No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF PUBLIC ENTERPRISES (MOPE)
EGYPTIAN ENVIRONMENTAL AFFAIRS AGENCY (EEAA)

STUDY ON INDUSTRIAL WASTE WATER POLLUTION CONTROL IN THE ARAB REPUBLIC OF EGYPT

FINAL REPORT
SUMMARY

DECEMBER 2000

CHIYODA-DAMES & MOORE CO., LTD.
CHIYODA CORPORATION

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1.0 Outline

1.1 The Purposes of the Study and the Procedures

The Purposes of the Study and the Procedures are:

1) To survey the current pollution due to industrial waste water(s).

2) To design the treatment facilities for industrial waste water(s) at five (5) factories already nominated. Further, to select one (1) factory where it is judged suitable to install the treatment facilities for industrial waste water(s) as "Demonstration Plant" by considering several factors to be mentioned hereinafter.

3) Develop recommendations on policy measures for industrial waste water abatement.

4) Make technology transfer through the study

1.2 Study Area

The Phase 1 Study has been authorized to address the waste water treatment system at the following five factories, located as shown on Figure 1.2.1, vicinity maps:

1. Delta Steel Mill Company
2. Egyptian Iron & Steel Company,
3. Egyptian Ferro-Alloys Company
4. El-Nasr Steel Pipes & Fittings Company
5. Mansoura Company for Resins and Chemicals

Four (4) factories are located in Cairo or its vicinity while one is located at Aswan.

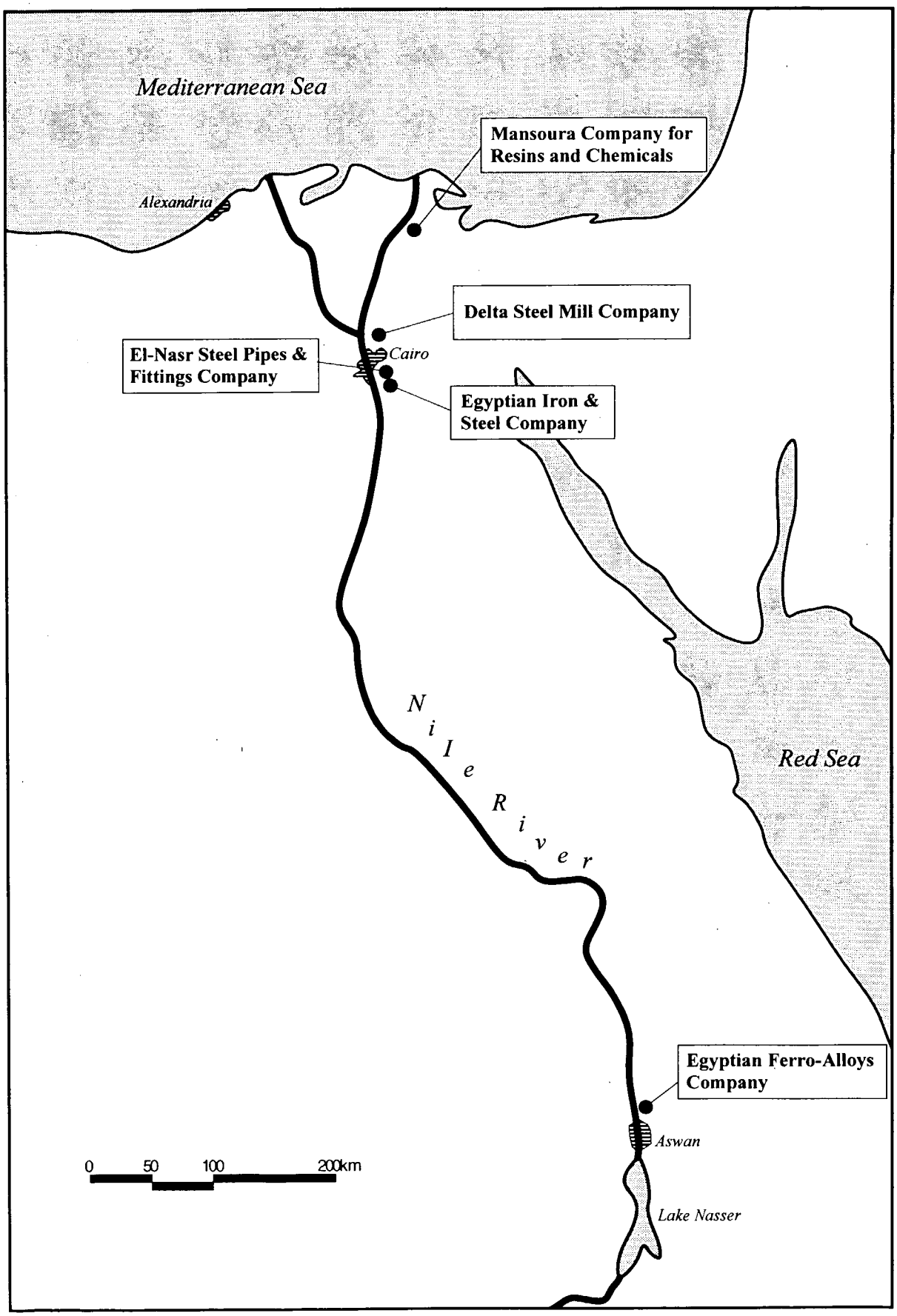


Figure 1.3.2 Study Area

1.3 Result of Study

1.3.1 Design of waste water treatment facilities

Study Team made the following design:

Conceptual Design

Conceptual design of certain waste water treatment facilities were made for 5 factory nominated. (One conceptual design for each factory: Total 3 designs)

Basic Design

Out of five (5) factories following three (3) factories were selected as representative factory:

(A) Mansoura Company for Resins and Chemicals

(B) El Nasr Company for Steel Pipes and Fittings

(C) Egyptian Iron and Steel Company (EIS)

Individual conceptual design of each factory was developed to "basic design".

Further, for EIS, another basic design was made for the new neutralizing facilities under the premises that spent sulfuric acid be never discharged to the new neutralizing facilities. Therefore, two (2) basic designs were made for EIS. (Total 4 basic designs)

1.3.2 Recommendation on Environmental Management Policy of Egypt

In reviewing the water quality control administration in Japan, especially the history of fighting with the pollution problems caused by industrial wastewater, the most suitable administration systems for water pollution control in Egypt and effective measures were discussed.

1.3.3 Technology Transfer Seminar

One seminar was held on December 6, 1999 where two topics were lectured: one was "the introduction how to treat waste water(s)" and the other one was "project execution (engineering and procurement) in

Private sector". The seminar was so successful that certain technology transfer was attained.

2.0 Outline of the Study Area

2.1 Location and Topography

Egypt is situated in the northeast corner of Africa and is located in the north latitude between 22 and 32 and the east longitude between 24 and 37. The country is surrounded on the north by the Mediterranean Sea, on the east by the Red Sea and Israel, on the west by Libya and on the south by Sudan. The total area of Egypt is 1,001,450 km^2 (about 2.7 times bigger than Japan). Over 95% of this area is desert and only 4% of this area is cultivated. Topographically, Egypt can be divided into the regions of (1) The Nile Valley and the Delta, (2) The Western Desert, (3) The Eastern Desert and (4) The Sinai Peninsula.

2.2 Population

The total population of Egypt is 62,966,000 (1996 Census) and most people inhabit either the Nile Valley or the Delta. Inhabited area constitutes 6% of the total area of the country and the rest is desert where few people inhabit scattered settlements. The population density of the total country area is about 60 people/km^2, while population density of the inhabited area is about 1,000 people/km^2.

2.3 Climatology

The climate of Egypt is dominated by a Mediterranean-type climate in the northern coastal area and a desert-type climate in the remainder of the country. Rainfall in Egypt is extremely scarce, with fewer than 50 mm in most areas, with most rainfall occurring in the winter season. Even in the wettest coastal area around Alexandria, annual rainfall is only about 200 mm. Annual rainfall in Cairo and Aswan is 24 mm and 1 mm, respectively.

2.4 Hydrology

Egypt largely depends on The Nile River for fresh water source with 98% of water supply extracted from the Nile. The Nile main water source is Lake Victoria situated near equator. Other water sources are the many streams that discharge rainwater from the Ethiopia Plateau. The Nile is the longest river in the world with a total length of 6,690km.

2.5 Ecology

About 95% of the total area of Egypt is occupied by desert, and most of the vegetation can be found in either in the Nile Valley or the Delta.

2.6 Industry

The Gross Domestic Product (GDP) of Egypt was 251,673 million LE (75,502 million US$) in June 1998. Agriculture contributes 15.7%, Mining and manufacturing contributes another 26.6%. Trade and finance make up 21.2% of GDP, while social services amount to 15.0% of GDP, and the remaining 21.5% come from various other activities. In recent years, the economy of Egypt is growing up in remarkably rapid pace. As a result, the budget deficit of GDP has been steadily declining.

3.0 Existing Water Environment of the Nile

The River Nile is the most important water source in Egypt supplying approximately 98% of Egypt's fresh water needs. In 1959, an agreement was singed between the countries located along the river course to determine each country's share from the Nile water. The agreement provided Egypt with an annual release of 55.5 billion cubic meters (BCM) per year. Actual release from the Aswan High Dam has varied between 52.9 and 57.4 BCM per year. The average yearly water consumption in Egypt has been estimated as shown in Table 3.1.

Table 3.1 Annual Water Use (unit: billion m^3/y)

WATER CONSUMED BY	Average Yearly Consumption During		
	1980-86	1990	2000
Industry	0.4	0.7	1.8
Urban consumption	1.8	2.4	3.1
Fresh water flow to sea (Edfina)	5.6	1.8	0.3
Drains to the sea	13.8	12.3	6.4
Balance: agriculture and evaporation	35.0	38.6	45.9

Source: Environmental Action Plan Egypt, April, 1992

As shown in the above Table, agriculture is the largest water consumer. This is due to the fact that 98% of irrigation is carried out by old, inefficient methods. Modern, water-saving irrigation techniques are only applied on 2% of the cultivated land and mostly in new reclaimed areas. Of the water consumed by irrigation, up to 50% is lost both through seepage from canals during conveyance and distribution of water, and on the farm as a result of poor, outdated irrigation practices. Industrial water will have increased by four-and-a-half folds between 1986 and 2000. Despite this increase, the industrial sector consumes less than four percent of the average yearly flow out of Aswan High Dam.

The use of industrial water is summarized as follows:

- The industrial sector obtained about 90% of its total water needs from the Nile and Canals.
- The industrial activities in the Greater Cairo region and in Alexandria consume approximately 40% of the total industrial water use.
- The food industry is the largest water consuming industry.

The following governmental institutions in Egypt have been conducting water quality monitoring in the Nile:

- Drainage Research Center (Ministry of Public Works and Water Resources)

- Nile Research Center (Ministry of Public Works and Water Resources)
- Environmental Monitoring and Occupational Health Center (Ministry of Health)

From the results of water quality monitoring, current situation of a water quality and problems of the Nile River can be summarized as follows:

- In general, concentrations of pollutants are becoming worse toward the downstream zone. In other words, pollutants exceeding a natural purification capacity have been discharging into the Nile River.
- In view of the facts that concentrations of some pollutants are much higher than background level at specific points, it is assumed that some factories have been continuously discharging large amounts of pollutants.
- Higher nutrients (nitrogen, phosphorus) concentration in the Nile Delta is possibly caused by a runoff of fertilizer from agriculture land and untreated sanitary wastes.

Table 3.1 shows the variation of COD along the River Nile, as example.

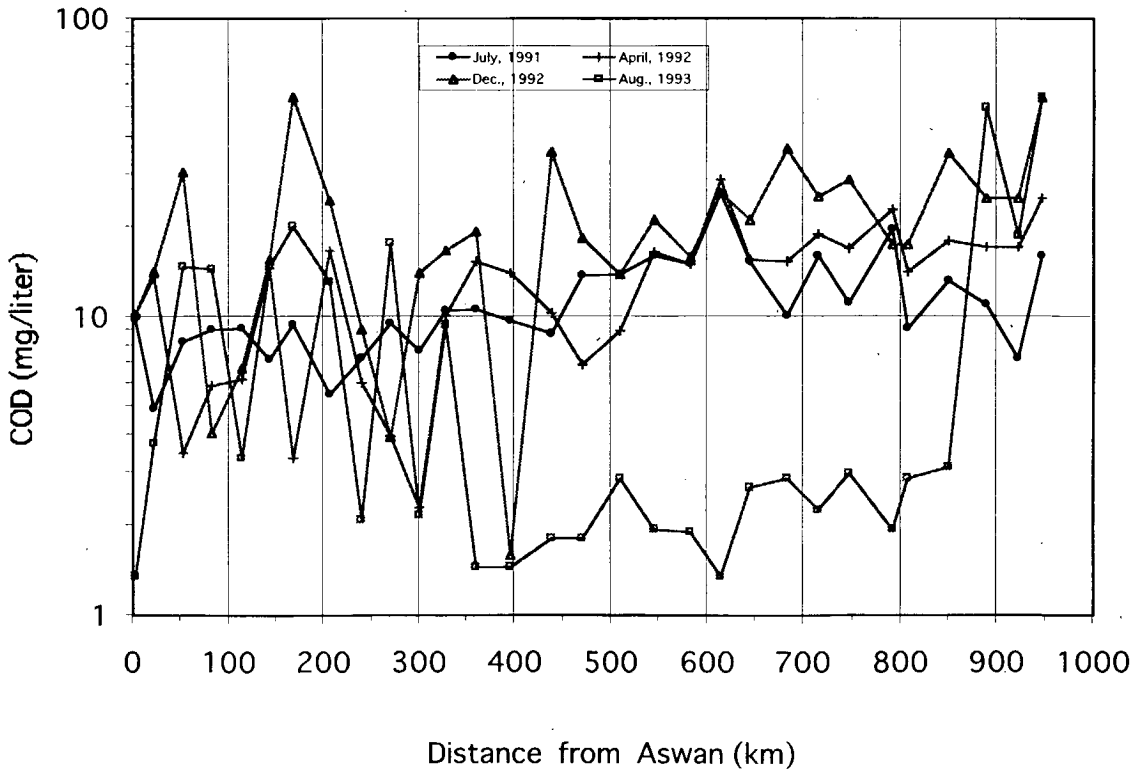


Table 3.3 the variation of COD along the River Nile

Current situation of potential sources of water pollution are as follows:

(1) Agricultural Source

Out of the 79 agricultural drains, 72 drains discharge their waters into the main river from Aswan to Cairo. Five of these drains discharge their waters into the Rosetta branch; while the remaining 2 drains discharge their waters into the Damietta branch.

(2) Industrial Source

A total of 59 industrial outfalls are loacted along the main stream of the Nile. In upper Egypt, there are varieties of industries including sugar, fertilizer, paper pulp, aluminum, food production. Sugar factories, which are the main industry in upper Egypt, are located in Kom Omub, Edfu, Armant, Ques, Deshana and Naga Hammadi. In the south region of Cairo (Hawamdia, El Tibeen and Helwan), factories including iron and steel, coke and fertilizer, wood processing, sinning and weaving, sugar are located.

(3) Municipal Source

There are a few direct discharges of municipal waters into the Nile. Most of the municipal wastewater is discharged to the Nile through agricultural drains.

The National Environmental Action Plan of 1992 indicated that, in 1989, wastewater discharge from the various industries was as summarized on Tables 3.2 to 3.4.

Table 3.2 Industrial Waste water Discharge Area and Volume (1989)

Region	Number of Factory	Discharge Area and Volume(Mm^3/year)				
		Nile	Canal	Sew. canal	Lakes	Total
Upper Egypt	35	192	5	2	5	204
Cairo	126	80	21	20	7	128
Nile Delta	60	27	85	13	1	126
Alexandria	85	13	7	33	35	88
Other	24	0	0	3	1	4
Total	330	312	118	71	49	550

Source: Environmental Action Plan Egypt, April, 1992

Table 3.3 Pollutant Load at Each Region (1989)

Region	Pollutant Load (ton/day)					
	BOD	COD	OIL	SS	TDS	Heavy Metals
Upper Egypt	72	37	5	68	532	0.20
Cairo	71	120	93	97	135	0.75
Nile Delta	34	42	24	86	224	0.50
Alexandria	91	186	45	40	246	0.17
Other	2	3	1	5	15	0.03
Total	270	388	168	296	1152	1.65

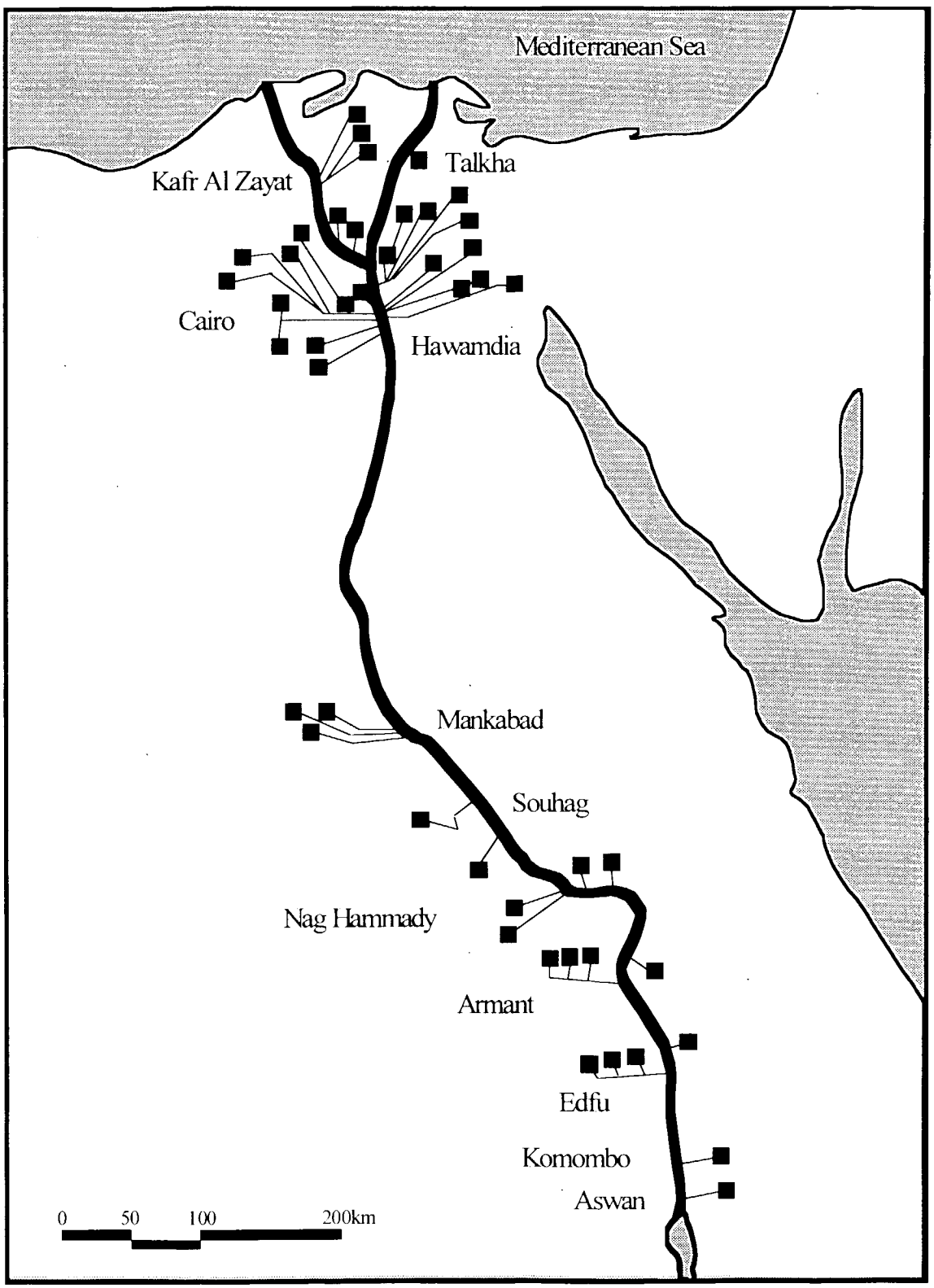
Source: Environmental Action Plan Egypt, April, 1992

Table 3.4 Pollutant Load from Each Industry (1989)

Industry	Pollutant Load (ton/day)					
	BOD	COD	OIL	SS	TDS	Heavy Metals
Chemical	26	178	23	33	241	0.94
Food	182	142	110	168	666	0.17
Textile	39	47	24	64	191	0.30
Engineering	5	7	2	3	13	0.03
Mining	15	14	8	24	29	0.20
Metal	3	0	1	4	11	0.01
Total	270	388	168	296	1152	1.65

Source: Environmental Action Plan Egypt, April, 1992

As shown in the above Tables, industries in the Greater Cairo region and in Alexandria discharged about 40% of the total industrial water use and drainage. Pollutant load from food industry contributed more than 50% of the BOD load, while the heavy metal discharge originated for almost 60% from the chemical industry. However, industrial pollutant load has been reduced by implementation of industrial wastewater treatment projects for major pollution sources.



Source: Drainage Research Center, Reuse Monitoring Program, Yearbook 1994/95, Drainage Water in the Nile Delta, Report 40

Figure 3.1 Location of Industrial Effluent

4.0 Environmental Administration

4.1 Organization

The assigned counterpart of the project are Egyptian Environmental Affairs Agency (EEAA) and Ministry of Public Enterprise (MOPE). The administrative organization for industrial waste water is Ministry of State for Environmental Affairs (MSEA), EEAA, Ministry of Industry (MOI), Ministry of Housing and Utilities (MHPU), Ministry of Irrigation Water Resources (MIWR) and Ministry of Health and Population (MOHP). An organization chart of administration for industrial waste water is shown in Figure 4-2.

4.2 Legislation

(1) Law No.4

Law No.4 was enacted in 1994, which is a law of comprehensive principles for environmental protection and management. Law No.4 provides responsibility of EEAA, environmental protection fund, incentives, protection of soil pollution, protection of air pollution, protection of water pollution and penalties. Law No.4 sets effluent standards for wastewater discharges to the marine environment. Prime Minister's Decree No.338 was promulgated in 1995 to provide detailed rules in implementation of the Law No.4.

(2) Law No.93

Law No.93 of 1962 regulates the discharge of waste water to public sewage and stipulates that licenses be obtained from the MHU prior to any discharge. According to the law, water from commercial and industrial waste water is sampled by the MHU, to check the compliance of industries and commercial establishments to the specifications and standards set by the Ministry itself. The Ministry of Housing and Utilities Decree No.643 was issued in 1962 to implement Law No.93. The decree sets the standards for wastewater discharge to public sewage.

(3) Law No.48

Law No.48 of 1982 for the protection of the River Nile against pollution, also regulates the quality of the wastewater discharged to the Nile and its waterways, and sets standards for such discharges. The administration responsible for the enforcement of Law No.48 is the MIWR. The Ministry of Housing and Utilities Decree No.8 was issued in 1983 to implement Law No.48. The decree sets the standards for wastewater discharge to the Nile and its waterways, and ambient water quality standards for two categories of non-potable water and potable water. Law No.48 stipulates that licenses be obtained from the MIWR prior to any discharge. MOHP

has the obligation for the monitoring of effluent from the facilities.

5.0 Current Status of Industrial Waste Water Pollution Abatement

There are many industries which waste water is discharged into the Nile River. Current status of Industrial waste water treatment is described the following sections based on the case study :

- Industrial waste water treatment project (Nile Pollution Prevention Program)
- Environmental management

5.1 Nile Pollution Prevention Program

The Ministry of State for Environmental Affairs (MSEA) decided in early 1997 to place the prevention of industrial wastewater to the Nile at the top of the environmental project. The MSEA initiated a national program to prevent direct discharge of industrial waste water into the Nile.
The Nile Pollution Prevention Program (NPPP) was officially launched in July 1997, with a firm deadline to complete all program activities by 31 December 1998.

The initial phase of NPPP, which focused on the identification of industrial sources that discharge effluents in the Nile, was completed in July 1997. Soon after, a crash program involving diagnostic environmental audits was begun in order to formulate specific PP Project proposals that were cost-effective, feasible, and relevant to the needs of the 34 targeted industries. The industries include oil and soap, fertilizer, petroleum refining, sugar refining, glass and crystal, cement, iron and steel, flour mill, beverage, starch and glocose, pulp and paper, dairy and ferrosilicon.

Investment Mobilization of L.E. 350 million by 34 major industries to stop the direct discharge of 100 million cubic meters/year of polluted industrial waste water into the river Nile and effective environmental alternatives implemented by December 1998.

5.2 Environmental Management at Factories

5.2.1 Environmental Audit at Food Industry

Environmental industrial auditing conducted at a food industry factory is reported. Water related issues identified by the audit are as follows:
It is estimated that 30-40 m3 of water are consumed per ton of fish processed. This is an enormous quantity and leads to a large hydraulic flow to pick up contamination. High organic load exists in the industrial waste water and also high values of oil and grease in the oil plant waste water. No public sewer system exists and both sanitary and industrial waste water are discharged into the Nile.

5.2.2 ISO 9000 and ISO 14000

Awareness of international standard ISO 9000 series for Quality Management System (QMS) and ISO

14000 series for Environmental Management System (EMS) have not yet substantially spreaded in Egypt. According to information of Management Development Center for Industry (MDCI) which is a management training center under MOPE, about 350 factories have been certificated for ISO 9001 while about 30 factories have been certificated for ISO 14001.

5.3 Summary

The Nile Pollution Prevention Program contributed to reduce pollution loads of waste water from 34 major industries to the Nile River. Proper operation and maintenance of the waste water treatment plant are required to assure continuous compliance of the effluent with standards. Regular monitoring is also required to check compliance level of the waste water with standards.

Most factory discharge untreated waste water into the Nile river or sewers. In addition of waste water treatment plan, feasible waste water management at production sites is required to reduce waste water discharge and to improve waste water quality. It involves the judicious use of resources through source reduction (recycling within a process, material substitution, process modification), reuse of input materials and reduced water consumption.

Not many factories have been established an environmental management system when compared with the number of ISO 14001 certificated factory and a total number of industrail factories. The Egyptian government has issued policy directives to promote environmental management systems by ISO 14001 certification. However, factories have not fully implemented nor understood the importance of the environmental management system. Awareness, education and training for management and employees are required to spread environmental management in factories

6.0 Present Status of Industrial Waste Treatment and Disposal

The volume of industrial hazardous wastes generated in Egypt is estimated to be approximately 50,000 tons per year. The volume of industrial wastes generated in the Greater Cairo Area alone is estimated to be approximately 77,000 tons per year (solid waste is 32,000 tons per year, remainder is mostly sludge).

Prime Ministerial Decree No. 338 of 1995, the Executive Regulations of the Law No.4 on Environment provide rules for permitting, collecting, storing, transporting, treating, handling, disposing and monitoring of hazardous materials and wastes. A special license is required to use and handle hazardous materials and wastes. To obtain the license, an application must be submitted including:

- Full description of materials and waste
- Method of collection
- Means of transportation
- Methods of storage
- Method of disposal
- Record keeping
- Covenants not to mix hazardous materials or waste with other non-hazardous materials

The treatment facility for hazardous materials or waste must not be located within three kilometers from the nearest residential or urban areas. The treatment site must also satisfy the following conditions:

- Site must have an adequate capacity to handle the estimated quantity of hazardous materials or waste treated
- Site must be completely enclosed
- Site must have adequate access and evacuation route
- Site must have adequate water supply
- Site must have a proper occupational health protection plan
- Site must have sufficient communication means
- Site must have adequate and safe storage areas
- Site must have an adequate incineration capacity
- Site must have dedicated marking equipment
- Site must have a dedicated, properly-constructed area for waste burial

In many cases, however, an off-site disposal is presently done without consideration of the nature of the waste and without due identification and segregation of suspected hazardous wastes. One or more of the following venues are pursued:

- Sale by auction or through specific contractors without knowing what the waste final

destination will be and without responsibility to the waste generator.

- Disposal under contract with a contractor or the municipality whereby the wastes are transported and disposed of by the contractor or the municipality. In most cases, these wastes will find their way to the public dumps – or even illegally dumped in vacant lots or public places.
- Illegal dumping in vacant spaces

JICA Study Team visited the Dumping Site No.4 of Helwan Industrial Area on September 14, 1999, and observed the significant gap between regulations and state-of-practice at the waste dumping site.

7.0 Water Pollution Control and Management Project in Egypt

In Egypt, the prevention and improvement of environmental pollution has been handled on a project-by-project basis, and many projects have been executed with the assistance of foreign countries.

Table 7.1 summarizes the major environmental projects executed or planned by Oversea Donors related with Egyptian Environmental Affairs Agency (EEAA).

Table 7.1 Major environmental projects and by Oversea Donors related with EEAA

Donor	Project Title	Budget	Duration
USAID (U.S.A.)	Cairo Air Improvement Project (CAIP)	US$ 35 mil. (planned US$ 60 mi.)	1995-
	Integrated Environmental Program for the 10th of Ramadan City		
	U.S Egyptian Partnership for Economic Growth and Development - Lead Exposure Abatement Plan (LEAD)		
	Program for Eco-Tourism Development in Egypt		
	Egyptian Environmental Policy Plan (EEPP)		
DANIDA (DENMARK)	Environmental Education and Training Program (EETP)	DKK 10,197,996	1995-
	Organization Support Program (OSP)	Phase 1: DKK 13.5 Million (approx. LE 7 Million) Phase 2: DKK 23.6 Million (approx. LE 12 Million)	1993-
	Environmental Information and Monitoring Program (EIMP)		1996-
	North Sinai Governorate Environmental Action Plan		1994-1997
	Development of a National Integrated Coastal Zone		
	Design of Economic Instruments Project (DEIP)	(Potential)	
	Pilot Project for Hospital Waste Management Program for Specified Hospitals in Cairo, Phase 1 & 2		1995 -
	Technical Support to the Shore Protection Authority (TSSPA)		
	Training in Urban Sewer Modeling (TUSM)		
	Aswan Governorate Environmental Management Unit (AGEMU)	(Potential)	
	Industrial Waste Management and Energy Conservation For Aswan Fertilizer Complex of the Egyptian Chemical Industries	(Potential)	
	Establishment of Shore-Based Oil Water Treatment Facilities in Suez and Alexandria.	(Potential)	
	Updating of the National Oil Spill Contingency Plan.	(Potential)	
	Preparation of Safe Landfill for Hazardous Residuals from Industrial Production.	(Potential)	
	Technical Assistance to Coastal Research Institute and Hydraulic Research Institute	(Potential)	
	Environmental Non-Governmental Organizations (ENGO) Support Program	(Potential)	
	Community Action for the Environment (CAFE)		
	Environmental Business Egypt (EBE)		

Table 7.1 Major environmental projects and by Oversea Donors related with EEAA (continued)

Donor	Project Title	Budget	Duration
CIDA (CANADA)	Egyptian Environmental Information System (EEIS)	CD$ 11,200,000	1997-2002
	Egyptian Environmental Initiatives Fund (EEIF)		
UK DFID (U.K.)	Support to Environmental Assessment and Management Program		2000-2004
	6th of October Abatement Initiative	(Potential)	
	National Industrial Pollution Prevention Program (NIPPP)	(Potential)	
FINNIDA (FINLAND)	The Egyptian Pollution Abatement Project (EPAP)		1997-2002
	Hazardous Waste Management Project in Alexandria	(Potential)	
DGCS (ITALY)	Enhancement of the Organization and Capabilities to Preserve Cultural Heritage Assets of Egypt	(Potential)	
	Decision Support for Agricultural Water Resource Planning Based on Ecological Balance	(Potential)	
	Environmental Protection in Siwa and Fayoum Oases	(Potential)	
WORLD BANK	Pollution Abatement Fund for industry	$ 20 million from IBRD $ 15 million from IDA $ 5.5 million from Finland $ 19 million from the European Investment Bank	
KFW (GERMANY)	Environmental Protection Facility for Public sector Industries	$33.5 million	
JICA (JICA)	Environmental Monitoring Training Project		1997-2002

Major projects implemented by the Government of Egypt for industrial wastewater abatement are as follows:

(1) Nile River Clean Up Program

The initial phase of this program, which focused on the identification of industrial sources that discharge effluents in the Nile, was completed in July 1997. Soon after, a crash program involving diagnostic environmental audits was initiated in order to formulate specific PP Project proposals that were cost-effective, feasible, and relevant to the needs of the 34-targeted industries. This fast track activity was successfully accomplished by the end of September 1997. The 34 major industries allocated about 350 million Egyptian pounds to stop the direct discharge of 100 million cubic meters/year of polluted industrial wastewater into the river Nile and to implement effective environmental alternatives by December 1998.

(2) The Egyptian Pollution Abatement Project (EPAP)

This project has been conducted under the financial support of The World Bank and IBRD. The

Finnish Ministry of Foreign Affairs (FINNIDA) is proving technical and institutional support to the stakeholders.
Major activities of this project are:

- Training and developing staff capabilities at the Environmental Management Units (EMUs) within the four governorates of Cairo, Alexandria, Qalyoubia and Suez and at the EEAA's Regional Branch Offices (RBOs) to manage industrial pollution issues, by developing procedures and guidelines, and by providing basic facilities necessary for monitoring and supervision;
- Developing Governorate Industrial Pollution Abatement Plans (GIPAPs);
- Promoting the reduction of industrial pollution by helping fifty major polluting industries by the development of Pollution Abatement Action Plans (PAAPs), the identification of cleaner production alternatives and environmentally sustainable investments and, the progress towards compliance with the requirements of environmental laws;
- Assisting banking institutions in the identification of mechanisms to evaluate environmental financing applications and develop financing procedures and opportunities; and
- Building the capacity of NGOs and the media to raise environmental awareness, enhance participation, and mobilize public opinion for a safe and healthy industrial environment.

(3) Support for Environmental Assessment and Management (SEAM)

The purpose of this project is to show the big benefits of pollution control by the modification of processes, through demonstration projects focusing on three sectors: textiles, food and oil & soap. Under the financial support of the UK Department for International Development (DFID), fifteen demonstration projects are being implemented in 23 sites. Additional work is also being carried out to identify technologies which could be implemented across the sectors, the so-called "hub technologies".

(4) Environmental Protection Facility for Public Sector Industries

The objective of this project is to finance investments for mitigating environmental impact of the Egyptian Public Sector industry and utilities. The Kreditanstalt Fur Wiederaubau (KFW) funds the project. This is providing also technical assistance for the preparation of the investment projects. In the start-up phase of the project, finance was concentrating on the reduction and/or treatment of wastewater at the plant level of companies.

(5) Compliance and Enforcement Program

Joint teams representing EEAA, Ministry of Manpower and Public Works, and Water Resources undertook the inspection of more than 50% of a total of 200 industrial facilities with capital investment exceeding L.E. 2 million. An additional 400 factories will be inspected during 1999.

Inspection reports are shared with other industries. In addition, follow up on the implementation of environmental interventions is conducted.

8 . Industrial Wastewater Survey and W.W.T Design

8.1 Implementation of Industrial Wastewater Survey

To proceed the conceptual design of W.W.T. demonstration plant for candidate 5 factories, the Study Team surveyed the outline of the factories by hearing and measured wastewater flow rates and water qualities at site.

The candidate 5 factories are as follows:

(1) Delta Steel Mill Co.

(2) Egyptian Ferroalloys Co.

(3) El Nasr Co. for Steel Pipes and Fittings

(4) Mansoura Co. for Resins and Chemicals

(5) Egyptian Iron and Steel Co.

8.2 Conceptual design

Based on the survey results, typical wastewater were selected and the conceptual design for W.W.T. demonstration plant was carried out.

(1) Design of wastewater treating system

(2) Design of major equipment

(3) Design of layout plan

(4) Rough estimation of plant construction cost

8.3 Selection of 3 Representative Factories and Basic Design

The 3 representative factories were selected comparing with " Selection Criteria for Representative Factories " written on M/M of S/W and based on the results of the conceptual design.

As a result, the following 3 factories were selected under mutual agreement.

(1) El Nasr Co. for Steel Pipes and Fittings (NSP)

(2) Mansoura Co. for Resins and Chemicals (MRC)

(3) Egyptian Iron and Steel Co. (EIS)

The basic design of W.W.T. demonstration plant for each factory was proceeded by developing the conceptual design and referring the results of additional wastewater survey.

8.4 Selection of the Demonstration Factory

Based on the selection conditions of the Demonstration Factory, EIS Factory was decided preliminarily after completion of the basic design work.

But, it was cleared that the estimated construction cost of demonstration plant was extremely high comparing with JICA's budget.

Therefor the Study Team tried some case studies to decrease the construction cost, but it was impossible to reach the JICA's budget.

Also, the Egyptian Side proposed some ideas to decrease the cost and to implement construction of a demonstration plant, but the Study Team decided any case could not meet the "Selection Criteria of the Demonstration Factory".

As a result, the implementation of the demonstration plant (Phase 2) was given up reluctantly and the Egyptian Side agreed.

8.5 Implementation of Basic Design (Modified case)

The following study and design for EIS were added.

(1) Basic Design (Modified Case)

The basic design of neutralization plant for Pickling Plant in EIS was proceeded under the condition that the spent sulfuric acid recovery (SSAR) unit would be completed.

(2) Technical Evaluation of SSAR unit Revamping Plan

EIS was under studied to improve the existing SSAR unit. The Study Team evaluated and commented technically about the revamping plan of EIS .

8.6 Compilation of Design Package

The design package consist of the following materials was prepared.

(1) Conceptual design

(2) Basic Design

(3) Study Report for Basic Design

(4) Calculation Sheet for Basic Design