heavy Equipment	620
	Design	427.2
	Subtotal	4,699.2
	Contingency Fee	704.88
	Total	5,404.08
O/M Cost (000L.E)	Personnel	200
	Maintenance and Administration	30
	Total	230

Source: Avijit Dasgupta, et al, 'Hazardous and non- hazardous solid waste management in the 10th Ramadan industrial city, Volume 1', June 2000

The next section describes the only one hazardous waste final disposal plant of Egypt, developed by Alexandria Governorate with the support from Finland. （See page 99 for photos）

- Primary contractor: Alexandria Governorate

<Outline>

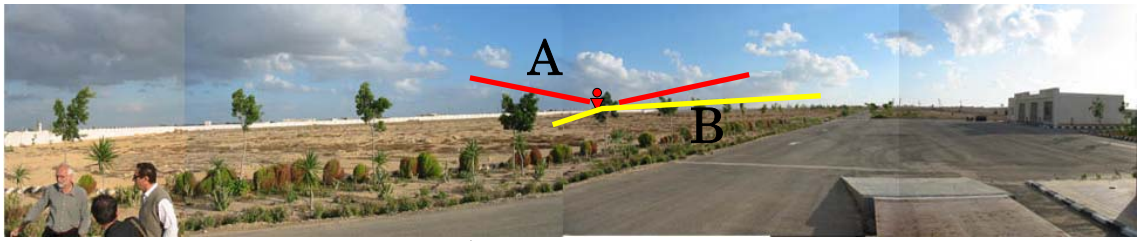
- Total area of the site: 14 hectare
- Facility: Controlled type of landfill with liner facilities, leachate holding pond, laboratory, and administration office etc.
- Construction of a physical and chemical treatment plant is scheduled to start from January or February of 2005 and begin operation from the autumn of 2005.
- Leachate Holding Pond: Store leachate at holding pond. With arid climate of Egypt, leachate will be evaporated without treatment and dispose remnant to landfill. Drainage from physical and chemical treatment plant will be also evaporated in the same way.

<Landfill Site>

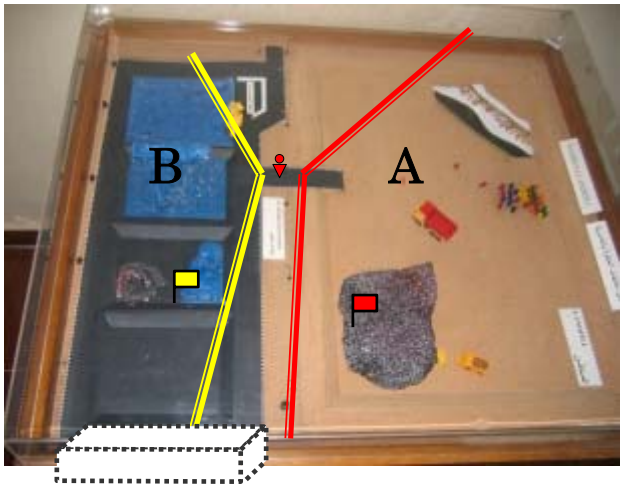
- Total area of the site: 1.4 hectare, capacity: 40,000m^3
- Lifetime of the site: assuming inflow of waste stream as 3,000m^3/year, more than 10 years of lifetime for each cell. 3 more cells can be developed.
- Height of covering soil: up to 3 meters.
- At the time of on site survey, small quantity of asbestos was accepted and as the operation of the site had just began.

<Others>

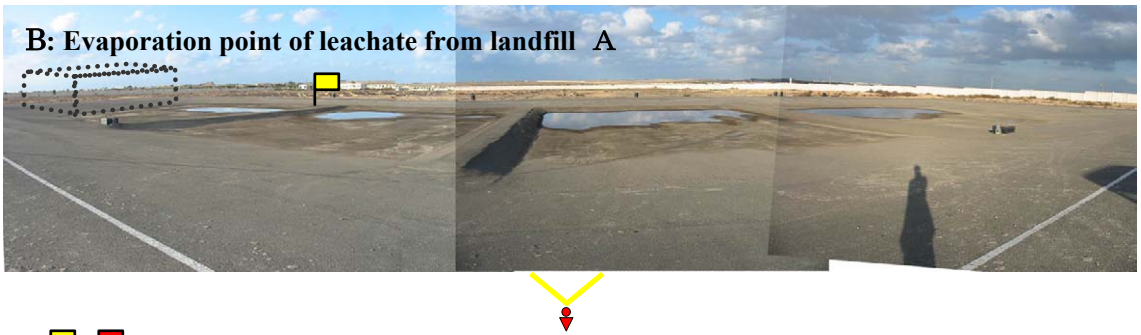
- Operation cost should be covered by user fee. However the operation had been just started and not enough wastes were coming in. Alexisandria Governorate has paid for staff wages.
- User Fee: 238 LE/ton (will be 300 LE with transportation cost)
- This site currently can not treat organic hazardous waste which need thermal treatment. There is no plan for a construction of thermal treatment facility like incinerator, however, considering to corporate with cement factory. There are two cement factories in and near Alexandria. The one is French based Lafarge and the other is Portuguese factory. Lafarge is recognized as a better partner equipped with better facilities and has many years of experiences in hazardous waste management.



1) View of the site



2) Detail model of the area shown above



show points match to the model

indicates the planned construction site of physical and chemical treatment facility. The physical and chemical treatment facility will be developed on the left of evaporation pond.

Photo 5.26: Hazardous Waste Disposal Site in Alexandria