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EGYPT IRRIGATION IMPROVEMENT PROJECT

TECHNICAL PROGRESS REPORT

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# I. REGIONAL IRRIGATION IMPROVEMENT PROJECT

## 1.0 INTRODUCTION

The goals, objectives, and strategy for this project are outlined in this section.

### 1.1 Goals

The main goals of the project are to:

1. Develop methods and procedures to rehabilitate and improve irrigation systems on Egypt's old lands;
2. Develop capabilities of the RIIP staff to undertake a national program to rehabilitate and improve irrigation systems.

### 1.2 Major Objectives

The major objectives are to:

1. Implement a systematic approach to evaluate existing irrigation systems, identify their problems, and to plan their effective rehabilitation and improvement;
2. Train the staff of RIIP to undertake all phases of investigating, planning, and executing a rehabilitation project in the National Irrigation Improvement Program;
3. Undertake the rehabilitation of the Serry canal command by prioritized unit command areas (UCA);
4. Procure state-of-the-art and technologically advanced equipment for data collection and analysis, to make design calculations and drawings, and to inspect and supervise construction;
5. Organize Farmers to operate their water courses, through cooperation among themselves and with officials, and to develop an Irrigation Advisory Service to assist farmer leaders to operate and maintain the system below the distributary channel level.

1'

### 1.3 Strategy

The strategy in this project is to formalize a step-by-step process through which individual UCAs of the Serry canal command can be rehabilitated and improved. By following the steps in improving a few UCAs, RIIP engineers can learn the procedures and the various techniques involved in the process. The recommended procedure is outlined as follows:

1. Define the problems and constraints of the UCA, including social, agronomic, economic, as well as the physical aspects;
2. Examine alternative improvement measures to alleviate or to mitigate these problems;
3. Develop detailed plans and specifications of the selected plan;
4. Reconstruct and rehabilitate the system according to the detailed plans;
5. Implement system operation with farmer cooperation and participation;
6. Monitor, evaluate, and update the system to avoid major future rehabilitation.

## 2.0 TECHNICAL PROGRESS

### 2.1 RIIP Organization (Reorganization)

The Regional Irrigation Improvement Project (RIIP) was reorganized at the end of the year. The Ministry of Irrigation was itself reorganized and renamed the Ministry of Public Works and Water Resources in November. There are five organization charts attached hereto which depict the new RIIP reorganization.

The Head of the RIIP Sector is a First Under Secretary, located in Cairo. There is to be one Under Secretary for Upper Egypt located in Minya, and another Under Secretary for Lower Egypt to be located in Kafr El Sheikh. Under each Under Secretary there are three General Directors. For Upper Egypt there is one for Upper Egypt, located in Esna, one for Middle Egypt, located in Minya, and the third for Fayoum, located in Fayoum. For

Lower Egypt there is one General Director for West Delta, to be located in Alexandria, a second for Middle Delta to be located at Kafr El Sheikh, and a third for East Delta at Zagazig.

The Headquarters Organization will consist of two General Directors under the First Under Secretary. There will also be four Directors responding to him directly. A Technical Director, a Director for Security and Public Relations, a Director for Finance and Administration, and a Director for Training and Farmer Organizations. In addition there will be a Secretariat reporting directly to him. Consultants and other Experts are also shown reporting to the First Under Secretary directly as well. The first General Director, who is responsible for Planning and Evaluation will have three Directors reporting to him, one each for Monitoring, Evaluation, and Planning. The second General Director will be responsible for design, and he will have two Directors, one responsible for design, and the second for Specifications and Contracts.

The organization for Upper and Lower Egypt is divided into Sections, each headed by a Director. There are 8 Sections for Lower Egypt, at Damanhour, Nubariya, Tanta, Shabin El Kom, Kafr El Sheikh, Benha, Ismailiya, and Zagazig. There are 6 Sections for Upper Egypt, at Esna, Sohag, Assiut, Minya, Beni Suef, and Fayoum. Each General Director will be responsible for planning, designing, executing, placing the rehabilitated system into operation, and evaluation the improvements of irrigation commands included in his project area. In addition, he is responsible for carrying out the necessary administration duties attendant to the project. The Section Directors will assist him in designing and executing the various projects designated for improvement, and to place them into operation.

## 2.2 Serry Command

Although the procedure for planning and executing a rehabilitation project, outlined in the first section, is straightforward, there have been difficulties in implementing the step-

by-step procedure in logical sequence. The reasons are many, but important among them is pressure from within the Ministry to show progress in the project, which forces RIIP staff often to short-cut the procedure and proceed directly to design and construction without thoroughly investigating and defining the problems that are to be solved. The problems of Egypt's irrigation systems are believed to be well understood and solutions are pre-empted based on the those pre-conceptions. Nevertheless, some progress is being made in the Serry canal command area and is described in this section of the report.

### 2.2.1 Serry Canal

Construction of three regulators, replacing old structures in the Serry canal, has been completed. The first, Balansora, is at 19.8 km, the second, Demshow, is at 29.9 km, and the third, Fellahin, is at 49.6 km. The unsteady-state analysis for canal operation has been completed and the results indicate that all the existing regulators in the Serry canal are required for effective control of flows and water levels along the Serry canal. In view of the conditions of the existing regulators, all eleven (eight additional) will have to be replaced.

### 2.2.2 Herz-Numaniya UCA

A request for tender offers for improving the (103) mesqas in the Herz-Mumaniya UCA has been made. A contract for construction is expected to be let in February 1988. A feasibility report for mesqa improvements in the Herz-Numaniya UCA is being prepared. Designs which form the basis for the request for tenders are based on two types of mesqa improvements, a raised lined mesqa with a single point lift (at the head), and a low pressure pipeline. The decision for these designs were based on a need to demonstrate recognizable improvements for mesqas.

Extensive sociologic activity preceded the tender request, and reports on those activities are in preparation. Farmer Organizations have been started at the mesqa and branch canal

levels. Farmer leaders have been identified for every mesqa, and Mesqa Committees are in the process of being formed. It is planned that Canal committees will be organized from among the mesqa leaders.

The automatic radial gates with downstream water level control were delivered in October, 1987. They will be installed during winter closure in January, 1988.

Lining of the Waselet-Herz-Numaniya canal (600 m), and 2 km of the Numaniya canal has been completed. Lining of 2 km of Herz canal will be completed in February. The lining, which consists of 25 cm by 50 cm concrete blocks 7 cm thick, is primarily to prevent weed growth along the banks and to maintain channel alignment.

#### 2.2.3 Beni Ibeid UCA

Construction of three structures for the automatic radial gates on the Beni Ibeid UCA was started in December. Preliminary agronomic surveys are being undertaken in preparation for the first step of the rehabilitation process, that of problem identification. After the agronomic surveys, specific hods and mesqas will be selected to determine the agronomic, sociologic, economic, and irrigation problems that exist in this UCA. Feasibility studies of improvements will follow the problem identification phase.

#### 2.2.4 Beni Mazar Area

The problems of this UCA were studied in various stages throughout the year and a problem definition report was prepared. A principal problem is a restrictive structure in the main drainage channel, Ashraf El Bahry. The structure often keeps the water levels in the drainage channels high, well above the outlets of the tile drains. Portions of the agricultural land in this UCA are periodically waterlogged and salinization is readily evident, especially between the villages of Shulqam and Ashruba. High soil salinity is a major cause for poor crop yields in this UCA.



Detailed land surveys of the area are being made by the Survey Authority in preparation for feasibility studies of improvement measures. Detailed surveys of the drainage channel at the problem area are also being made in preparation for proposals to solve the problem.

### 3.0 TRAINING

Training of RIIP personnel continued through the reporting period. Out-of-country short courses are concentrated during the summer and fall but the on-the-job training is continuous throughout the year. Senior level personnel have participated in their second out-of-country short course in this project, but many Junior level Engineers have not yet been scheduled for such training. The major constraint for them is lack of English language proficiency. In Cairo, English language training has been scheduled at the American University of Cairo, but in Minya, training has been through voluntary after-hour participation in seminars conducted by English speaking Egyptian staff and by the resident CID staff. Such training has been less than satisfactory, however, and a more formal course for English language training through Minya University is being investigated.

#### 3.1 Out-of-Country Short Courses

Hanaa Rasmy, a staff member from Headquarters, and Laila Hussein from the Department of Planning and Follow-up attended a short course at CSU in July entitled "Pressurized System Trials in Gravity Projects". Two additional staff members from Headquarters, Nadia Welson and Essam Barakat, attended in September a short course at CSU entitled "Monitoring Evaluation Feedback and Management of Irrigation Systems". Two senior staff members from Headquarters, Hassan Shouman and Ramses Bakhoun, attended a third short course at CSU in November entitled "Management of Research, Training, and Extension in Irrigation Management".

#### 3.2 In-Country Short Course

A special surveying short course was held in Minya by Dr. Al

Barnes and Rashwan Ibrahim. This course was a continuation of the short course held in Fort Collins in June, 1987. A follow-up course is planned for March, 1988 which will complete the integration of the electronic surveying instrument with the micro-computer and result in a computer drafted output of the field survey data.

### 3.3 On-The-Job

Engineers in Minya are receiving considerable on-the-job training in all aspects of the work, from preliminary survey work to design of canals, mesqas, and structures, and supervision of construction. Design of mesqas for the Herz-Numaniya UCA is being completed by Engineers in Minya with guidance and assistance from Dr. Biggs and from Engineers in Cairo.

### 4.0 TDY SERVICE

The following specialists served with RIIP during the reporting period:

Mr. Herb Mattingly and Wes Farley, from the SRP in Phoenix, served four weeks in July to supervise the startup of shotcrete canal lining work in the Bahieg canal.

Dr. Gary Gosnell, a private consulting engineer, worked four weeks with Engineers in Shoubra on pre-stressed and pre-cast concrete designs. Pre-cast structures will be used in the rehabilitation and improvement of mesqas in the Herz-Numaniya UCA.

Dr. James Layton worked with Dr. Abdulla Saber in Minya organizing farmers in the Herz-Numaniya UCA in preparation for improvement of mesqas throughout the UCA. He also worked with Dr. Shafia Sallam in Cairo on the Sociology report for the Beni Mazar area.

Mr. Tim Martin worked with the Remote Sensing Center in July to finalize the soil classification work for the Serry Canal command. Soil classification maps and colored maps from Landsat data were prepared by the Remote Sensing Center. The final report of the work is in preparation.

Dr. Wayne Clyma, Dr. James Layton, and Mr. David Levine worked for a month in Minya and Cairo preparing plans and developing background for the Irrigation Advisory Service. Part of the preparation work requires key Egyptian personnel to travel to CSU for intensive work and training to further develop and finalize IAS plans.

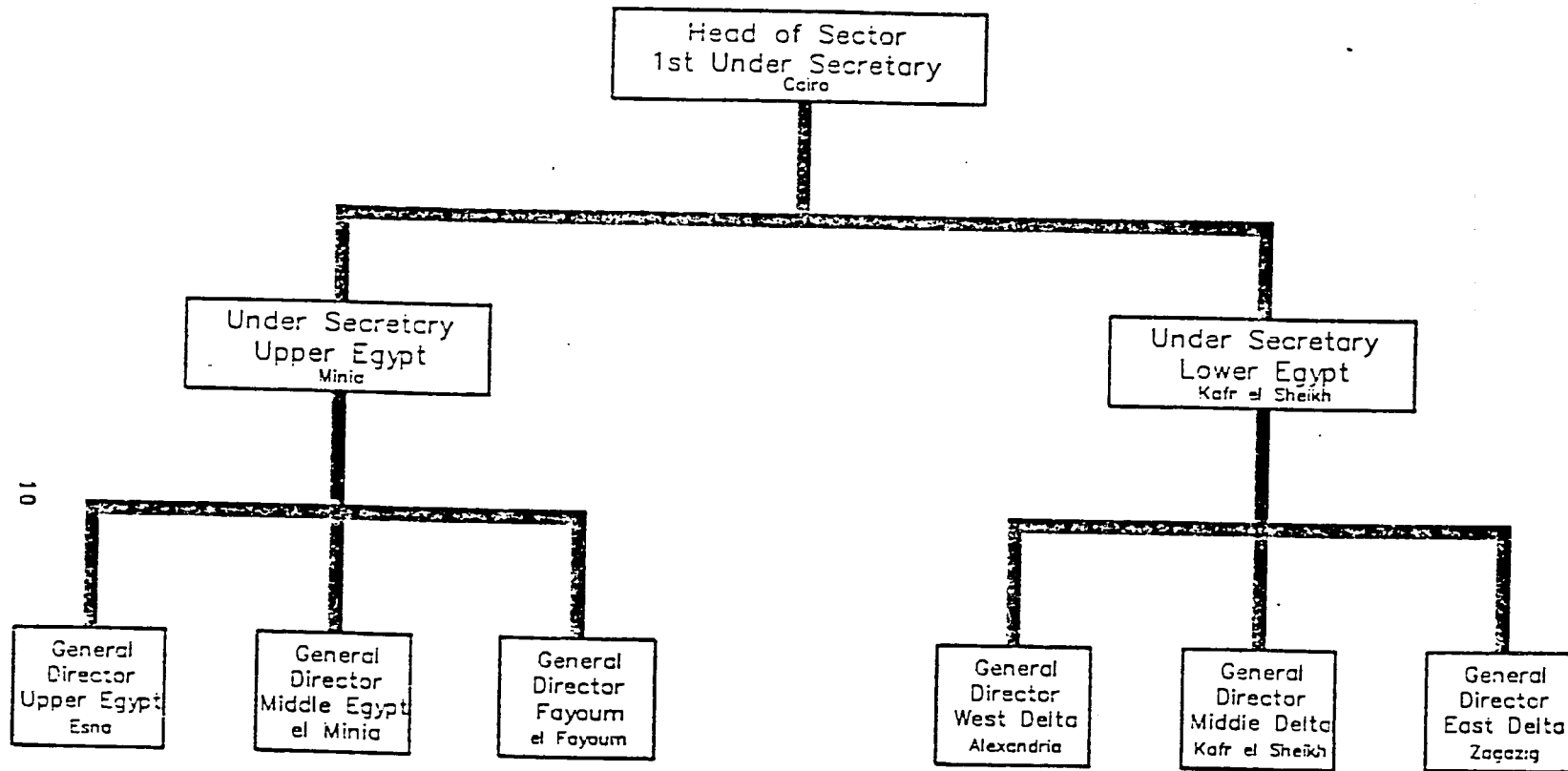
Dr. Barnes and M. Rashwan (training) spent four weeks in Minya training a group of 11 Engineers in land surveying. This was a follow-up course to the short course at CSU in June.

## 5.0 EQUIPMENT PROCUREMENT

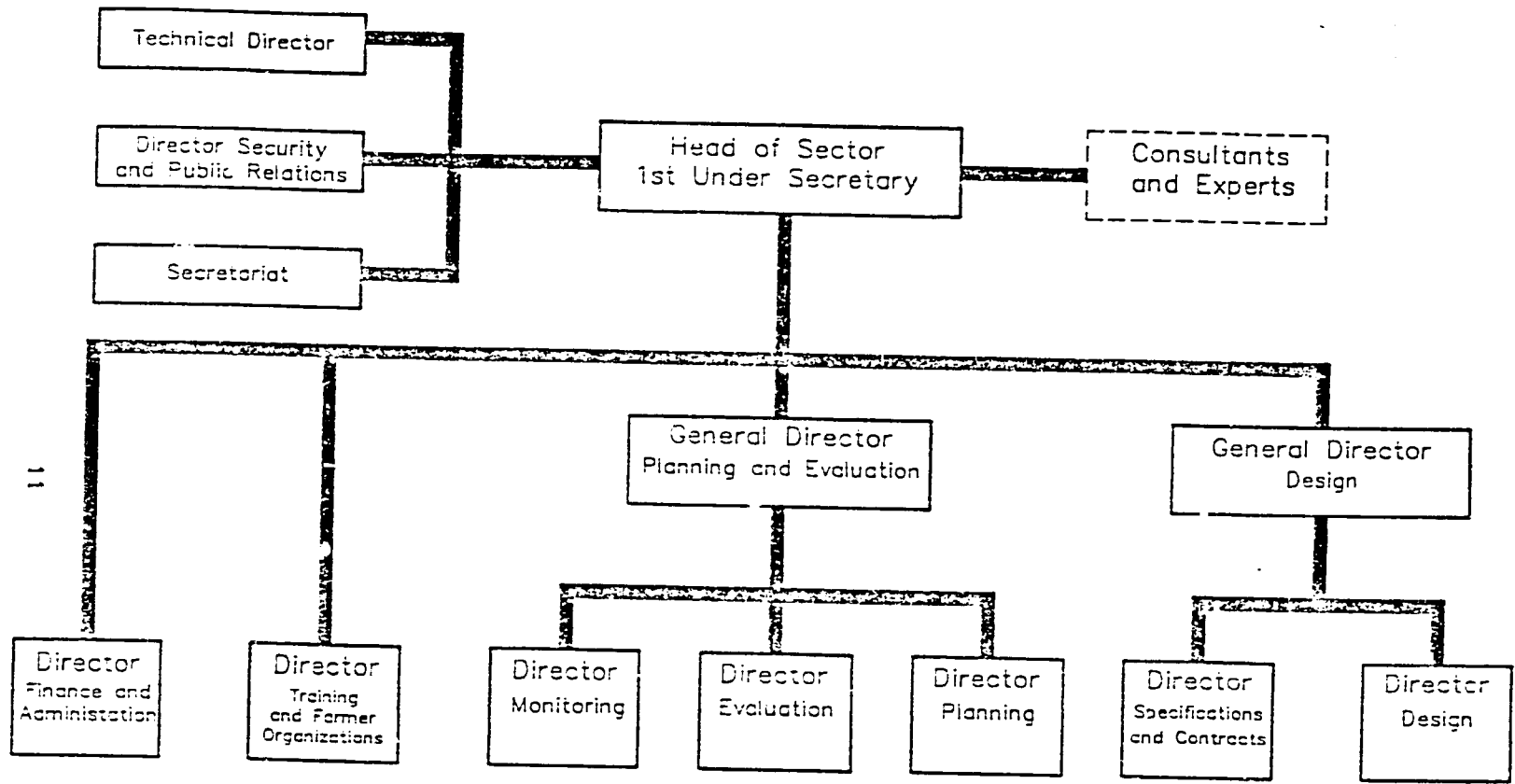
Most of the major equipment purchased for RIIP were delivered or ordered during the reporting period. Computers, flowmeters, water level recorders, gaging stations, and automatic radial gates were among the major items. On order, scheduled for delivery early in 1988, are 10 additional vehicles and 4 additional microcomputers.

Surveying equipment for Minya and Cairo were also received during the reporting period. Included in the shipment were two micro-computers set up for computer-aided drafting of surveyed lands. Computerized output from the TC2000 (Total Station) surveying instrument can be input directly into the computer for plotting. Using AutoCad, the same computer equipment is useful also for engineering design.

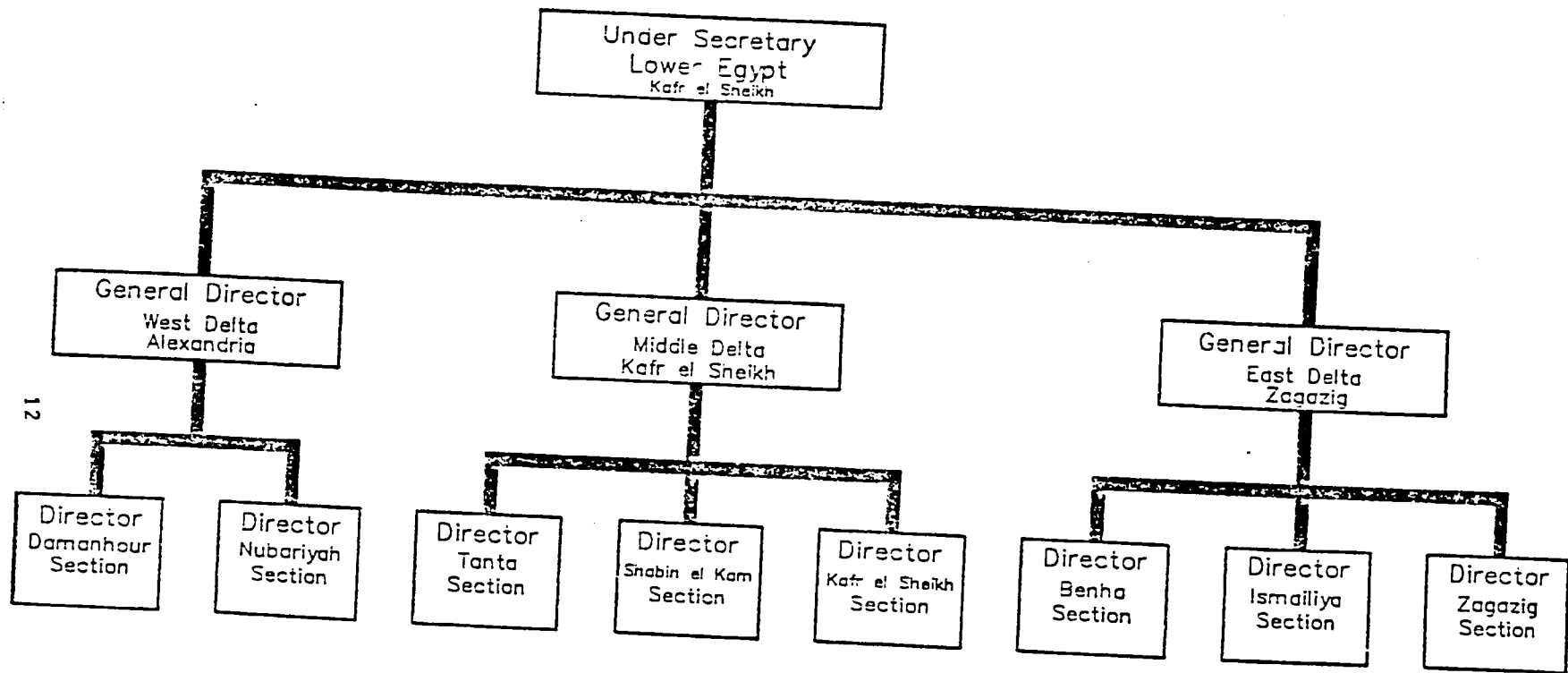
**RIIP ORGANIZATION CHARTS**



IRRIGATION IMPROVEMENT SECTOR  
OVERALL ORGANIZATION



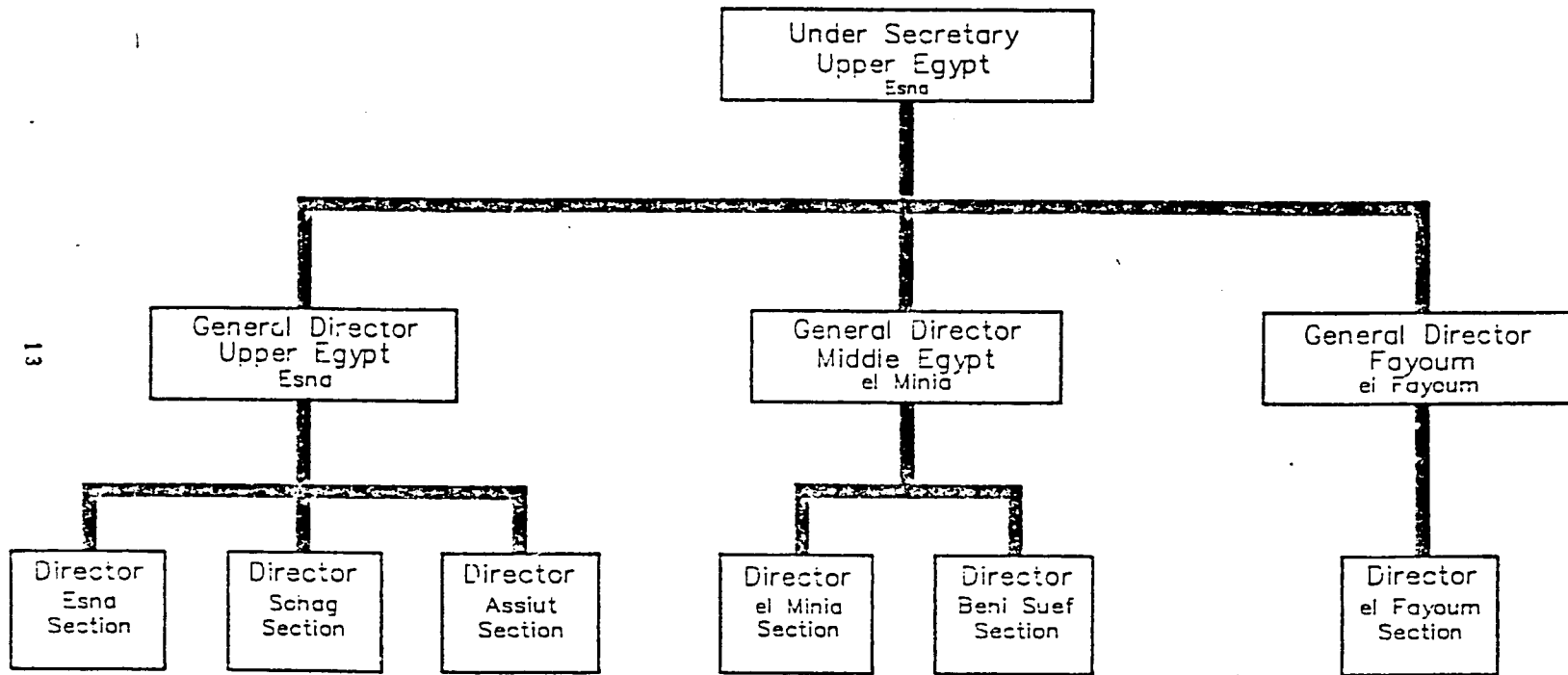
IRRIGATION IMPROVEMENT SECTOR  
HEADQUARTERS ORGANIZATION



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IRRIGATION IMPROVEMENT SECTOR

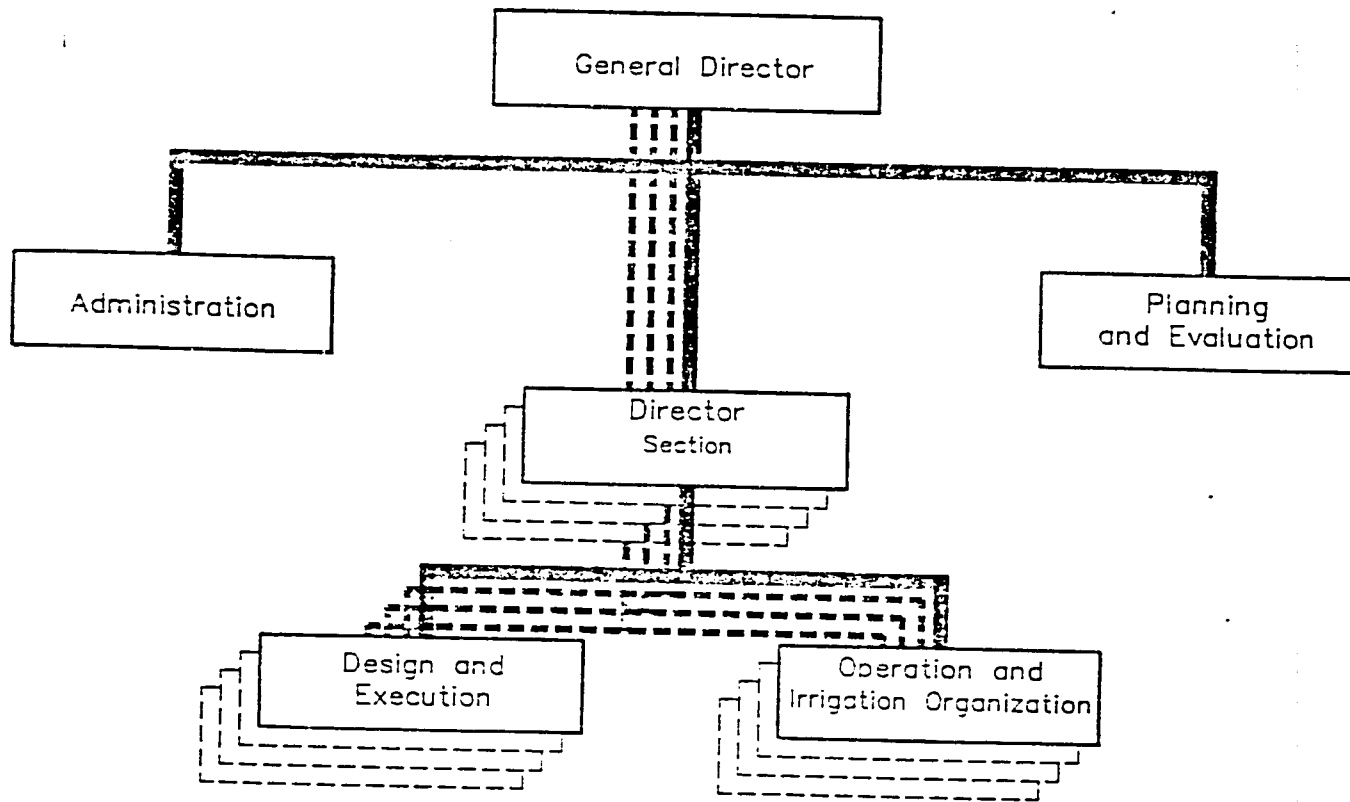
LOWER EGYPT ORGANIZATION



IRRIGATION IMPROVEMENT SECTOR

UPPER EGYPT ORGANIZATION





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IRRIGATION IMPROVEMENT SECTOR  
 GENERAL DIRECTORATE ORGANIZATION

## II. WATER RESEARCH CENTER

### 1.0 INTRODUCTION

Progress in technical assistance of the Water Research Center (WRC) during the second half of 1987 is discussed in this section of the report. Support continued to all eleven Research Institutes and the Training and Manpower Development Department (TMDD) of the Water Research Center. This support is provided through:

1. Training of professional staff to further develop their abilities, and special training of other support staff while on-the-job, through short courses in the USA, and formal degree and non-degree academic programs;
2. Procurement of equipment and commodities necessary to plan, manage, and conduct their research and training responsibilities;
3. Technical assistance using short-term (TDY) subject matter specialists to assist in the formulation and solution of special problems in management, research and training.

### 1.1 WRC GOAL

The goal of WRC is to determine the most effective and efficient methods for the development, control, and use of Egypt's water resources for its social and economic welfare.

### 1.2 WRC OBJECTIVES

The objectives, within the framework of this project are to:

1. Conduct research to provide solutions to problems facing the Ministry of Public Works and Water Resources (MOPWWR) in its activities to meet its overall goal;
2. Conduct the research necessary to provide answers to key policy issues in the irrigation sector.

3. Develop the long-term capabilities of the WRC and its research institutes to provide the MOPWWR and Egypt with solutions to their irrigation and water resources problems.

## 2.0 WRC ORGANIZATION

The Water Research Center is organized with the Central Office of the Chairman, and 11 Institutes. The research institutes and their Directors are shown in Fig. 1. The function of the Chairman's Office is to coordinate the overall activities of the institutes within the framework of WRC goals and objectives.

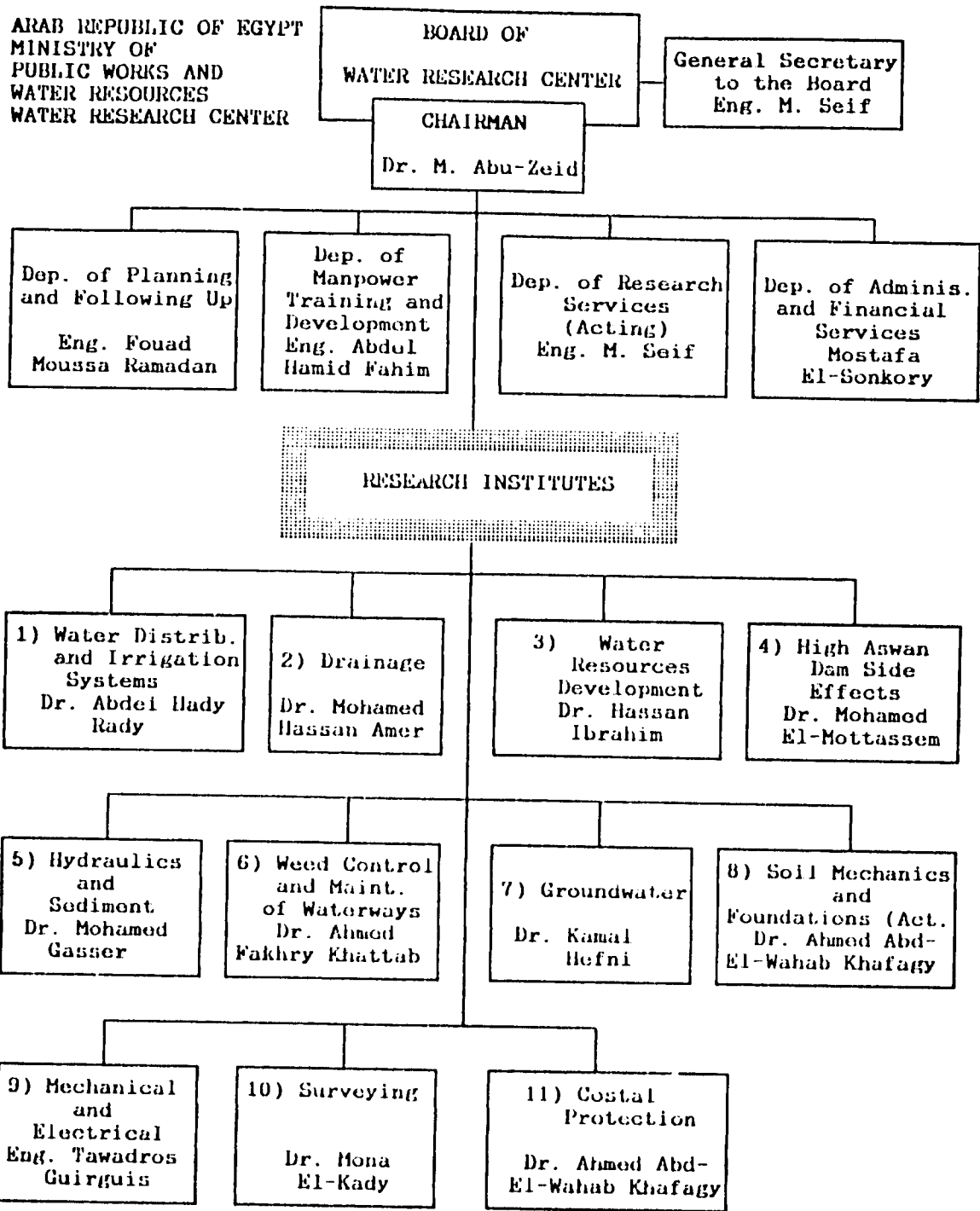
In addition to the research institutions, the Chairman's office has responsibility over the Training and Manpower Development Department. This department is responsible for administering appropriate training programs for upgrading the practical knowledge and technical skills of personnel in the Ministry of Public Works and Water Resources. Two changes in the organization were made during the reporting period. Dr. Mona El-Kady was appointed Director of the Survey Research Institute and Eng. Fouad Moussa Ramadan was appointed head of the Department of Planning and Follow Up.

## 3.0 TRAINING

Training activities during the reporting period involved academic degree, post-doctoral, invitational tours, short courses, and on-the-job training.

### 3.1 Academic Degree

Eng. Maha El-Hakim of the Chairman's Office started her Ph.D. program in Irrigation Engineering Management at Colorado State University (CSU). Eng. Hesham Mohamed Kandil of the Drainage Research Institute began an M.S. program in drainage engineering at Utah State University. Eng. Fathy Saad Hassanein El Gamal and Eng. Laila Abed of the Hydraulics and Sedimentation Research Institute began a Ph.D. program in river hydraulics and



soil mechanics at CSU. Engs. Ashraf Abdel Hai Said (Ph.D.), Alaa Mohamed Abdel-Motaleb (M.S.), and Sherif El-Kholy (M.S.) of the Soil Mechanics and Foundations Research Institute began a graduate program in soils engineering at Utah State University. Magda Salah A. El-Din of the Weed Control and Maintenance of Waterways Research Institute began a Ph.D. program in Biology and Fisheries at Auburn University.

Eng. Assem M. Atef Abdel Salam of the Research Institute for Groundwater began an M.S. program in groundwater engineering at CSU. Eng. M. Mohamed Abdel Abdella Mohamed, and Eng. Naguib Guirguis Riad of the Soil Mechanics and Foundation Research Institute began a M.S. program in soil mechanics at CSU.

Abdel F. Metawi, M. Ragy Darwish, Farida A. Meguid El Hessy, Tarik A. Tawfik, and Mohamed Naguib, of the Water Distribution and Irrigation Systems Research Institute continued their Ph.D. studies at CSU. Eng. Mervat Sidhom Awad (Chairman's Office) continued her academic training at Oregon State University. Hoda Dweeb of the Water Distribution and Irrigation Systems Research Institute and Eng. Mohamed G. Abdel Maksoud of the Soil Mechanics and Foundations Research Institute continued their M.S. studies at CSU.

Ahmed El-Attar obtained his Master of Education degree in August. His emphasis of study was in extension.

### 3.2 Invitational Tours

Dr. M. Abu Zeid, Chairman WRC, and Eng. Ali Abu El-Soud, General Director of the Ministry Technical Office, accompanied Eng. Essam Rady, Minister of Public Works and Water Resources, on a visit to irrigation projects in Italy and Western US.

Dr. Mohamed Gasser, Director, Hydraulics and Sedimentation Research Institute, Dr. Ahmed Abd-El-Wahab Khafagy, Acting Director, Soil Mechanics and Foundation Research Institute, and Eng. Tawadros Guirguis, Director of Mechanical and Electrical Research Institute visited laboratories and projects in the Western US. Dr. Hassan Amer, Director, Dr. Samia El-Guindy, and Dr. Dalal

Sobhy Al-Nagar of the Drainage Research Institute visited drainage projects in Colorado, California, and Arizona. Eng. Ahmed Awad El-Meligue, Geologist Tag El-Deftar, and Eng. Gihan Ibrahim Ali El-Cerse of the Water Resources Research Institute visited irrigation projects in the Western U.S. Engineers Fatma Attia and Nadia Wahby participated in some individual training for microcomputer programming and then visited irrigation projects in the western U.S.

As part of a short course for On-Farm Water Management, conducted annually by TMDD, 31 people travelled to the South-western U.S. to tour irrigation systems and to see some of the up-to-date on-farm management practices.

### 3.3 Short Courses

#### 3.3.1 Chairman's Office

Mrs. Mary Halim completed a 4-month training program for technical editing and conference management at CSU. Ms. Mervet Hassan Abdel Aal completed a 4-month training program for executive secretary and use of computers at CSU. Agronomist Anhar Saleh of the Department of Planning and Following Up completed a course titled "Management of Agricultural Research" in Washington, D.C. Dr. Emad Hamdy, Cairo University and Dr. Abdel Kawi Kalifa, Ain Shams University attended and presented a paper to the international conference "Design of Hydraulic Structures" in Fort Collins, Colorado. Eng. Abdel Hamid Fahim, Director of TMDD attended the XII Congress of ICID "Improving Water Management in Developing Countries" in Morocco, as did 4 others from the Water Research Center.

Eng. Fouad Mussa Ramadan, Department of Planning and Follow Up, attended a short course at CSU titled "Monitoring, Evaluation, Feedback, and Management of Irrigation Systems". Eng. Ahmed H. Bayoumi, TMDD, attended a training program for development of audio-visual (video) tapes at the Salt River Project, in Phoenix Arizona.

### 3.3.2 Drainage Research Institute

Eng. Attiat Abu-Bakr and Eng. Laila El-Sis completed a course titled "Agricultural Research Methodology" by USDA in Washington D.C.

### 3.3.3 Hydraulics and Sedimentation Research Institute

Dr. M. Bahaa El-Din A. Saad attended a Micro-computer Workshop on Irrigation Data and Project Management and participated in the International conference "Design of Hydraulic Structures" in Fort Collins, Colorado.

### 3.3.4 Water Distribution and Irrigation Systems Research Institute

Engineer Nahla Abu El-Fotouh attended a course put on by the USGS entitled, "Techniques of Hydrologic Investigations for International Participants." Agharid Saleh Rifat participated in the CSU course "Social and Technical Aspects of Irrigation Organization." Sohair Kamal Yousef completed a course on on-farm irrigation scheduling presented by Utah State University, and Wadie Fahim and Safaa Richo attended a symposium at CSU on design of hydraulic structures. Economist Farouk Abdel Al attended a course at CSU entitled "Irrigation Project Analysis."

### 3.3.5 High Aswan Dam Side Effects Research Institute

Engineer Medhat Saad Aziz attended a USDA course entitled "Microcomputer Applications in Agricultural Development."

## 3.4 Post-Doctoral

Dr. Safwat Y. Abdel-Dayem began a post-doctoral training and research program at North Carolina State University in drainage modeling for arid lands with Dr. Wayne Skaggs. Dr. Mohab R. Semaika of the Water Distribution and Irrigation Systems Research Institute began a post-doctoral training and research program at CSU in irrigation agronomy and management.

### 3.5 On-The-Job

Training on the use of computers for solving technical problems continued for engineers and support staff assisting Dr. Gwinn with special problems of the Water Distribution and Irrigation Systems Research Institute, and Water Resources Research Institute.

### 4.0 TECHNICAL ASSISTANCE SPECIALISTS (TDY)

Dr. Katherine B. Seibert and Dr. Don B. Medley, Calif. State Polytechnic Univ., Pomona Calif., prepared a Needs Assessment for an Information and Documentation Center for WRC in August and September.

Dr. Lyman Willardson, Utah State University, completed a one-month assignment with the Drainage Research Institute in September.

Mr. Robert E. Rallison, Surface Water Hydrology consultant, completed a one-month assignment on Sinai Water Resources with the Water Resources Research Institute in September.

Dr. E. V. Richardson, CSU, reviewed the EIIP program with the Chairman's Office in October.

Ms. Antoinette L. Lueck, Physical Sciences Librarian, CSU, prepared a Library Needs Assessment for WRC in November and December.

Dr. Michael A. Stevens completed a one-month assignment on river hydraulics with the Hydraulics and Sedimentation Research Institute and two weeks with the High Dam Side Effects Research Institute in November and December.

Mr. Merlyn Paulson, Landscape Architect, CSU, completed a two-week assignment with the WRC chairman's Office in December.

Mr. Larry Agan, of SRP, began a one-month assignment to develop office automation for the WRC Chairman's Office.

### 5.0 PROCUREMENT

Dr. Gwinn, working with the Institute Directors, prepared specifications for procurement of equipment and commodities



necessary to plan, manage, and conduct their research and training responsibilities under the current WRC work plan.

Ten (IBM AT compatible) computers were delivered during this reporting period, and installed in the Chairman's Office and in Research Institutes. Laboratory instruments and equipment were also received and delivered to Research Institutes.

APPENDIX A  
ABSTRACTS OF EIIP REPORTS

EIIP TECHNICAL REPORT No. 4  
COMPUTER-PROCESSED RUNOFF DATA

by

Wendell R. Gwinn<sup>1</sup> and Sahar Kamal El-Din Mahmoud<sup>2</sup>

**ABSTRACT:** Runoff data in the form of date, time, and chart readings from a depth gage well are analyzed to produce a data bank of weir discharge, reservoir pondage discharge, total discharge for each line of data, and accumulated amount of runoff for each event. Also, maximum depth and intensity for nine selected time intervals, total for each day, total for each month, and the total runoff for the year are recorded in a data bank. Two other programs are used to produce a rectangular weir data table for the main program.

EIIP TECHNICAL REPORT No. 5  
COMPUTER-PROCESSED PRECIPITATION INCREMENTS  
AND INTENSITIES FROM RECORDING GAGES

by

Wendell R. Gwinn<sup>1</sup>

**ABSTRACT:** Precipitation data in the form of date, time, and chart readings from a rain gage are analyzed to produce a data bank of incremental time, incremental amount, and precipitation intensity, accumulated time, and accumulated amount for each line of data. Also, maximum depth and intensity for nine selected time intervals, totals for each day, total for each month, and the total for the year are recorded in a data bank.

EIIP TECHNICAL REPORT No. 6  
COMPUTER-PROCESSED PRECIPITATION DATA

by

Wendell R. Gwinn<sup>1</sup> and Sahar Kamal El-Din Mahmoud<sup>2</sup>

**ABSTRACT:** Precipitation data in the form of daily readings (8:00 am to 8:00 pm the following day) from a rain gage are recorded in a data bank to produce the total for each day, total for each month, and the total for the year. Also, maximum depth and intensity for nine selected time intervals, and frequency in the form of number of days for selected amounts are recorded in a data bank for use in data analysis.

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