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QUARTERLY REPORT

October, 1982 to December 31, 1982

EGYPT WATER USE AND MANAGEMENT PROJECT

Submitted By

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Contract No.

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PERSONNEL ON PROJECT (This Quarter)

Dr. E. V. Richardson, Project Coordinator, TDY
Ms. D. A. Rein, Administrative Assistant
Ms. P. S. Hobbs, Secretary
Ms. C. L. Stevens, Secretary
Dr. W. R. Schmehl, Technical Backstopping, Training,
Dr. W. Clyma, Technical Backstopping, Training
Dr. M. E. Quenemoen, Field Staff
Dr. E. Nielsen, Field Staff
Mr. K. Litwiller, Field Staff
Mr. W. Braunworth, Field Staff
Dr. R. Tinsley, Field Staff
Dr. J. Layton, Field Staff
Mr. E. G. Hanson, Field Staff
Mr. T. K. Gates, Field Staff
Mr. D. Martella, Field Staff
Dr. P. Soltanpour, Technical Backstopping, Training
Dr. D. K. Sunada, Technical Backstopping, Training
Mr. R. P. Vandenberg, Technical Backstopping
Dr. M. Skold, Technical Backstopping,
Dr. D. Redgrave, Training, TDY
Mr. A. R. Robinson, Backstopping
Mr. W. Ree, TDY
Dr. D. Hilleman, TDY
Mr. J. McDade, TDY
Mr. R. Merkley, TDY
Dr. R. Christoffersen, TDY
Dr. G. Radosevich, TDY
Mr. T. Ley, Technical Backstopping
Dr. R. McConnen, TDY

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I. PROJECT STATUS IN EGYPT

The minutes and recommendations from the joint meeting of the campus based Planning and Coordinating Committee and the Cairo based Advisory Committee, held Sept. 13-17, 1982 at Fort Collins, were reviewed and distributed in Cairo. A copy was forwarded to His Excellency Samaha, the Minister of Irrigation, for his review and approval.

One recommendation involves extension of EWUP results throughout Egypt. Another concerns an International Conference on Branch Canal and On-Farm Water Management. Implementation of both recommendations began during the fourth quarter of 1982.

Dr. E. V. Richardson, Project Coordinator from the Colorado State University campus, visited Egypt and assisted in developing an irrigation improvement plan for consideration by the Egyptian Government as a part of its Five Year Plan. While in Egypt, he consulted with the Minister of Irrigation, the Chairman of the Water Research Center, officials from USAID and EWUP personnel in order to prepare a working draft of a plan which included the major recommendations of EWUP. The draft is presently under review in the Ministry of Irrigation. It is anticipated that it will lead to a proposal to be presented to the President's Cabinet.

Plans have been initiated to hold an International Conference in Cairo during April, 1984. Dr. R.J. McConnen and Dr. Ibrahim El Assiouty worked together in November to draft a tentative agenda and contact potential sponsors. Drs. Richardson and McConnen have contacted potential sponsors in the United States. Further preparations for this conference will resume when these men return to Egypt on TDY early in 1983.

A committee was appointed to arrange a workshop to review Project findings. The committee consists of Ahmed Maher, Ahmed Taher, Mona El Kady, Mohamed Naguib and Farouk Abdel Al. Dates set for the workshop are May 30,31 and June 1, 1983. At this workshop it is intended to review all task group and pilot program reports of EWUP findings and recommendations. The workshop may be attended by members of the P&C Committee and a limited number of other

invited reviewers. Out of this process certain papers will be selected for presentation at a National Conference and/or an International Conference.

Major field work the past quarter consisted of consolidating and refining farmer organizations, land leveling, *mesqa* and open drain cleaning, construction of improved canals and *mesqas*, construction of a buried pipeline system and experimentation with alternative systems of *marwa* and *mesqa* lining. A considerable effort was also devoted to planning the irrigation management of the buried pipeline system and raised *mesqas* which are now under construction. Routine work continued regarding evaluation of on-farm irrigation systems, collection and analysis of farm record data, collection and analysis of water budget data and collection of sociological data through visits to farmers. Agronomists continued to work on development of crop calendars and the use of crop calendars in analyzing water requirements for specified areas in FWUP field sites.

Twenty-one employees of the Ministry of Irrigation completed a training course in on-farm water management at Kafr El Sheikh in September. They were joined by seven senior employees of the MOI who participated in a tour to Southwestern United States to observe irrigation systems and practices. They returned to Egypt on October 16.

The construction of the buried pipeline system at El Hammami progressed during the past quarter. Dewatering equipment was installed and the foundations were completed for pumpstations #1 and #2. It is now anticipated that pumps and electrical connections will be installed in February with final completion of the system scheduled for May.

Construction of the raised banks of Abyuha Canal is nearly completed. Gates are being manufactured and should be installed the first quarter, 1983. A contract will be let to complete cleaning and modification of thirty *mesqas* served by the Abyuha Canal. This will permit the entire area of 1,200 *feddans* to benefit from the increased head available in the new system.

In general, task groups and pilot program groups are progressing according to plans. The only major exception is the El Hammami

Pilot Program which is delayed due to poor performance by the contractor.

The Egypt Agricultural Mechanization Project (EAMP) in the Ministry of Agriculture has agreed to provide land leveling for Abyuha System at Minya. EWUP has completed planning with farmers to eliminate some *mesqas* which will be made into roads. This will necessitate land leveling in order to irrigate the farms from more distant *mesqas*. EAMP welcomes the opportunity to use its equipment and get experience in an area where the planning and arrangements with farmers has already been accomplished.

Arbitrary application of regulations by the Egyptian Customs Department have caused continued problems. An air freight shipment containing desk calculators, paper for water level recording instruments and other equipment and supplies has been detained at the airport since March, 1982. Release of recent shipments of other equipment vitally needed to complete Project research reports, has also been held up. Meanwhile, the Customs Department charges storage for these shipments. Continued efforts are being made through USAID and the Government of Egypt to resolve this problem.

Project work is now organized among six pilot program groups and nine active task groups.

Pilot Programs

Kafr El Sheikh Site: Manshiya *Mesqa*

Hammad *Mesqa*

El Mansuriya Site: El Hammami Pipeline
Mesqa #10 Raised Channel

El Minya Site: Abyuha Canal Raised Channel
Mesqa #26 Raised Channel

Task Group

TG	1	On-Farm Water Management
TG	2	Water Distribution Systems
TG	3	Farmer Organization
TG	4	Farm Management and Planning
TG	5	Water Budget
TG	6	Land Leveling
TG	8	Soil Characterization
TG	10	Conjunctive Use of Water
TG	11	Irrigation Advisory Service

Task groups #7 and #9, Soil Fertility and Pest Control respectively, have completed their objectives and have been terminated.

A detailed report of each pilot program and task group follows.

MANSURIYA

The pilot programs of Mansuriya include the elevation of *Mesqa* #10, forming a lined concrete structure and construction of a buried pipeline replacing the El-Hammami Canal.

The objectives of these structures are basically to:

1. Deliver proper quantities of water to all farmers served by the system.
2. Reduce the conveyance losses which now occur.
3. Deliver water to farmers with sufficient head to allow for faster irrigations by gravity.
4. Eliminate the need for lifting water on an individual basis by providing centralized lifting.

I. Accomplishments and Future Plans for the El-Hammami Pipeline Pilot Program are as follows:

Table 1. Construction progress of the El-Hammami pipeline to January 10, 1983.

	Unit	Total amount to be installed	Pipes actually laid	
			No.	%
Pipes with diameter 60cm	meter	3084	2298	75
Pipes with diameter 50cm	meter	1667	1224	73
Horizontal pipes, 10 cm	Unit	768	176	23
Vertical Pipes, 10 cm	Unit	---	---	---
Elbow pipes	Unit	64	8	12.5
T-Connection pipes	Unit	64	30	47

1. Work is now proceeding on pumphouse one and two. Both houses are complete at least to ground level. Once corner stand is being worked on, and is complete to above ground level.

Approximately 30 T-connection for alfalfa values have been installed. However, this installation does not include the riser pipes and alfalfa values as yet.

No testing of the pipeline has been completed to date. The quality of work now being done is better than some of the past work which was rejected.

The contractor has secured his own dewatering system which has greatly helped in the construction process.

During the closure period in January the contractor will construct the pipe connections between the El-Mansuriya Canal and each of the pump stations.

Problems have occurred in water delivery to farmers during construction. This had had deliterious effects on EWUP-farmers relationships. Weekly meetings are being held with the contractor to push the work and to solve operational problems. Attendance at these meetings by the contractor has been than satisfactory.

2. On-farm water management data are being collected on several sites. This will continue in the next quarter.
3. The farm record data are being maintained and will continue. The data for the agricultural year ending October 1982 are being summarized. Several new crop enterprise cost studies have been completed as well.
4. Selected water budget data are being collected and will continue, as well as water quality data.
5. A preliminary system for scheduling the use of the water has been completed. This will be developed in more detail.

II. Accomplishments and Future Plans for Beni Magdul, Mesqa #10, Pilot Programs are as follows:

1. OFWM data continues to be collected.
2. Data collection has included documentation of the farmers' irrigation schedule. This will be continued and be used to evaluate the performance of the new *mesqa*.

In preparation for peak demand times in the summer season, a new well has been installed along *Mesqa #10*. It is located near gate 3. This well, installed by one of the farmers, will assist in providing the required water which may not be available otherwise at peak demand times.

III. Special Studies:

- A) The water budget work is being continued in the Beni Magdul area. Full details are reported by the water budget task group. The pump test results have been written up in preliminary form. It is anticipated that this will become a Technical Report in the near future.
- B) The cropping sequence studies are continuing in both areas.

We anticipate the following reports to be released in the next quarter:

1. Report on *berseem* irrigation and production on *Mesqa #6*, Beni Magdul 1981/82.
2. Report on corn irrigation and production on *Mesqa #6*, Beni Magdul Canal 1982.
3. Report of basic engineering data and pipeline construction concepts related to our experience with the Hammami Pipeline Pilot Program.

Mansuriya Field Staff

I. Professional

Wadie Fahim	Team Leader	Bill Braunworth	Ass. Team Leader
Eldon Hanson	Eng.(Half time)	Moheb Semaika	Agr.(1/3 time)
Shinawy A. Atty	Economist	Mohamed Naguib	Sociologist
Ahmed Tahoun	Agronomist	Sabah Mahmoud	Agronomist
Farouk Abel Al	Sociologist	Lotfy Nasr	Economist
Gamal Fawzy*	Economist	Mahmoud Khadr	Agronomist
Tarik Abdel Rahman	Agronomist	Tarif Zeitoun	Engineer

II. Non Professionals

Badry Mahmoud	S. Tech.	Handy El Said	S. Tech.
Ibrahim Hussein	S. Tech.	Gamal Ahmed	S. Tech.
Mervat Mohamed	Secretary	Rokaya Abdel Mawla	Secretary
Ibrahim Abdou	S. Tech.	El Said Kamal	S. Tech.
Ibrahim Zakaria	S. Tech.	Moustafa Mahmoud	S. Tech.
Said Rezk	S. Tech.	Mohamed Abdel Hamid	S. Tech.
Abdalla Abdel Moneim	S. Tech.	El Said Hamed	S. Tech.
Ibrahim Abdel Fatta	S. Tech.	Mohamed Farrag	S. Tech.
Mohamed El-Dash	S. Tech.	Mohamed Shaaban	J. Tech.
Ismail El Shimi	J. Tech.	Abdel Rahman Eid	J. Tech.
Abdel Rahim Mohamed	J. Tech.	Shawky El Awady	J. Tech. Lab.
Abdel Maaboud Ibrahim	J. Tech.	Selim El Tantawy	J. Tech.
Farahat El Ashkar	J. Tech. Lab.	Fathy Abouel Nasr	J. Tech. Lab.
Hamed Aly Tahoun	J. Tech. Lab.	Ahmed Ragab	J. Tech. Lab.
El Shimi Ismail	J. Tech. Lab.		

III. Drivers

Abdel Latif El Tawil	Mohamed Rezk
Abu El Ella	Aly Habashy
Salah Sadek	Nagy Hassan

* Presently in USA for semesters of academic training at CSU.

KAFR EL-SHEIKH

I. Summary of Progress

During the fourth quarter of 1982, work at the Kafr El-Sheikh EWUP site focused on activities as described below:

1. Routine work on all pilot program and economic sites for the Summer season 1982 was completed. Corn, cotton, and rice were harvested and yield data were taken. A sociological survey of farmers perceptions about the summer EWUP pilot work was carried out. The various professionals worked on analyses of pilot program data in preparation for writing of a comprehensive summary report.
2. A farmer irrigation time preference report for June, July, and August 1981 on Om Sen Canal was submitted for printing as a Draft Working Paper. Farmers prefer to irrigate from 3:00 a.m. until 12:00 noon but some farmers irrigate at night during the critical period of rice transplanting.
3. Sites were selected for EWUP pilot program implementation in the Manshiya and Hammad areas for the winter 1982/83 season. Sixteen *feddans* were leveled by the K.S. EWUP land leveling team and equipment. Long furrows were constructed for sugar beets and long borders for wheat.
4. Arrangements for winter season *marwa* improvement were made with the Plastic Development Center (PDC) in Alexandria. The PDC provided plastic sheets and technical help. Difficulties were encountered in burying the plastic sheets to the 20 cm depth recommended by the PDC.

Gated pipe was also obtained from the EWUP store in Mansuriya for testing on a $7\frac{1}{2}$ *feddans* site on Hammad Canal. The site has borders for wheat of lengths 220 and 160 meters.
5. The EWUP grain drill was prepared for use in planting wheat on the 220 meter borders mentioned above. Advance-recession data

were taken during the first irrigation to test the effect of drilling as compared to broadcasting seed, on water distribution. Other potential benefits include better seed distribution, lower seed requirements and decreased planting time.

6. Dr. Mona El-Kady met with the engineers to discuss future work direction. Kafr El-Sheikh engineering activities have focused on on-farm work and the Om-Sen water budget study. More emphasis is required on the delivery system. A tour of *mesqas* on Daqalt Canal was conducted to investigate possibilities for changes in the water delivery rotation. On the first reach of Daqalt Canal there are several *mesqas* of over 1 km length with many obstructions to water flow. Discussions were also held with the District Engineer concerning inlet structures for the 14 *mesqas* on Daqalt Canal.
7. Dr. Christoffersen, President of Colorado State University, visited Kafr El-Sheikh to be briefed on EWUP activities. Members of a U.S. Senate Subcommittee on Europe and the Middle East also visited Kafr El-Sheikh.
8. Filming of Kafr El-Sheikh land leveling work was carried out by Dan Hilleman with the support of the Kafr El-Sheikh team. The KS EWUP slide set was also sent to CSU for copying. This slide set presents an over-view of Kafr El-Sheikh problem identification, solution search, and implementation work.

II. Personnel Activities

1. Professional Staff

Abdel Pattah Metawie	Team Leader	Ken Litwiller	Ass.Team Leader
Kamal Ezz El-Din <u>4/</u>	Engineer	Amany El-Kayal <u>4/</u>	Engineer
Magdy Awad <u>4/</u>	Agronomist	Ahmed El-Attar <u>4/</u>	Sociologist
Ahmed Ismail	Agronomist	Safaa Fahmy	Engineer
Mohamed I. Meleha <u>1/</u>	Agronomist	Hoda Hussein	Agronomist
Magdi Badawi	Economist	Ragy Darwish	Economist
Sohair Kamal Youssef	Sociologist	Saad H. Zaki	Engineer
Mahmoud Moh. Said <u>3/</u>	Agronomist	Sobhi Elewa <u>4/</u>	Economist

2. Technicians

Hammad Group

Moh. Ahmed Badr
 Moh. Omer Abdel Meguid
 Kamal Moh. Abu-Omar
 Helal Moh. Hussein
 Abdou Mostafa Kamel
 Abdel Aziz El-Yamany (Oct. only)
 Ragab Moh. Shanab (Oct. only)
 Gamal Moh. Ali (Oct. & Dec. only)

El-Manshiya Group

El-Said Abdel Hamid
 Salah El Sayed Abdel Hafeez
 Ahmed Abdel Hamid (Oct. & Nov. only)
 Magdy Abdel Hamid (Oct. only)
 El-Said El-Said Helal (Oct. only)
 Abdel Hamid A. Seif (left in Dec.)
 Hamdi Abdel Hady Moh. (Oct. & Nov. only)
 Mostafa Moh. Abu-Omar (Dec. only)
 Salah Ahmed Badr (Dec. only)
 Moheb Abdel Samad EL-Sawy

Water Budget

El-Said Abdel-Salam (Oct. only)
 Sabri Mostafa Taha (Oct. only)
 Bilal El-Said Metawie (Dec. only)
 Ahmed Abdel-Hamid (Nov. & Dec. only)
 Ramadan Gazal

Laboratory

Atef Hamed Sayed
 Hanaa Ali Said

Equipment & Cars

Alaa Fatouh Ibrahim.
 Abdel Hamid Sayed

3. Secretary & Administrative

Mohamed Abu Omar	Admin. Assistant
Nadia Mahmoud Arafa	Secretary

4. Drivers

Asel Ahmed A. Aziz
 Osama Moh. Sobh
 Kamal Saled Talha
 Attia Mostafa Abdu
 (tractor)

5. Laborers

Saber Ahmed Ismail
 Ibrahim Gaid Ahmed
 Abdel Raouf Mazal
 Mohamed Mostafa Omar
 Osman Abdel Rasoul
 Ahmed Mostafa Baraka
 Ibrahim Moh. El-Besawy
 Abdallah Abdel-Hamid
 (Nov. & Dec. only)

6. Guards

El-Sayed Ahmed El-Falawi
 Moh. Mahmoud Al-Mashaly
 Mostafa Basyouni El-Gamal

1/ Farm Machinery 2/ Vehicles 3/ Laboratory 4/ On training leave

III. Training Status and Changes

1. Engineer Amany El-Kayal is continuing a Master's Degree Program at Utah State University under the Peace Fellowship Program.
2. Engineer Kamal Ezz El-Din, Agronomist Magdy Awad, and Sociologist Ahmed El-Said El-Attar are continuing with two semesters academic training at Colorado State University.

IV. Work Plans for the Next Two Quarters

1. A comprehensive summary report for the summer 1982 on-farm pilot work will be written.
2. Efforts will continue for solving the *Manshiya* "Lake" problem.
3. Preparations for the summer season 1983 pilot program work will be carried out including site selection and land leveling for cotton, corn and rice crops.
4. Professionals from the various disciplines will determine topics for draft working papers covering EWUP work at *Abu-Raya* for the past 5 years.
5. Routine data collection will continue for the water budget.
6. Delivery system improvements for Daqalt Canal will be implemented.

MINYA

I. Summary of Accomplishments

During the fourth quarter of 1982 work at El-Minya continued to emphasize canal, *mesqa* and road improvement, according to the Master Plan for Unit Area Development, June 1982.

A. Abyuha Canal Pilot Program

1. The team met with Engineers Gates and Ree to discuss the hydraulic design for the system. It was agreed a check structure should not be installed on the Abyuha Canal at this time between *Mesqas* #16 and #17. It was also agreed that construction of check structures on *mesqas* would be delayed until we have experience with actual use of the modified *mesqas*. Then locations will be determined after consultation with farmers.
2. The contractor continued to work on the left bank of Abyuha Canal. The right bank has not yet been improved. The contractor has used a sheeps foot roller for bank compaction but without success. Soil moisture conditions and the depths of soil placed on the banks have not been adequately coordinated with compaction operations. The canal has been cleaned from kilo 2 to the end. Pitching is being installed at specified locations. *Mesqa* inlets have been constructed but gates have been installed only at *Mesqas* #4, #27 and #28. Four of the 9 pipes needed for irrigating directly from Abyuha Canal have been installed.

B. Improvement of *Mesqas*

During the past quarter it has been decided to proceed with cleaning and modifying the *mesqas* in the entire Abyuha command area with construction contractors. Consequently the work on *Mesqa* #26 and #7 has been expanded to include the total 1,200 *feddans*.

1. Unit # 4-A

Land leveling was completed and *Mesqa #9* was closed. The area will now be irrigated from *Mesqas #7* and *#11*. A road was constructed on the site of former *Mesqa #9*. The farmers agreed to build a water hydrant storage cistern for domestic waste water in order to eliminate the drain for waste water which followed *Mesqa #9*. *Mesqa #11* will now be improved by the contractor.

2. Improvement of other *Mesqas*

A topographic survey of the Abyuha command area with readings every 50 meters was completed. A survey to determine the areas actually occupied by the *mesqas* is continuing. This survey will be used to determine final alignments for each *mesqa*. Meetings were held with farmers to explain and discuss proposed plans. A computer assisted analysis technique is being used to select the best design for specification in the contract. A newspaper advertizement for tenders will be made in early February. In the meantime EWUP personnel and equipment is being used to plow the land adjacent to the *mesqas* in preparation for cleaning and renovation. The sociologists worked with the farmers to get agreement for this operation. To date plowing is completed along 30 percent of the *mesqas*.

C. *Mesqa #26*

Measurement of water into *Mesqa #26* is continuing for the water budget study. All responsibility for irrigation management and cleaning the *mesqa* has been assumed by the farmers.

D. *Mesqa #7*

The farmers have learned to use a canvas dam as a check structure in order to improve irrigation management. They are working together to keep the *mesqa* clean. All land between *Mesqa #7* and *#9* is now irrigated from *Mesqa #7*. (Unit 4-A of the Master Plan).

E. Routine Work

The water flow in canals and drains is periodically measured according to plans for water budget analysis. Data are also collected from observation wells to determine ground water levels. Approximately 150 *feddans* of land have been leveled. Large areas will soon be leveled through cooperation with the Egyptian Agricultural Mechanization Project (EAMP) using their laser controlled equipment.

II. Plans for the Next Quarter

1. Complete construction on Abyuha Canal before the end of the winter closure.
2. Complete installing of headgates at *mesqa* inlets.
3. Install iron headgate of Abyuha Canal inlet.
4. Let contract for improving all *mesqas*.
5. Complete the development of Units 5 and 13 including leveling (EAMP) *mesqas* and roads.
6. Continue organization development work with farmers on each *mesqa*.
7. Continue development of the Abyuha Canal organization of farmers that will operate the new canal system.

III. Personnel Assigned to Minya

Professionals

Abdel Raouf Hassan	Team Leader	Erwin Nielsen	Ass. Team Leader
Tim Gates	Eng.half time	Abdalla Saber	Sociologist
Farouk Hassanein	Sociologist	Mohamed Awad*	Agronomist
Ahmed Abdel Naim	Engineer	Nabil Farag	Economist
Esmat Wafik	Engineer	Elia Sorial	Economist

Technicians

Eman Ebid
Nashat Younis
Mahmoud Noman
Bekhit Nazer
Mohy Yehya
Mohamed Allah

Drivers

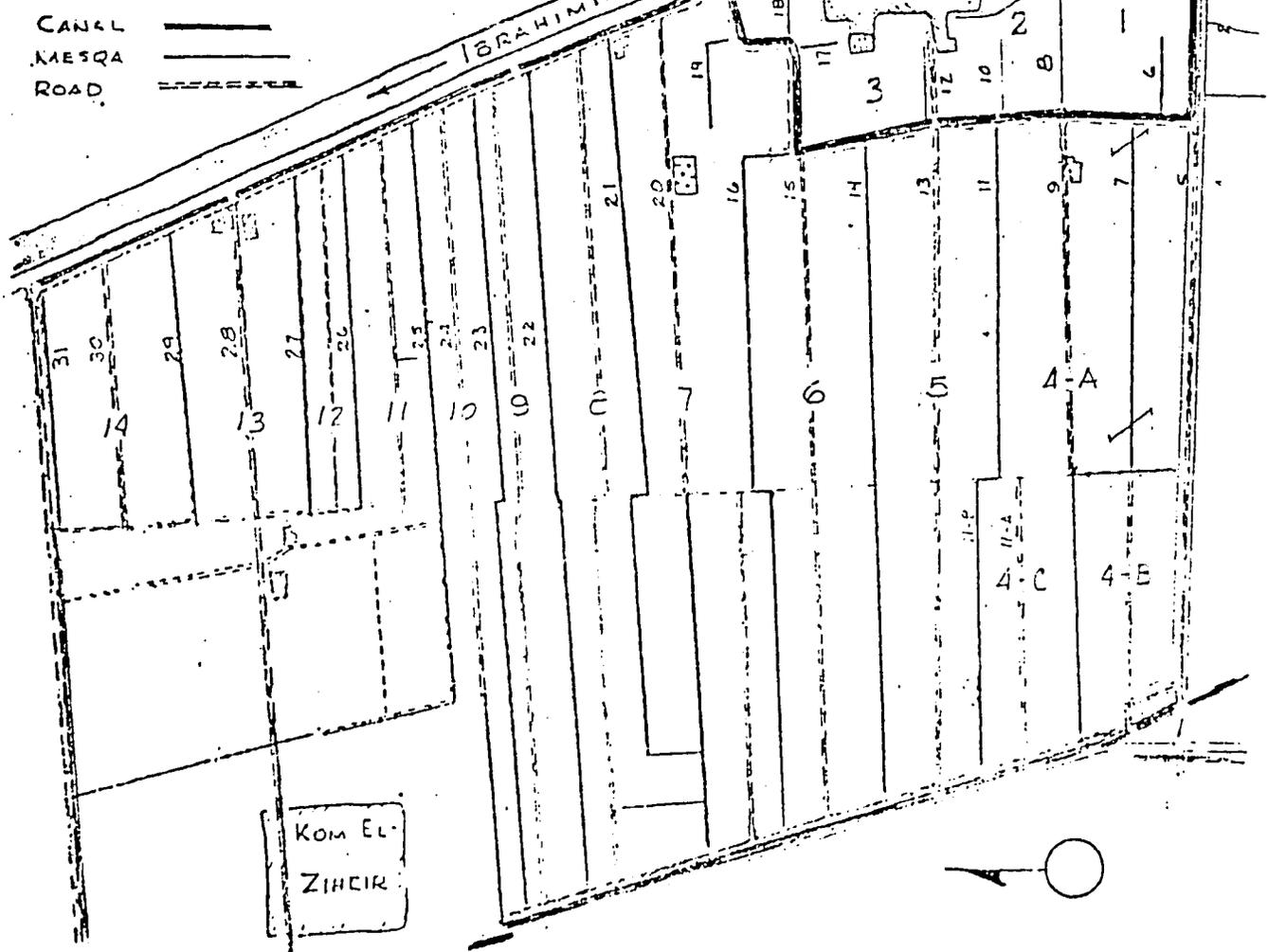
Khalaf Moh. Khalaf
Farouk Hassan
Mohamed Esawy

Laborers

Khalaf Saad
Kamel Ahmed
Hemid Said
Said Abdel Fattah

* Agronomist Mohamed Awad is at Colorado State University for two semesters of training.

MASTER PLAN FOR UNIT AREA DEVELOPMENT
EWUP FIELD SITE
ABYUHA - EL MINIA
JUNE 1982



TASK GROUP 1 : ON-FARM WATER MANAGEMENT

Objectives

1. The development of criteria for the proper frequency and amount of irrigation and the development of an acceptable procedure for implementing the criteria in the pilot areas.
2. The impact of various on-farm water management practices on soil properties, water table, and crop production.
3. The cost and benefits associated with the changes in delivery system for selected sites.
4. The sociological changes brought about by the various changes in *marwa* delivery systems and on-farm water management practices.
5. The on-farm water management practice of long furrows and/or borders as compared to conventional basins.

Work Completed During The Quarter

1. A draft of a report on " The Influence of Land Leveling on Irrigation Efficiency and Management of Irrigation Water " was completed by Eldon Hanson et al. This report delineates the relationship between land leveling and the implementation of long basin and/or furrow irrigation systems. The criteria necessary for obtaining acceptable field irrigation efficiencies is also presented.
2. A report, " On the Sugar Beet Yield and Soil Salinity Changes Under Long and Short Furrow Irrigation Systems " (Draft Working Paper No. 101) was completed by Assia El-Falaky. This report presents the results from the winter season 1981-1982 sugar beet crop at the Abu Raya site, Kafr El-Sheikh.

In summary the report concludes that 45 percent more water was required for each irrigation using the short furrow system. About 10.8 cm (454 m³ per *feddan*) of water could be saved by adopting the long furrow irrigation method. A cubic meter of

water produced 13.4 kilograms of beet root in the long furrow system, 100 percent more than in the short furrow system.

3. A draft report entitled "Effect of Land Leveling on the Time and Depth of Irrigation and The Water Use Efficiency for Wheat in Abu Raya" was completed by Assia El-Falaky. This report presents the results of the pilot program on four farms in Abu Raya, Kafr El-Sheikh Governorate.

In summary the report concludes that a 32 percent decrease in the irrigation time and a 30 percent decrease in the amount of water applied resulted in fields with EWUP irrigation practices (leveled large basins). The EWUP irrigation practice increased the irrigation efficiency by 57 percent over that measured for the traditional farmer practice.

4. A report on "Farm Irrigation System Design, Kafr El-Sheikh, Egypt" (Project Technical Report No. 35) was completed by the EWUP Kafr El-Sheikh Team. This report presents and discusses alternative farm irrigation system design improvements for the Kafr El-Sheikh area.

The improvements are based on useful and easily applied design techniques, a farm irrigation data base for the Abu Raya area, and actual case studies on Abu Raya farms. The improvement package is divided into three components, 1) precision land leveling to dead level, 2) level irrigation system design, and 3) improved water management for the new system.

Work in Process

Seasonal evaluation reports consisting of the farmers' perceptions of the various on-farm practices are being accumulated by the sociologists. These reports will provide the necessary data for the final report focusing on the sociological aspects of introducing on-farm water management practices.

Plans for Next Quarter

1. Water use efficiencies and water table positions will continue to be evaluated.
2. The evaluation of long furrow and/or basin irrigation systems as compared to conventional irrigation of small basin systems will continue. Tom Ley and John Wolfe will provide TDY assistance to the resident staff.
3. The evaluation of the influence of land leveling on irrigation efficiency and management of irrigation will continue. Tom Ley will assist.
4. A report on the criteria for determining irrigation frequency requirements will be completed by John Wolfe.
5. The farm record summary and analysis reports for each site will be completed by the site economists supported by the main office staff.
6. A report on the impact of on-farm water management on soil properties, water table level and crop production will be drafted by Taher, Assia and Saleh.
7. Plans for the second phase of the farm management surveys will be reviewed by Farouk and Martella.

Future Work Involving TDY Personnel Will Be

1. Final report on the criteria for determining irrigation frequency and requirements.
2. Final report on the evaluation of long furrows and/or basins as compared to small basin irrigation systems.
3. Complete tabulation and reports on farm management surveys, phase one.

Personnel Presently Assigned to the Task Group

Mona El-Kady, Martella, Hanson, Taher, Assia, Semaika, Farouk, Layton and Nadia.

TASK GROUP 2 : WATER DISTRIBUTION SYSTEMS

Objectives

1. Prepare and evaluate procedures for designing gravity distribution systems through canals and *mesqas*. Along with hydraulic principles consider aspects of minimum and maximum stream sizes required at the field inlet, and delivery by continuous flow, rotation, and demand schedules for peak demands and period of reduced demands.
2. Organize and evaluate operation and scheduling procedures for the El-Hammami pipeline.
3. Describe how farmers are organized around their present distribution systems and analyze how different types of farmer organizations may be established in response to changes in those distribution systems.
4. Measure and evaluate seepage losses in the El-Hammami Canal and in improved *mesqas* (lined and/or elevated) and other selected *mesqas*. Evaluate the effect of the improvements on seepage losses.
5. Using data obtained in seepage tests, evaluate the aspects of *mesqa* maintenance with respect to the efficiency of water delivery.

Activities and Progress this Quarter

A draft of Computer Assisted Design and Evaluation Procedures for Irrigation Improvement Programs (CADEP) in Egypt has been completed by Martella, Gates and McConnen. (See Attachment).

Abyuha Canal

Using CADEP, six detailed design alternatives have been prepared for the renovation of *mesqas* served by the Abyuha Canal. Hydraulic and structural specifications and estimated costs were prepared for each alternative to allow for a comparative evaluation.

Work is continuing on reshaping the Abyuha Canal and raising the banks.

El-Hammami System

A Draft Working Paper #111 entitled "El Hammami Irrigation System and Actions for Improvement" has been completed by M. El-Kady and E. Hanson and submitted for publication.

This report describes the pipeline system in comparison to the El-Hammami Canal systems and the shortages of irrigation water deliveries by the canal in 1979 and 1980. Data are presented indicating deliveries in 1979 to be as low as 22 percent of requirements during month of peak consumptive use, and in 1980, to be as low as 14 percent of requirements. Design aspects of the pipeline system are considered, one of which pertains to the flow capacity that will be adequate to irrigate the entire area on a 14-hour per day operation throughout an irrigation cycle.

Work is continuing on the EL-Hammami pipelines with major emphasis on the construction of pumping plans for Pipelines 1 and 2, and the corner stand for Pipeline 2.

Abyuha Canal - El Hammami

The basic sociological input has been continued in regard to work on farmer organizations surrounding the distribution systems. This work is in conjunction with Task Group 3.

Dakalt Canal

A preliminary plan for improving the delivery system for the entire Dakalt Canal has been prepared by the Kafr El-Sheikh team. This plan is intended to reduce excess flows through the system by reducing "on periods" by 27 days per year. This plan is the first step. A more comprehensive plan will be developed for improving the delivery system in K.S. during the next quarter.

Plans for Next Quarter and Beyond

Abyuha Canal

Construction work on the canal will continue with completion expected by the end of the year.

Two or more of the alternatives for renovation of the *mesqas* will be selected for implementation. A contract will be prepared and renovation of *mesqas* will commence by March 15. Experimental work will be conducted during January to determine the adaptability of selected types of equipment for removing vegetation from old *mesqas*, filling and compacting soil in *mesqa* channels, and constructing new *mesqas*.

El-Hammani System

Construction work will continue and completion is estimated to be in May or June.

Personnel Assigned to Task Group #2

Mona, Hanson, Gates, Gamal, Tinsley and Layton.

Attachment: CADEP Procedure.

MISSING PAGE
NO. 24

COMPUTER ASSISTED DESIGN AND EVALUATION PROCEDURES

FOR IRRIGATION IMPROVEMENT PROGRAMS IN EGYPT

The design of water course improvements for EWUP activities has proven to be a complex process, but much has been learned in the process. On the basis of this knowledge, a more efficient set of procedures is being developed which will capitalize on the utilization of limited manpower in the design of small water course projects. This set of procedures is denoted as the "Computer Assisted Design and Evaluation Procedures" (CADEP).

CADEP, as being developed, would be applied to branch canals and to the *mesqas* the branch canal serves. The following seven steps provide the framework around which CADEP is being developed.

1. Survey the existing system (area) to be investigated to provide information about the characteristics and constraints of the system including:
 - a. A physical survey of the existing distribution system - channel cross-sections, land elevations, water surface elevations in the parent canal, structures, obstructions, trees.
 - b. water lifting - *saqias*, *tambours*, pumps.
 - c. property ownership patterns.
 - d. internal access.
 - e. cropping patterns (rotations) and distribution.
 - f. livestock activities and requirements.
 - g. farm irrigation practices (management and scheduling).

2. Analyze and summarize the survey data to:
 - a. estimate the cut and fill which will be needed to close the old water courses and any deficit or surplus of fill material that exists.

- b. plot cross-sections at specified intervals along presentwater courses in the system.
 - c. plot topographs of each water course
 - d. determine land area occupied by the present system.
 - e. determine the required rates, schedules, and elevations of a proposed water delivery system.
3. Calculate the hydraulic characteristics for specified system alternatives, insuring hydraulic feasibility, which will achieve a specified water delivery scheme.
 4. Design improved water course characteristics for the specified alternatives. Each alternative must be feasible i.e. not violate any engineering or socio-economic constraints (requirements) for the area.
 5. For each specified alternative, determine the construction base (i.e. pad) which will have to be constructed. The construction technique should be considered in developing the characteristics of the pad.
 6. Evaluate the specified alternatives. Use engineering and socio-economic criteria to select either a single alternative or a set of alternatives as best.
 7. Develop preliminary working (construction) drawings for the alternative(s) selected in (6) above.

These seven steps should be completed for the entire system being investigated. The primary reason for dealing with the entire system is that in most cases, benefits from improvements will not be realized unless the entire system is improved.

TASK GROUP 3: FARMER ORGANIZATION

Objectives

1. To define the purpose and nature of a farmer organization.
2. To examine the existing organizational capabilities of the farmers.
3. To develop and analyze strategies for implementation of specific farmer organizations.
4. To analyze the procedures and administrative structure encompassing the farmer organizations at the specific field sites.

The work of this task group involves three major forms of activities: (1) the actual development and sustaining of various farmer organizations, (2) the documentation of this process, and (3) the documentation of the existing situation of which the organization is part. Activity 1 is designed to accomplish objective 3 while activity 2 is designed to complete objective 4. Activity 3 is matched with objectives 1 and 2.

Work Completed During The Quarter

A. Developing and Sustaining Farmer Organization.

1. Minya

The organizations developed on *Mesqas #7 and #26* are operating by themselves. The major focus of work is now in developing a canal-wide organization in relation with the work evolving along Abyuha Canal. *Mesqa* leaders have been designated for the whole area and they will hold their first meeting with EWUP as a group on Jan.5, 1983. The plan for their organization will follow the structure set up by Dr. George Radosevich in his TDY report; i.e. a federated formal organization on a canal evolving from the informal *mesqa* organization developed within the canal area.

2. Mansuriya: Mesqa #10

The farmers have had an organizational framework established and periodic meetings with the leadership, and others, have been held. This organization is being used for the sharing and scheduling of the irrigations. Discussions have begun with the farmers for the transformation of the operation and maintenance of the *mesqa* from mostly EWUP control to that of the farmers' control.

3. Mansuriya: El-Hammami

The work with the farmers is commensurate with the status of the pipeline itself.

4. Kafr El-Sheikh

Preparation for the winter closure period has begun with the contacting of the organization leaders concerning the cleaning program and the participation of the farmers with the farmers with the cleaning.

B. Documentation of farmer Organization Work

The documentation of the organizational work will follow the six major procedural steps in organizing farmers:

1. identifying the local leadership,
2. contacting that leadership,
3. contacting the farmer,
4. establishing the organization,
5. sustaining the organization,
6. evaluating the organization.

All documentation will result from interviews and observation studies.

1. Accumulated leadership studies (complete for all of the three field sites with continual updating needed).

2. Contacting leadership (same as 1).
3. Contacting farmers (complete for Mansuriya and Kafr El-Sheikh and now in the process for completing Abyuha).
4. Establishing the organization.
 - Creating the structure of the organization (complete for Kafr El-Sheikh, *Mesqa* #10, and Abyuha).
 - Naming the personnel for the organization (same).
 - Establishing working procedures for the organization (complete *Mesqa* #10, Kafr El-Sheikh, and developing them in Abyuha).
5. Sustaining the organization.

EWUP interaction (in process for all areas). Documenting how EWUP works with the farmers in the particular organization.

6. Evaluating the organization (to be accomplished in future).
 - Performance under the existing structure.
 - Performance under the existing procedures.

C. Documentation of the Existing Situation

Efforts for this topic are focused on looking at how the farmers presently work together for particular practices and how other organizations affect the farmers' activities. The major source of this documentation as of now is the system of farmer contact records which delineate how the farmers are reacting to various project activities. These records are continually being kept.

Future Tasks For Next Quarter

- A. Developing and Sustaining Farmer Organizations.

1. Minya

Further develop the recently organized *Mesqa* organizations and establish the viability of the canal association.

2. Mansuriya

Work with the organization on *Mesqa* #10 to take over the new *Mesqa*. Develop the El-Hammami organization when the work on the canal deems it appropriate.

3. Kafr El-Sheikh

Evaluate the winter closure cleaning program.

B. Documentation of Farmer Organization Work

Begin to analyze the data which have been collected for inclusion in the final report drafts.

C. Documentation of the Existing Situation

Same as B.

Personnel Assigned

Jime Layton, Farouk Abdel-Al, and Eldon Hanson.

TDY Support this Quarter

George Radosevich

TDY Support Next Quarter

Dave Rogers

TASK GROUP 4: FARM MANAGEMENT AND PLANNING

Objectives

Farm Management and planning task group objectives are to evaluate alternative farming systems on Egyptian farms, to evaluate current agronomic practices as contrasted to recommended practices, and to evaluate the farmers' ability to implement improved agronomic practices.

Activities Completed During Past Quarter

- Accessibility study has been revised and returned to the Editor for publication.
- Crop Calendar for Kafr El-Sheikh was revised and should be ready for review shortly.
- Crop Calendar for *Beni Magdul* was reviewed, revised and submitted for publication.
- Project Technical Report #29 on irrigation practices (EWUP Farm Record Keepers - Abyuha and Abu Raya sites) has been published.
- A draft on Crop Management - Summer 1982 - has been prepared and it will be turned over to the Editor.
- Farm Management Survey - 2nd phase - was postponed to arrange TDY help for the 1st phase analysis, *Mesqa #7, #26* at Abyuha, and at the El-Hammami site.

Plans for Next Quarter

- Work on El-Minya Crop Calendar.
- Complete Crop Calendar of Kafr El-Sheikh.
- Begin second season of Crop Calendar analysis in both *Mansuriya* and Kafr El-Sheikh.
- Continue to keep farm record books with the selected farmers to evaluate the alternative farming systems.

- Begin work on a Technical Report on farm record summary and analysis for year 81/82.
- Work on Enterprise Cost Study, summer 1982, (internal memorandum).
- Begin work on internal memorandum on irrigation practices in farming systems 1981/82.

Personnel Presently Assigned to Task Group #4

Farouk, Tinsley, Martella and Naim.

TASK GROUP 5: THE WATER BUDGET

Objectives

The objective of the water budget work for the remainder of the project are as follows:

1. To continue to collect complete water budget data (surface inflow and outflow, precipitation, weather station data for evaporation and evapotranspiration, water table elevations, specific yield, hydraulic conductivity, water quality, surface outflow) at each of the project sites.
2. To conduct regular periodic analysis of water budget data for each site with subsequent reports of results.
3. To produce an annual water budget report for each site.
4. To produce a final comprehensive report of the water budget work.

Activities and Progress this Quarter

Monitored and assisted with routine data collection at each of the Project sites.

Completed initial analysis of Abyuha inflow and drain flow data for 1981 and 1982.

Completed initial analysis of Om Sen inflow and drain flow data for 1982.

Completed initial analysis of Beni Magdul inflow data for March through September 1982.

Computed monthly average water table elevations for each of the Project areas.

Plans for Next Quarter

Continue to monitor data collection at each of the Project sites.

Complete preliminary water budgets for each of the Project sites and summarize in a report entitled "Water Budgets for Irrigated Regions in Egypt."

Prepare draft of a report entitled "Aquifer Pumping Test for Determination of Vertical Leakage in Beni Magdul"

Personnel Presently Assigned

Mahmoud Ibrahim, Azza Nasr, Moheb Semaika and Tim Gates

Main Office Support Staff

Iman Saber and Laurette Gouel (P.T.)

Field Professional Staff

A. Abdel Naim (Abyuha), Wadie Fahim (Mansuriya) and Ahmed Ismail (Om Sen).

TASK GROUP 6: LAND LEVELING

Objectives

1. Collect and analyze all information on land leveling done by EWUP in the three work areas. Distinguish between land leveling (operations which involve considerable movement of soil or changing the original slope of the land) and land planing which is mainly for smoothing the land or for seedbed preparation.
2. Summarize the previous land leveling activities of the farmer, and evaluate his acceptance of new standards and practices.
3. Analyze the costs of precision land leveling.
4. Assess the impact of leveling on farm water management.
5. Establish training for farmers and other people who wish to improve their own land leveling skills.

Activities and Work Completed this Quarter

1. The manuscript entitled "The influence of Land leveling on Irrigation Efficiency and Management of Water" which was prepared last quarter has been expanded to include results of field trials in the three team areas. A major finding of these results is that water-application efficiency in long furrow/basin irrigation can be as high or higher than that attained by farmers using the conventional small basins. Some negative results indicate that farmers must be trained to irrigate long basins if high efficiencies and savings of time during irrigations are to be realized (this report also relates to Task Group #1). It is expected that this report will be used as a base for the preparation of the final report to describe results of irrigation trials on leveled land. It will be expanded to include all results of irrigation trials with small basins and long furrows/basins in the three team areas.

A draft report entitled "Effect of Land Leveling on the Time and Depth of Irrigation and the Water Use efficiency for Wheat in Abu Raya" by Assia El-Falaky has been submitted for inclusion in the basic report. This also pertains to Task Group #1. It is described in more detail in the current TG #1 Quarterly Report.

A draft report "Irrigation Trials at Mansuriya (Corn, Wheat, *Berseem*, 1980/82)" has been prepared by Bill Braunworth for the Mansuriya Team. This report describes results of tests comparing long furrow/basin irrigation systems with conventional small basin system during 1980/81 wheat irrigations, 1981 corn irrigations 1981/82 *berseem* irrigations and 1982 corn irrigations. According to irrigation trials described by the report, the water-application efficiency for small-basin irrigation was generally higher than that for long furrows/basins. This appears to be due to the limited flow rates from the *saqia*.

A draft report entitled "Land Leveling Data Analysis Program for HP 9825 was completed by Tom Ley. This draft contains a program which was developed to follow the procedures outlined in EWUP Manual #8, "Thirty Steps to Precision Land Leveling in Egypt. The draft is being considered for publication as an EWUP Manual.

A draft report "Precision Land Leveling on Abu Raya farms, Kafr El-Sheikh Governorate, Egypt", was written by Tom Ley using data assembled by the Kafr El-Sheikh Team. It has been submitted for review and consideration for publication as an EWUP Technical Report. This report details the experience of the K.S. Team in performing precision Land Leveling (PLL), provides technical analysis of PLL data, and summarize the impacts of PLL on improving OFWM as part of the pilot program in K.S.

Plans for Next Quarter

Irrigation trials will be continued in the team areas.

The following TDY personnel will work on analysing land leveling subjects described during periods specified:

Tourey (Jan. 5 to Feb. 18, 1983)

1. Evaluation of the impact on on-farm water management of land leveling for : (1) modifying the field layout and topography, (2) utilizing large irrigation streams to save irrigation time and water and (3) eliminating drains and *mesqas*. (Task Group 6).
2. Evaluation of irrigation by long furrows or basins as compared to conventional irrigation of small basins (Task Groups #1 and #6).

John Wolfe (Jan 19 to April 5, 1983).

1. Evaluate methods for "predicting when to irrigate". Review reports of irrigation activities in the three project areas and write criteria for determining irrigation frequency and irrigation requirements. (Task Group #1).
2. Review a semi-final report of results comparing irrigation of long furrows and borders with conventional irrigation of small basins. Write an addendum report containing additional information he recommends to be included in a final report. (Task Groups #1 and #6).

Personnel Assigned to Task Group #6

Bayoumi, Hanson, Assia and Gamal.

TASK GROUP 8: SOIL CHARACTERIZATION

Objectives

1. To determine what soil management techniques are needed for best use of soil and improving water management.
2. To develop water management recommendations based on soil characteristics.

Accomplishments

1. Final Soil Survey Reports of both Kafr El-Sheikh and El-Minya have been typed and are ready for printing.
2. An internal memorandum on problems of irrigation Vertisols in Egypt is in the process of being published as a technical report.
3. A draft of report on root penetration of winter crops in Kafr El-sheikh was submitted to the editor.
4. Provide information on water management of Vertisols for inclusion in International Committee on Vertisols meeting in Khartoum, Sudan, Nov. 1 - 11, 1982. Paper presented by Dr. H. Hamdy, but co-authored with Drs. Taher and Tinsley.

Plans for Next Quarter

Following up our task group activities.

Personnel Presently Assigned

Taher, Tinsley, Assia and Semaika.

TASK GROUP 10: CONJUNCTIVE USE OF WATER

Objective

1. Evaluate water collected from the main drains, canals and irrigation wells from the three project sites.
2. Classify the water from various sources for its suitability for irrigation.
3. Determine the consequences of using drainage water for alternative soil and crop situations.
4. Indicate special management practices necessary for using water of different qualities.
5. Determine the effect of using different combinations of water on the leaching requirements for alternative soil-crop situations.

Work Accomplished During The Quarter

Water samples have been collected regularly from canals, drains, and pumping and observation wells from the three Project sites beginning from March 1982 up to September 1982. Different chemical determinations for water samples have been carried out and the indices for PH_c , SAR, adj SAR, RSC have been calculated. Some determinations that include trace elements like (Fe, An, Mn and Cu) and NO_3 that have to be done twice a year on the samples of canals, drains and wells (according to Verne Scott report 1981) have been carried out in August.

Plotting the results as a function of time is going on as a step for interpreting the data and writing the final report which is due in April 1983.

Dr. Verne Scott completed a draft report on the State-of-the-Art of conjunctive use. It is presently being reviewed.

Personnel Presently Assigned

Assia, Hanson, Taha and Ikram.

TASK GROUP 11: IRRIGATION ADVISORY SERVICE

The Irrigation Advisory Service (IAS) component of Task Group #4 has focused on two major areas of analysis in order to examine the existing situation in terms of establishing such a service. First, there is the need to document how EWUP presents its different pilot programs to the farmers with the purpose of describing how a possible prototype to an IAS may actually perform. Next, an examination of the organizational environment into which the IAS must implement its objectives needs to be delineated. From these two areas of analysis, the objectives of the task group have been created and the work activities have been designed.

Objectives

1. Make explicit provisions for providing the technical advice and assistance to farmers and farm organizations served by the pilot studies which will at least:

Provide technical advice and assistance to the individual farmer on irrigation practices and systems by cooperating with the existing extension service, village cooperative, and farmer organization. Provide technical advice and assistance to the farmer organizations, which will be needed if the farmer organizations are to be successful, on expected water requirement, irrigation scheduling, maintenance of *mesqas* and drains, etc.

Establish the responsibility for specifying the nature of and the person responsible for providing the technical assistance for each pilot study.

2. Develop criteria and procedures for establishing a country-wide IAS. To define what should be the purpose and parameters IAS. To delineate how an IAS is to be organized in terms of its of an personnel, administrative structure, procedures and programs.

To examine how the IAS is to be integrated into the existing institutional structure, i.e., what role will this service play in terms of other organizations.

To examine the preparatory and training aspects of the staff members for this advisory service.

Tasks Completed

- Evaluation studies of the Kaf'r El-Sheikh work in terms of interacting with the farmers have been completed and are now starting to be analyzed in terms of the task group objectives.
- The Project's work with the farmers on *Mesqa* #10 in Mansuriya has been documented for the past year through a special study examining how an innovation is presented to a receiver group. data from that study are now being tabulated and analyzed.
- A questionnaire designed to provide the information to complete objective two has been received from Dr. Ed Knop (TDY) and is now being readied for administering next quarter.

Future Tasks for Next Quarter

- The questionnaire designed by Dr. Knop is to be administered.
- Analysis of the evaluation studies in Kaf'r El-Sheikh and of the special study on *Mesqa* #10 will be continued next quarter. Completion of these analyses will be done for inclusion in the final report.
- Analysis of the contact records describing the Project's efforts in implementing the various programs will commence.

Personnel Presently Assigned

Jim Layton--Coordinator, Moheb Semaika and Gamal Ayad.

MAIN OFFICE

The technical work of the main office is done through eleven task groups. The work is performed by 27 professional staff members with TDY assistance as indicated in the "Backstopping" portion of this report. The main office and TDY staff work with field team personnel at each of the three Project sites to conduct demonstrations and field tests, collect data, and carry out plans for interaction with farmers and local government officials.

The following is a complete list of personnel assigned to the Main Office as of March 31, 1982.

Hassan Wahby	Project Director
Gene Quenemoen	Technical Project Director
Farouk Abdel Al	Economics Discipline Leader
David Martella	Economics Disc. Counterpart
Ahmed Maher	Deputy Institute Director
Gamal Ayad	Senior Economist
Ahmed Taher	Agronomy Disc. Leader
Richard Tinsley	Agronomy Disc. Counterpart
Mohamed Abdel Naim	Senior Agronomist
Assia El-Falaky	Senior Agronomist
Hamed Saleh (33% time)	Senior Agronomist
Moheb Semaila (66% time)	Senior Agronomist
Mona El-Kady	Engineering Disc. Leader
Eldon Hanson	Engineering Disc. Counterpart
James Layton	Sociology Disc. Counterpart
Mohamed Naguib	Sociologist
Yousria Allam (50% time)	Sociologist
Mohamed Helal*	Computer Engineer
Azza Nasr	Computer Engineer
Tim Gates	Engineer-Water Budget
Mahmoud Ibrahim	Computer Engineer
Iman Saber	Technician
Ahmed Bayoumi	Farm Mechanization Engineer
Nadia Wahby	Senior Eng. Water Requirements
Abdel Atti Allam	Engineer - Water Requirements
Wadie Ragy	Engineer - Water Requirements
Mohamed Nabil Naguib	Engineer - Water Requirements

* in training at CSU for 9 months.

Farida Abdel Meguid	Engineer - Water Requirements
Mohamed Ahmed Salem	Senior Adminis. Personnel
Mohamed Sail El-Shatter	Senior Adminis. Expeditor
Salah El-Din Salem	Junior Adminis. Secretary
Sayed Sakr	Junior Adminis. Storekeeper
Zeinab Abdel Ghany	Junior Adminis. Inventory
Ekhlal Abdel Ghaffar	Junior Adminis. Secretary
Magda Yassin Mahmoud	Junior Adminis. Arabic Typist
Ashgan Abdel Zaher	Junior Adminis. Photocopier
Bamba Shaarawy	Junior Adminis. Photocopier
Mona Fakhry	Junior Adminis. Typist
Maher Attallah	Junior Tech. Mechanical Work
Abdel Naby Youssef	Techn.-Mechanical, Motor Pool
Ahmed Soliman Abdallah	Techn.-Mechanical, Motor Pool
Ahmed Ibrahim	Junior Administrative, M.P.
Said El-Said Elwi	Junior Administrative, M.P.
El-Araby Mansour Shahin	Junior Technician, Electrician.
Imam Sayed Washba	Technician
Osman Shaker	Junior Admin.
Shaaban Mohamed Abdou	Telephone Operator
Ahlan Abdel Rahman	Junior Admin. Accountant
Taha Moustafa	Eng.-Water Laboratory
Ikram Mohamed <u>2/</u>	Eng.-Water Laboratory
Ahmed Ghanem	Techician-Water Lab.
Abdalla Gad	Techician-Motor Pool
Ahmed	Guard-M.P.
Moustafa Mahmoud Mahran	Electrician-M.P.
Saad Mansour	Management Ass. for Finance
Nawal Abdallah Ahmed	Accountant - Main office
Magda Moh. Mahrous	Ex. Secretary - Main Office
Mona Farouk Morsi <u>1/</u>	Secretary Main Office
Mervat Hassan	Secretary - Main Office
Hannan Samuel	Secretary - Main Office
Mary Halim	Editor - Main Office
Hamdi Ahmed Hamdi	Translator- Main Office

1/Resigned at the end of Dec.

2/Vacation without pay

TRAINING

During the past quarter the training component of EWUP was involved in three major activities:

1. Sending Egyptian personnel for short term training programs in the United States.
2. Completion of the tour to the United States for OFWM trainees.
3. Salt River Project - Ministry of Irrigation Exchange.

At present there are eight professionals training abroad. They are:

- Gamal Fawzy, Economist, Colorado State University.
- Kamal Ezz El-Din, Engineer, Colorado State University.
- Mohamed Awad, Agronomist, Colorado State University.
- Amany El-Kayal, Engineer, Utah State University (Peace Fellowship).
- Mohamed Nabil Naguib, Bari Institute, Italy (Italian Government Fellowship).
- Magdi Awad, Agronomist, Colorado State University.
- Ahmed El-Said El-Attar, Sociologist, Colorado State University.
- Mohamed Helal, Engineer, Colorado State University.

Two of the Project professional staff attended the Utah State University course on "Water Production Functions" from November 26 to December 20. They are :

- Dr. Assia El-Falaky (Main Office)
- Eng. Nadia Wahby (Main Office)

Twenty eight staff members from the MOI returned on October 16 from a tour of irrigation projects and supporting institutions in Southwestern United States. Complete documentation of this tour and the preceding OFWM training at Kafr EL-Sheikh is being prepared.

Two Egyptian engineers returned from eight weeks of training with the Salt River Project at Phoenix, Arizona. They are :

- Eng. Abdel Rahman Shalaby.
- Eng. Salem Abdel Ghaffar.

Two American engineers from the Salt River Project returned to the United States from six weeks in Egypt. They worked with irrigation engineers at Giza Irrigation District from Oct. 13 to Nov. 24, 1982. These Americans are

- Ron Merkeley
- Jim McDade.

PUBLICATIONS REPORT

Publications are being turned out at a rate of 3 Technical Reports (or 4 Draft Working Papers) per month, including their editing, typing, proofreading & corrections, printing and covering. Any delay that happens is mainly attributed to the overcrowding of printshops at certain occasions or seasons of the year.

The reports are now written on the "Word Processor" which is a real help in making all the necessary changes in a very clean and tidy manner. Besides, the right margin is adjusted, the titles are written in black print and the tables are very nicely arranged.

Concerning the covers of the Technical Reports, it was decided to return once more to the original green covers that were previously used. We managed to print them in Egypt and they proved to be less expensive than the "Fabriano" grey covers currently used.

Correspondence with F.C. is now taking place through Mr. Henry Horscy and we finally succeeded to agree upon a standard format to be used in all EWUP papers, whether produced in Cairo or in F.C.

The process of distribution of Technical Reports has also become a very easy job thanks to the Word Processor, where all the distribution letters are recorded on a special disk and can be printed at any time upon request, by changing only the name of the report.

The following publications were put out by the project during the months of October - December: (N.B. An updated list of publications is always available in the Editorial Office upon request).

I. Draft Working Papers (DWPs)

None

II. Project Technical Reports (PTRs)

- PTR # 10. Soil Fertility Survey of Kafr El-Sheikh, El Mansuriya and El-Minya Sites. By M. Zanati, P. N. Soltanpour, A. T. Moustafa, A. Keleg.
(from DWP # 77)
- PTR # 11. Kafr El-Sheikh Farm Management Survey, Crop Enterprise Budgets and Profitability Analysis. By M. Haider and F. Abdel Al.
(from DWP # 78)
- PTR # 12. Feasibility Studies and Evaluation of Irrigation Projects: Procedures for Analyzing Alternative Water Dist. Systems in Egypt. By R. J. McConnen, F. Abdel Al, M. Skold, G. Ayad, Elia Sorial.
(from DWP # 51,64,71)
- PTR # 19. Rural Development And Effective Extension Strategies: Farmers' and Officials' Views. By M. S. Sallam, E. C. Knop, S. A. Knop.
- PTR # 22. The Hydraulic Design of *Mesqa* 10, An Egyptian Irrigation Canal. By W. O. Ree, Mona El-Kady, J. W. Wolfe, Wadie Fahim.
- PTR # 24. Agricultural Pests and Their Control: General Concepts. By Elwy Attalla.
- PTR # 28. An Economic Evaluation of Wheat Trials at Abyuha Area, El-Minya (1979/80 and 1980/81 Winter Season).
(from DWP # 84) By Nabil K. Farag, Elia Sorial, Mchamed Awad.
- PTR # 29. Irrigation Practices Reported by EWUP Farm Record Keepers (Abyuha and Abu Raya Sites 1979/80 & 1980/81). By Farouk Abdel Al, M. Skold, D. Martella.
(from DWP # 88)
- PTR # 30. The Role of Farm Records in the Egypt Water Use & Management Project. By F. Abdel Al, D Martella.

III. Manuals

None

PAPERS PRESENTLY UNDER PRODUCTION

PROGRESS REPORT

I. Draft Working Papers (DWP)

No.	Title	Remarks
DWP # 102 DWP # 103 DWP # 104 DWP # 105	To be Assigned.	Still with Economics Discipline. Not yet submitted to Editorial Office
DWP # 106	Beni Magdul Crop Calendar.	With author for review.
DWP # 107	Root Penetration.	Submitted to Ed. Office on 11.15.82.
DWP # 108	Day/Night Irrig. Timing Preference of Om Sen Farmers (Summer 1981).	Submitted to Ed. Office on 11.24.82.
DWP # 109	Farm Machinery: Activity Report.	Delivered to printer on 12.30.82.
DWP # 110	Kafr El-Sheikh On-Farm Pilot Program (1981/82 Winter Season).	Submitted to Ed. Office on 12.16.82
DWP # 111	El-Hammami Irrig. Delivery System And Actions for Improvement.	Del. to Ed. Office on 1.4.83

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II. Project Technical Reports (PTRs)

No.	Title	Remarks
PTR # 14	The Challenge of Implementing an Irrig. Program in an Egyptian Village (organization Development and leadership Training Needs in EWUP). By J. Mayfield, M. Naguib.	To be processed in F.C.
PTR # 16	Irrigation System Improvement by Simulation and Optimization, I. Theory, II. Application. By J. M. Reddy , W. Clyma.	To be processed in F.C.
PTR # 17	Optimal Design of Border Irrig. Systems. By J. M. Raddy & Clyma	To be processed in F.C.
PTR # 18	Population Growth and Development in Egypt: Farmers' and Rural Development Officials' Perspectives. By E. Knop, S. Knop	With author for final review
PTR # 21	El-Hammami Pipeline Design. By Sherith.	To be processed in F.C.
PTR # 25	Problem Identification Report for El-Minya. By Royal Brooks.	With Dr. Erwin Nielsen for technical review
PTR # 27	Alternative Approaches in Extension & Rural Development Work: An Analysis of Differing Perspectives. By Sallam, E. C. Knop.	With author for revision

No.	Title	Remarks
PTR # 31	Analysis of Farm Management Data From The Abyuha Project Site. By Elia Sorial, M. Skold, R. Rehnberg, Gamal Ayad and F. Abdel Al	With Fr. Richardson for approval & comments
PTR # 32 (from DWP # 94)	Accessiblity of EWUP Pilot Sites.	Submitted to Ed. Office on 11.1.82
PTR # 33	Soil Survey of Abyuha Area. By Abdel Wahed Selim, M. El-Nahal, M. H. Assal.	Typed & ready for printing
PTR # 34	Soil Survey For Abu Raya Area. By Abdel Wahed Selim, M. A. El-Nahal, and M. H. Assal.	With Editorial Office for review
PTR # 35	Farm Irrig. System Design, Kafr El-Sheikh, Egypt By EWUP Kafr El-Sheikh Team.	Reviewed and sent to F.C.
PTR # 36	Discharge and Mechanical Efficiency of Egyptian Waterwheels. By Slack, Wahby, Clyma.	Submitted to Ed. Office on 1.3.83
PTR # 37	Allocative Efficiency And Equity of Alternative Methods of Charging For Irrig. Water: A Case Study in Egypt. by R. Bowen and R. A. Young.	Reviewed & sent to F.C. on 12.19.82

III. Manuals

No.	Title	Remarks
Manual # 6	Programs for Calculators HP - 67 and HP-97	Reviewed and ready for printing

II. BACKSTOPPING

Planning and Coordinating Committee

Committee members worked on the training programs for Egyptian professionals who are taking non-degree graduate training, attended weekly meetings to plan project activities, reviewed and worked on reports, discussed work plans with the TDY's, provided orientation to Egyptians taking part in the U.S. training programs and backstopped the discipline needs for the Egyptian and American staff in Egypt.

Dr. Dan Hilleman and Dr. Dan Lattimore worked on scripts for a T.V. program on land leveling and on farmer organization. Dr. Hilleman went to Egypt to shoot the T.V. footage for the scripts and still photos for other uses.

The minutes of the Joint Advisory/P & C Committee Meeting (Sept. 13-17) were reviewed by the P & C Committee and finalized in Cairo. They are in the appendix.

Tom Ley devoted significant effort this quarter to analysis of precision land leveling data for Kafr El-Sheikh for 1979-1982. Project Technical Report (PTR No. 35) entitled, "Farm Irrigation System Design, Kafr El-Sheikh, Egypt", was completed, reviewed by Cairo and Fort Collins and finalized for final typing and printing. It should be completed next quarter. PTR No. 9 on rice was completed and sent to Cairo for final typing and printing. A draft report entitled, "Precision Land Leveling on Abu Raya Farms, Kafr El-Sheikh Governorate, Egypt", was also prepared.

Mr. Henry Horsey conducted the training tour along with Ms. Omnia El Hakim. His report is in the appendix. In addition, he reviewed, suggested changes and amended the publication policy for project reports. Reviewed and edited Project Technical Reports No. 13, 14, 15, 22, 24 and 26. Mr. Horsey also developed and implemented an academic evaluation procedure for EWUP Egyptians taking academic training. At the request of Cairo he collected data on procedures, equipment needed and costs for lining ditches with concrete or plastic membrane lining. This information was sent to Cairo.

Drs. Richardson and McConnen helped the field staff and the Egyptian counterparts prepare a program for a National Irrigation Improvement Program (NIIP). A draft of this program is in the appendix.

Training

1. Field Trip

The field trip that is part of the on-farm water Management Short Course was completed this quarter. The report on the trip and participant's names is in the Appendix.

2. Participant Training

Ms. Azza Nasr completed her participant training this quarter and received an M.S. degree in Civil Engineering. Her fall semester courses and grades are as follows:

<u>NAME</u>	<u>COURSES</u>	<u>HOURS</u>
Azza Nasr	CE613 Hydraulics	2 B
	CE605 Exper. Fluid Mech. & Hydraulics	3 B
	AE538 Groundwater Hydrology	4 A
	CE712 Hydraulic Struct. Design	Audit

The five new students completed their first semester work at CSU. The courses and grades are as follows:

<u>NAME</u>	<u>COURSES</u>	<u>HOURS</u>
Magdy Awad, Agronomy	AE505 Irrigation Scheduling	3 C
	AE538 Groundwater Hydrology	4 B
	AG560 Chemical Equilibria in Soils	3 dropped
	M340 Diff Equations	Audit
	AG795 Special Study	3 I
Gamal Fawzy, Economics	EA405 Agriculture Production Management	3 B
	EA305 Farm Records & Analysis	3 B
	EA695 Independent Study	3 S
	EC540 Economics of Natural Resources	3 dropped

<u>NAME</u>	<u>COURSES</u>	<u>HOURS</u>
Ahmed El Attar, Sociology	S100 General Sociology	3 B
	S331 Community Dynamics & Development	3 A
	AD590BV Workshop: Community Education	4 A
	S795V Independent Study	1 I
Kamal El Din, Engineering	AE505 Irrigation Scheduling	3 C
	AE538 Groundwater Hydrology	4 C
	CE613 Hydraulics	2 dropped
	CE695 Special Study	1 I
	AE535 Surface Irrigation System	Audit
Mohamed Awad, Agronomy	AE505 Irrigation Scheduling	3 F
	AE535 Surface Irrigation System	3 dropped
	AG415 Crop Response to Environment	3 I
	AG795 Independent Study	3 I

Although Mohamed Awad did poorly in his course work, his advisor, Dr. Schmehl stated he worked very hard, his English was o.k., but his background was deficient. Dr. Schmehl further recommended that he continue in participant training eventhough does poorly, because he is a good field man and will do a better job with additional training.

The four student will take a special course entitled "Agricultural Project Analysis", January 3-21, during the time between quarters. They are enrolled for the following courses spring semester.

<u>NAME</u>	<u>COURSES</u>	<u>CREDITS</u>
Agronomy Magdi Awad	AG470 Soil Physics	3
	AG471 Soil Physics Laboratory	1
	AG666 Salinity and Soil-Water Mgmt	3
	AG564A Chemical Analysis-Saline and Sodic Soils	1
	GS670 Inter. Agricultural Development	3
	AG795 Independent Study	4

<u>NAME</u>	<u>COURSES</u>	<u>CREDITS</u>
Agronomy		
Mohamad Awad	AG470 Soil Physics	3
	AG471 Soil Physics Lab	1
	AG666 Salinity and Soil-Water Mgmt	3
	AG564A Chemical Analysis-Saline and Sodic Soils	1
	GS670 Inter. Agric. Development	3
	AG370 Irrigation	AU
Economics		
Gamal Fawzy	EA505 Agricultural Production Economics	3
	EA510 Agricultural Marketing	3
	GS670 Interdisciplinary Agric. Development	3
	EA695 Independent Study	1
	EA540 Agricultural Finances	AU
	EC542 Econ. Analysis of Water Development	AU
Engineering		
Kamal El Din	CE615 Open Channel Flow	3
	CE544 Water Resources Planning	3
	CE514 Hydraulic Structures	3
	GS670 Interdisciplinary Agric. Dev.	3
	AG370 Irrigation	3
Sociology		
Ahmed El Attar	S 210 Intro. to Social Research	3
	AD629 Program Development	3
	PR600 Research Methods	2
	S 795 Independent Study	1
	AD620 Processes and Methods	3

3. Special Program (Short Courses)

Engineer Nadia Wahby and Dr. Assia El Falaky spent one week in Fort Collins (Nov . 26 to Dec. 4) on a study tour of Irrigation Projects, agronomy irrigation research, soils laboratory analysis and irrigation economics. Then they spent two weeks (Dec. 5-18) at Utah State University taking a short course entitled "Irrigation Water Production Functions".

Engineer Amay El Kagal, is completing her M.S. degree program at Utah State University under a peace fellowship.

4. Salt River Project Exchange

Abdel R. Hohamed Shalaby and Salam A. Gaffar Moussa spent the period Oct. 16 to No. 27, 1982 working and training at the Salt River Project at Phoenix, Arizona. Prior to the time in Phoenix, they spent a week in orientation and study tour of Colorado irrigated agriculture at Fort Collins. After the time in Phoenix they took a study tour of irrigation districts in Western Arizona and Southern California. The itinerary for the two men at the Salt River Project is in the Appendix.

Engineers Jim McDade and Ron Merkley from the Salt River Project spent the period October 12, to November 24, working as exchanges in Egypt for the Ministry of Irrigation.

Egyptian Exchanges Hassen El-Ahafie and Essa M. Monofir Mohamed will take part in the Salt River Exchange from Feb. 13 to Apr. 9, 1983.

Engineers Don Womack and Sid Wilson Salt River Project will be given orientation in Fort Collins in February prior to traveling to Egypt on the Salt River Project Exchange Program. They will go to Egypt some time this spring.

EQUIPMENT

All laboratory equipment for determining soil permeability has been received except the consolidation permeability attachment. When the last item arrives, all of the equipment will be shipped, by sea, in the same box.

An additional tape drive unit for the HP 9825 desktop computer has been shipped.

The two "Malibu" station wagons have been received in Egypt.

The xerox 7000 copier was shipped from the port of Savannah on November 28, 1982.

The HP-41CV calculator system has been received and will be shipped shortly.

Electrodes, phototubes and molarity standard solution for the Water Quality Lab has been hand carried to Egypt.

Replacement recorders for the wind monitoring system have been ordered.

The balance of equipment and supplies for El-Hammami Pumping Plant will be shipped soon.

TDY's

The following people were in Egypt TDY this quarter;

Dr. Richard McConnen, Economist (October 25, 1982 - November 30, 1982) task group #1 is charged with evaluating alternative on-farm irrigation systems at Kafr El Sheikh. McConnen will work on a baseline study necessary for concluding this evaluation. He will also work on a farming system economic analysis with economist Farouk, Martella.

Dr. Dan Hilleman, Technical Journalist (October 31, 1982 - December 15, 1982) work with sociology discipline to create a set of audio visual programs pertaining to the work and objective of EWUP.

Mr. Jim McDade, SRP (October 13, 1982 - November 24, 1982) to increase the professional competence of the participants by an exchange of literature,

information and on the job training relative to irrigation problems and practices in Egypt and USA. Exchange between SRP & MOI.

Dr. Dave Redgrave, Agronomist (December 1, 1982 - December 14, 1982) work with Dr. Taher and others on the water depletion report for Kafr El Sheikh and Minya.

Dr. George Radosevich, Economist (October 31, 1982 - December 2, 1982) assigned to sociology discipline to work with Farmer Organization task group to construct an evaluation design and instrument to be administered by project sociologists which would evaluate present procedures for developing farmer organizations for the whole area of Abueha Canal.

Mr. Bill Ree, Engineer (August 16, 1982 - November 11, 1982) plan and evaluate construction activities on gravity distribution system at Abueha. Preparation of comprehensive report and accompanying manuals describing design and construction of gravity distribution system at Abueha.

Dr. E. V. Richardson, Project Coordinator (October 17, 1982 - November 5, 1982) to review project progress.

Dr. Ralph Christoffersen, President (October 18, 1982 - November 5, 1982) visit project as university administrator.

Work Plans

The Salt River Project exchange will continue with two Egyptians going to Phoenix and two Americans going to Cairo next quarter.

Advisory service will be provided to the five Egyptians taking course work at CSU this spring quarter.

Planning will continue on the On-Farm Water Management Conferences to be held in Egypt in May, September and the Spring of 1984.

Work will continue on writing, reviewing and finalizing project reports.

As recommended by the Joint Advisory, P & C Committee meeting, the campus staff will work on recommendations to the MOI on the National Irrigation Improvement Program.

III. PERSONNEL

Field Staff

No change

Campus

The following people will be in Egypt TDY next quarter:

Deanna Durnford	12/30/82 - 1/23/83
Wayne Charlie	12/30/82 - 1/2/83
Tom Ley	1/5/83 - 2/18/83
Don Lybecker	2/1/83 - 3/8/83
Bill Ree	3/15/83 - 5/31/83
David Rogers	1/23/83 - 2/13/83
John Wolfe	1/19/83 - 3/30/83
Bob Vandenberg	2/15/83
E. V. Richardson	2/4/83 - 3/2/83
Wendell Gwinn	3/1/83 - 4/30/83

APPENDIX

October 1982 to December 1982

DISCUSSION AND RECOMMENDATIONS OF THE JOINT MEETING

ADVISORY COMMITTEE

and

PLANNING AND COORDINATING COMMITTEE

Colorado State University Campus

Fort Collins, Colorado

September 13 - 17, 1982

The Agenda, List of Participants, and EWUP Progress Report was given in the July to September Quarterly Report.

A joint meeting of the Advisory Committee and the Planning and Coordinating Committee was held at Colorado State University in Fort Collins, Colorado from September 13 through 17, 1982. The Committee reviewed in depth EWUP's research activities and discussed future activities of the Project through its termination date in June 1984. Members attending this meeting are attached.

During this review process the joint committee examined the Project's success in meeting the on-farm water management objectives as established at the beginning of the Project. The joint committee also raised the question of the future of the on-farm water management group after the Project ends. The committee's agenda with a list of the specific subjects discussed is attached, and is summarized below;

1. The Project Progress Report was reviewed and discussed (a copy is attached to these minutes).
2. The future work plans of the Project were reviewed and discussed.
3. An on-farm water management improvement program, and an organizational structure for such a program was discussed.
4. The present and future research needs in on-farm water management were reviewed.
5. The present and future training and continuing education needs in on-farm water management were reviewed.
6. The future of the on-farm water management research group was discussed.
7. The plans and general organization of the proposed on-farm water management conference were reviewed and discussed.

As the Project is nearing its end, the committee felt it would be appreciated to summarize the objectives of the Project as given in the Project paper:

GENERAL OBJECTIVE

Increase social and economic welfare for Egypt's small farmers in the old lands and thus increase the agricultural sectors' contribution to Egypt's gross national product.

SPECIFIC OBJECTIVES

1. Identify major problems and constraints to improved management and optimal water system operation.
2. Determine and establish the use of optimal irrigation practices at the farm level in the three representative pilot areas.
3. Establish improved water control practices for the water delivery and drainage systems in Project areas.
4. Develop plans for organization and implementation of expanded future programs based on results in Project areas.
5. Develop and/or train qualified scientists and technicians for the conduct of Project activities.
6. Provide technical assistance in all phases of irrigated agriculture.

Recommendations of the Joint CommitteeGeneral Recommendations

1. The Project has successfully met the significant majority of the objectives first envisioned at the Project's commencement. Some of the Project findings have been of a different nature than expected, and many of the interventions and solutions have been tested in the field, to determine if they are practicle and acceptable to the farmer.

The committee commends the Project for its continual review of the work plans as new solutions are tested and demonstrated, problems identified, and experience gained. This effective, dynamic process should be continued after June, 1984 under the administration of the Water Distribution and Irrigation System Institute.

2. Continued in-country and expatriate assistance to evolve policy needs related to on-farm water management,
3. Develop a proposal and initiate a request to USAID for continued financial and technical assistance for an on-farm water management program after June, 1984.

Recommendations for On Going Project Activities

1. Establish close ties and coordination among the various Projects engaged in collecting farm records and developing enterprise budgets to assure the continuity, consistency, and quality of the data.
2. The water budget studies should be given more priority. The data should be analyzed and reported seasonally as well as annually.
3. The technical and economic feasibility studies of raised mesqas, lined and unlined, must be given greater attention and the results of the trials must be published.
4. A technical report summarizing project analyses of irrigation should be written. The report should describe the scope of the problem, constraints, costs, control of water and the social feasibility aspects of night irrigation. The Committee suggests the report should address the role farmers' organizations could play in instituting an effective scheduling system.
5. Based on soil fertility surveys conducted by EWUP at the three Project sites in addition to the experience of the Soils and Water Research Institute, MOA, it is recommended that implementation of a national soil testing program should be considered. The objectives of this program would be to improve the allocation of fertilizers, micronutrients, and amendments to the different areas in the country. This allocation would be based on regular multi-year-soil analyses and the known crop needs. This program should include on-farm trials to provide basic data for soil testing methods and to determine the economic optima for the amounts and types of various fertilizers most appropriate to suit crop rotations and soils.

6. The joint committee recommends to the MOI that the management of the main delivery system may need to be reconsidered in order to ensure the timely delivery of the discharge required for effective on-farm water management. The committee suggests that this review might be one of the activities of the IMS (Irrigation Management Systems) Project.
7. If this additional research over-extends EWUP manpower, the joint committee recommends that TDY help should be sought.

Recommendations for Action Programs

1. The Project has identified a set of problems within the existing irrigation system network. Solutions to these problems are being tested and evaluated. However, these field trials are limited in scope. The joint committee suggests that the first action program should be extended to new areas within the 3 districts in which the Project's field sites are located. A second phase of EWUP might be appropriate to start implementing this program.
2. Future implementation programs, based on the Project's findings, should be developed. These programs should be prepared by an implementation organization or authority according to Egypt's economic and social priorities. EWUP can act as advisory agent to the implementation organization.
3. Detailed manuals should be prepared to aid the implementation groups. These manuals would address subjects such as problem identification, surveys, feasibility studies, selection of proper engineering techniques and agronomic practices.
4. EWUP should prepare a set of working plans for the continuation of the on-farm water management group within the Water Research Center after the project has ended. The duties of such an organization would be to continue on-farm water management research, field trials, and training.
5. A reasonable incentive may be necessary for getting farmers to adopt on-farm water management programs. It is assumed of course, that any implementation of an action program would be according to

the national policies and would provide for farmer participation in the amortization of a program costs.

6. Controlled, well managed gravity irrigation should be encouraged in areas where the main system provides adequate head without major structural modifications.

Organizational Recommendations:

The Project should submit an organizational model and plan that will assure the continuation of on-farm water management in research, training, monitoring, evaluation and as an advisory group for on-farm water management implementation projects. The organizational model must detail any necessary institutional changes and will be based upon the following tenants:

1. Technical change is a dynamic process.
2. There is a great need for a water management advisory service group.
3. Farmers have to be considered as the key to any on-farm water management system. The farmers participation and education are essential.
4. The implementation of any national program should be handled by a proper executing agency (existing or proposed).

Training Recommendations:

1. The training component of the Water Research Center, presently being developed, should continue the very successful on-farm water management training at Kafr El Sheikh. This training course, unique to Egypt in that it is interdisciplinary and farmer oriented, is well suited to developing the trained personnel essential for successful implementation of future national programs in on-farm water management.
2. The role of universitites in providing their students with an on-farm water management background is important. It is recommended that some of the undergraduate courses be modified and that the important involvement of the university staff in graduate work and training be recognized and increased. Furthermore,

it is recommended that the MOI support undergraduates who participate in on-farm water management training programs.

3. Those who have been trained in the Project should form the core of the on-farm water management implementation groups in the on-going IMS Project.

On Farm Water Management Conference

It is recommended that an international conference emphasizing on-farm water management should be held in Cairo in February 1984. The purpose of this conference will be two fold.

1. To share the findings of the Project with the rest of the world.
2. To subject the Project findings to critique by international experts.

In preparation for the international conference it is recommended that an in-country National Workshop be held in May 1983. The Workshop would be an occasion for the presentation of the Project's preliminary results. The participation of District Irrigation Engineers and members of the Egyptian institutions involved in agriculture will ensure a thorough review of the Project findings.

It is recommended that the leadership in organizing and coordinating the International Conference should be provided by Dr. Ibrahim El-Assiyuti and Dr. Dick McConnen. The organization of the National Workshop will be the responsibility of EWUP in Cairo.

The Project will initiate communications with several international organizations and agencies who may be willing to participate in the financing of an international conference.

Future

The joint committee has found the review and discussions at this meeting to be quite valuable.

It is recommended that the joint committee meet once more before the end of the Project to review the Project recommendations and findings prior to the drafting of the final report. The committee has tentatively agreed to meet in Cairo prior to the proposed National Workshop.

1982 FIELD TRIP

The 1982 EWUP training tour began on the 23 of September and finished on the 15th of October. During this 23 day period the tour participants observed a variety of water management related projects throughout the American Southwest. The tour participants included 20 Egyptian trainees from the EWUP On Farm Water Management Course and 8 senior officials from the Ministry of Irrigation. The trip was under the leadership of Engineer Mahmoud Issa as group leader, Mrs. Omnia El Hakim as a coordinator and translator, and Mr. Henry Horsey as a coordinator.

A list of the participants and the tour itinerary is attached. An outline of the various projects visited by the tour follows.

1. Fort Collins, CO

A general orientation of the tour members to American customs and culture. An introduction to water management problems in the American Southwest and a discussion on the similarity between these problems and those occurring in Egypt. A general introduction to irrigation and agricultural in the southwest.

2. Grand Junction, CO

Fruita Research Center - A tour of a new experimental irrigation method called Cable Gashion that improves both water management and water quality. Research and development to achieve higher irrigation efficiency was discussed.

3. Page, AZ

Glen Canyon Dam - Tour of multi-purpose dam and reservoir facilities. Discussions included the allocation of water for multiple purposes, power plant and power market as well as an overview of the Colorado River Development Project.

4. Phoenix, AZ

Salt River Project - Tour of a multi purpose water resource project. Coordination of the various project activities to avoid water resource conflicts was discussed. Tour of the irrigation delivery system was taken to illustrate the methods used to optimize irrigation water use.

United States Department of Agriculture Water Conservation Laboratory - Lecture and discussion on the current water conservation problems being studied, the research approach to these problems, and some preliminary findings. Subjects covered included: recycling municipal water for irrigation, reuse of saline water, reclamation, and irrigation timing.

5. Yuma, AZ

All American Canal - Lecture and discussion of the regulation of the Colorado river with regard to both quantity and quality of the river. The distribution of the Colorado River water between; the United States and Mexico, the different states, and the various users of the water. A tour of the All American

canal desilting works, illustrated methods to deal with sediment problems.

Wellton-Mohawk project. - A tour and discussion about this project and the extremely high irrigation efficiencies realized. Additional subjects discussed included; water quality, salinity, joint use of ground and surface water, pumped drainage, and drip irrigation.

6. San Diego, CA

Grove Chemical Co. - Inspection of the different components of drip systems, lecture on the proper combinations of system components and the proper utilization of drip systems. Tour of drip systems utilized by vegetable crop farmers to increase yields and of systems utilized for tree crops planted in marginal soil on previously unuseable steep slopes.

7. Riverside, CA

The United States Department of Agriculture Salinity Lab - A tour and lecture on the current research being conducted by the lab. Particular subjects covered included the latest field trials utilizing saline water, salt resistant crops, determination of the critical salt stress period for different crops, crop salt threshold levels, and rotations and irrigation practices which allow the joint use of saline and non saline irrigation water.

TRAINING TOUR 1982

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SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				23 Travel Cairo to Fort Collins University Motor Inn 914 S. College Avenue (484-1984)	24 Cash Per Diem Checks Orientation - Martha Denney Buffet 7:00 p.m. West Ballroom University Motor Inn	25 Free Day University Motor Inn
26 Free Day University Motor Inn	27 Colorado Big Thompson Irrigation Project, Irrigation District in Area	28 Travel Fort Collins to Grand Junction leave 8:00 a.m. Travel Lodge 104 White Avenue Grand Junction 303/242-0651	29 Fruita Research Center (Harold Golus) Grand Junction 8:00 a.m. Travel Lodge	30 Travel Grand Junction to Page, AZ Weston's Lamplighter 207 N. Seventh Page, AZ 602/645-2451		
					1 Elsie Swapp 602/645-2481 Glen Canyon Dam enroute to Phoenix, AZ 9:00 a.m. Rodeway Inn Metro-Center 10402 N. Black Canyon Highway Phoenix, AZ 602/242-2371	2 Free Day Phoenix Rodeway Inn Metro-Center
3 Free Day Phoenix Rodeway Inn Metro-Center	4 Salt River Project (Don Davis) 9:00 a.m. Phoenix, AZ Rodeway Inn Metro-Center	5 Water Conservation Laboratory (USDA) (Herman Bouwer) Phoenix, AZ Rodeway Inn Metro-Center 8:45 11:30 1:00 lunch 4:00 tour over	6 Travel Phoenix to Yuma Ramada Inn 3181 S. 4th Avenue Yuma, AZ 602/344-1420	7 Wellton-Mohawk Project, Yuma, AZ Ramada Inn Bureau of Reclamation will come to hotel at 8:00 a.m. (Someone from Bureau will meet at hotel 8:00 a.m.)	8 Wellton-Mohawk Project, Yuma, AZ Ramada Inn Ken Sidebottom Asst. Project Manager 602/726-2543 Mr. Conway	9 Travel Yuma to San Diego Seven Seas Best Western 411 Hotel Circle South San Diego, CA 714/291-1300
10 Free Day San Diego (Sea World) Seven Seas (make reservations 2 days in advance) 714/226-1221 \$2.45 group rate	11 Veg. Crops - Steep lands Irrig. Proj. Grove Chemical Co. Chula Vista (Bob Grove) Seven Seas (meet at Chula Vista location at 8:30 a.m.) (Ben S. qawa contact Chula Vista) 1616 Silvas (just south intersection Anita & Broadway)	12 Travel San Diego to Riverside Motel 6 4045 University Drive (Downtown) Riverside, CA 714/682-2250	13 USDA Salinity Lab Riverside, CA (Jack Goertzen) Motel 6	14 Free Day - Disneyland	15 Travel Los Angeles to Cairo	16 Arrive Cairo

(Ben S. qawa contact Chula Vista)
1616 Silvas
(just south intersection Anita & Broadway)

GOE Officials Traveling on the

U. S. Field Trip

- 1) Abdel Aziz Amin Soliman Deputy Minister of Water Distribution
- 2) Ali Abdel Rahman Ali Deputy Minister of Sharkiya Governorate
- 3) Atfy Mohamed Aly Deputy Minister of Fayum Governorate
- 4) Aly Rafie Ahmed Aly General Director of Monofiya District
- 5) Talaat Eshag Tadros General Director of Sharkiya District
- 6) Abdel Meguid Abdel Wehab Badran General Director of Dakahliya District
- 7) Mahmoud Ibrahim Issa General Secretary of Wacer Research
Center,
- 8) Mohamed Abd El Naim Ahmed Agronomy Discipline Leader - EWUP

Trainees Traveling on the

U.S. Field Trip

- 1) Refaat Fahmy Fanous Soliman
- 2) Anahar Saleh Mohamed Rifaat (Miss)
- 3) Abdallah Mohamed Hussein Mostafa
- 4) Magdy Mohamed Badawy Helal
- 5) Nabil Kamal Faraq
- 6) Farida Abdel Meguid El Hssy (Miss)
- 7) Samir Abbas Saad
- 8) Mahmoud Ibrahim Ali
- 9) Maamoun Mohamed Abou-Zaid
- 10) Ahmed Ebrahim Ghoniem
- 11) Maher Sobhe Salama
- 12) Mohamed Farouk Ali Abu Hindia
- 13) Abd El Aliem Mohamed Okasha
- 14) Talat Helmy Youwkiem
- 15) Yousria Ahmed Allam (Mrs)
- 16) Sohair Kamal Yousef (Miss)
- 17) Farouk Ibrahiem Hassanien
- 18) Nabil Mohamed Soliman
- 19) Saad Hussein Zaki
- 20) Safaa Fahmy Risho (Miss)

*Key: underlined name is surname.

NILE IRRIGATION REVOLUTION IN EGYPT

National Irrigation Improvement Program (NIIP)

Draft (December 30, 1982)

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(December 30, 1982)

NILE IRRIGATION REVOLUTION IN EGYPT

National Irrigation Improvement Program (NIIP)

INTRODUCTION

The National Irrigation Improvement Program (NIIP) will result in increased food production, save water and increase the potential for future beneficial use of the irrigation waters of the Nile. The full potential of Egypt's irrigated agriculture cannot be realized without significant improvement and modernization of the distribution of the waters of the Nile and applying those waters to the crops of the Egyptian farmers. EWUP's work shows that if these waters are to be used in ways which will be of greatest benefit to Egypt, the water delivery system and the farm level irrigation system must be treated as a single water resources system and if Egypt is to generate the full potential from its water resources, then NIIP Projects must treat the water resources system as a single system. Since the use of water must be related to agricultural production, there must be increased mutual understanding and cooperation between the MOI and MOA.

NIIP is designed to use the findings of EWUP to accomplish three primary goals of:

- (1) Provide for more efficient water use.
- (2) Increase food production.
- (3) Use water saved in the old lands for use in new lands.

NIIP requires, (1) the Ministry of Irrigation (MOI) to implement a program of main canal, branch canal, mésqa and on-farm irrigation improvement. (2) The Ministry of Agriculture (MOA) to implement a parallel program of helping the farmer improve his agronomic practices. And, (3) The utilization of the private sector for construction and maintenance of the improvements and provide for hire mechanization for seed bed preparation, cultivation and land leveling, Figure 1. Agronomic practices are defined as a farm level program to improve seed bed preparation, cultivation, fertilization, pest control, new seed varieties, and planting the proper number seeds at the proper time.

NIIP Projects in the Ministry of Irrigation are concerned with (1) the distribution of water using branch canals and mesqas, (2) the field application of that water and (3) the maintenance and continuing support for the improved irrigation system including on-farm activities. The Irrigation Management System Project (IMS) is concerned with the system of main and secondary canals. The work under NIIP and IMS must obviously be coordinated. NIIP will permit Egypt to capitalize on the new potentials which will be provided by IMS results. However, NIIP Projects need not await the completion of IMS results. EWUP work has demonstrated that increased food production and water conservation can be achieved using the existing structure of main and secondary canals. The benefits of IMS projects completed at a later date will be enhanced by any NIIP Projects already in place.

In order to take full advantage of an efficient irrigation system, farmers must be capable of using improved crop production practices. The MOI and the Ministry of Agriculture (MOA) must implement a program to help farmers to utilize improved irrigation and agronomic practices such as long level furrow or basins irrigation, improved seed bed preparation, cultivation, fertilization, pest control, new crop varieties, proper rates of seeding and the timing of farming operations. In order for Egypt to achieve the benefit of increased food production and water conservation, it is essential that (1) the MOI take full responsibility for the delivery of water to the farm by branch canals and mesqas and to provide farmers with assistance so that field irrigation application efficiencies will be high, (2) the MOA help farmers apply the appropriate agronomic practices, and (3) the private sector to provide the construction and farm mechanization services.

This paper will outline NIIP, a program for (1) the improvement of branch canals and mesqas, (2) the efficient field application of water, and (3) continuing support to the farmers to utilize the improvement. NIIP requires the involvement of the private sector in farmer support and a parallel MOA agronomic program. Also included are some suggestions of main canal improvement and survey department improvement to support the program.

FOOD SECURITY

Food security for Egypt requires a substantial increase in crop production in the old lands (vertical expansion) and an increase in lands that are efficiently irrigated (horizontal expansion). Both vertical and horizontal

expansion depend on improved farm water management. To obtain this improved farm water management requires improvement in farm irrigation and improvement in the water delivery system.

Crop production can be illustrated by the following equation which gives the necessary and sufficient interrelated variables affecting maximum crop production.

C.P. = o (Irr, Dr, Sd, SB, PP, FR, P.C., CC. Fr, En, SE.)

C.P. = Crop Production

Irr = Irrigation

Dr = Drainage

Sd = Seeds

SB = Seed Bed Preparation

PP = Plant Population

Fr = Fertilizer

P.C. = Pest Control

C.C. = Cropping Pattern

Fr = Farmer practices

En = Environmental (climate, soils)

SE = Social-Economic environment

In the above equation, all the major elements for increased crop production are included. For example, drainage includes salinity and waterlogging control. Also, irrigation and drainage are necessary in the maintenance of the proper soil-water balance for maximum crop production. These variables are all interrelated. It is obvious that with the proper soil-moisture regime, but poor seed and fertilizer application there will not be good crop production, just as it is also obvious that with the best seeds and fertilizer, poor soil water condition yields will also not be a maximum. There has been much research on these interactions in Egypt and the rest of the world. It is not the intent of this section to described these interactions, but to indicate that they exist and that this National Irrigation Improvement Program must be linked to a parallel MOA agronomic program private sector involvement to provide services such as mesqa and branch canal improvement, mechanization for seed bed preparation, and social-economic incentives to farmer involvement to improve crop production and efficient water use.

NATIONAL IRRIGATION IMPROVEMENT PROGRAM

The National Irrigation Improvement Program (NIIP) will be implemented in each of the 20 Governorates with irrigation of old lands. The program will be under the supervision of the U/S of State for irrigation in each Governorate and under the technical and budgetary control of EWUP. There will be established an office containing an interdisciplinary team of senior professionals in Upper Egypt and in the Delta reporting to a main office in Cairo. There will also be established an interdisciplinary staff of professionals in each Governorate to carry out the day to day activities of NIIP. These arrangements are necessary because EWUP has the expertise and knowledge of what is needed to improve the irrigation system and the U/S has the knowledge and expertise about local affairs. In time it is recommended that the technical and budgetary control be transferred along with the trained implementing personnel from EWUP to the irrigation sector. This organizational structure is given in Figure 1.

In addition to controlling the implementation program, EWUP will continue its Research and Development Program in El Minya, Kafr El-Shiekh and Mansuriya and undertake new research and development work in El-Fayoum and Qena. In these two latter areas it will develop a Farm Water Management Program to meet the unusual conditions of these two areas.

In each Governorate the branch canal, mesqa, farm irrigation and drainage will be modernized and improved so that the farmer can maintain the proper soil moisture regime in order to save water and maximize crop production utilizing the property agronomic recommendations of the MOA. In addition, these improvements to the irrigation system and farm water management will prevent losses in the land base due to waterlogging and salinization, prevent deterioration in ground and surface water quality and decrease the need for extensive tile drainage programs. This program requires close cooperation between the District Engineer, the NIIP professionals (MOI) and the District Extension Agents of the MOA. The recommended improved on-farm irrigation system is essential not only for improved irrigation but also to improve conditions for farm mechanization. EWUP's research has shown that long level furrow or basin irrigation is not only more efficient but saves land and allows for more efficient use or even the use of farm machinery. These long level basins or furrows are needed for mechanization which in the long run is essential for Egypt if she is to provide the food and fiber for the Mediterranean region and to have food security.

EWUP's research has shown that the branch canals and mesqas are in need of major repair and maintenance to serve the present farm irrigation system of small basins. Therefore, it only makes sense when improving the branch canal and mesqas to improve them for modern irrigation to serve the future and not the past. The present system was designed to serve the 19th and early 20th century. This improvement program is designed to serve the 21st century. As the result of the program to improve the irrigation system and advise farmers in the use of modern irrigation methods, the program will facilitate mechanization, farmer access to fields, improved on-farm irrigation and other agronomic practices.

Details of NIIP program for each element of the irrigation system (branch canal, drains, mesqas, on-farm irrigation, and main canals) follows.

BRANCH CANAL IMPROVEMENT

Branch Canals would be modernized where possible to continuous flow with rotation between mesqas. If possible main canals will be changed from rotation to continuous flow to serve the continuous flow in Branch Canals, (see main canal section improvement at the end of this section for explanation). Continuous flow decreases canal cross-section, increases the ability of the delivery system to meet crop water requirements and saves water.

The cross-section and slope of the branch canals will be designed to deliver the water requirements of the land it serves. Gates will be installed on the mesqas where gravity irrigation is possible. Where gravity flow is not possible diesel pumps will be installed to supply water to the mesqas. All mesqas will deliver water under sufficient head (gravity or pumps) and quantity for farmers to irrigate their lands quickly and efficiently on a rotation basis. EWUP has developed computer programs for the design of improved Branch Canals.

A measuring weir will be installed at the upstream end of the branch canal. A leakproof mechanical gate will be installed at the inlet from the main canal.

The operation of the headgate from the main canal will be by an Irrigation Field Man (IFM) working directly under the District Engineer. He will be a trained person with at least a high school degree and possibly an Agricultural Engineering graduate. He will be responsible for the operation of four or five branch canals which he will visit daily. It will be his responsibility to supervise regulation of the main gate or gates so that no water goes over the tail escape on the branch canal or mesqas. He will

accomplish this by working with farmer mesqa associations by rotating water between mesqas and with them determining which mesqas must use night irrigation in turn. With individual farmers not having to lift water, it should be possible for a mesqa to take its turn at night or have its turn include night irrigation without undue hardship or improper irrigation. If a fair rotation system is developed between mesqas and farmers, night irrigation will not be a burden for any farmer. The IFM will be responsible for keeping discharge records and furnishing this information to the District Engineer weekly along with his forecast of water needed in the next week.

In lands when the soil is "tight", the branch canal will be of earth. Where the land is sandy (i.e. near the desert) and seepage losses are large, the canal will be lined by slip form concrete or other methods. Where needed, buffalo baths and village cleaning for clothes and dishes will be installed.

The end product of branch canal improvement will be a realigned, improved physical structure that will be capable of being managed by trained personnel to serve the agriculture need of the future.

DRAINAGE IMPROVEMENT.

Major and minor drains serving the area of the branch canal will be surveyed and any improvement (cleaning, realignment), will be made prior to branch canal cleaning. If field or tile drains are needed, this information will be passed up to the Governorate U/S for inclusion in future drainage projects.

During the initial survey and three times a year drainage water will be sampled to determine short and long term trends in salinity.

MESQA IMPROVEMENT

Depending on the area (branch canal, Governorate or region) different mesqa improvements will be made. Where possible, mesqas will receive water from the branch canal by gravity. Where not possible, mesqas will receive water by pumps.

In all cases farmers on a mesqa will receive water in sufficient quantity and at high enough elevation (normally 20 cm) for efficient quick irrigation. Irrigation by farmers will be by rotation. The turns on the mesqa and between mesqas on a branch canal to be determined by the farmers and enforced by the farmers. If necessary, laws governing farmer associations and their rights could be passed so that civil authorities can handle violations rather than the Irrigation Ministry.

When possible mesqas will be of improved earth design. EWUP has a computer program for the design. This design saves land and allows for annual cleaning with simple equipment.

Where sufficient head is not available for the mesqa to be improved to provide gravity irrigation, a pump can be installed. Farmers will be required to pay for the pump and its operating cost, but the government will pay for the installation and mesqa improvement.

The pump will pump into a raised mesqa which may or may not be lined depending on the situation. If lined, EWUP has several designs from which a selection can be made. Also, EWUP is continuing to research low cost lining of mesqas and branch canals.

An alternative to pumping into a raised mesqa is to install a low cost buried plastic pipe line with low head valves serving each farmer. A system serving 50 to 200 feddans has been developed in India that should be researched (installed on a trial basis) in Egypt. This buried system should be practical for the sandy soils along the desert and for installation where present mesqas are so deep as to prevent inexpensive construction of a raised mesqa. These improvements will save water by decreasing the loss of water that occurs from the present mesqa with their over large and weed ridden cross-sections.

Mesqa improvement and management is difficult. But EWUP has developed methods to improve them and has shown that farmers will organize to maintain and operate them.

How to equitably pay for mesqa improvement and an operation program is a problem. A suggestion is that farmers pay for the gates and pumping plants including all operation and maintenance costs, and the government pay for all initial improvements.

Where possible, some mesqas will be eliminated and a farm road built in its place. Elimination of mesqas is possible with the installation of long level furrow or basin irrigation. For example, in the Minya area mesqas are 100 or 200 meters apart. Efficient long level basin or furrow irrigation is possible with this length if large enough discharges are available. (In the U.S. and Western Europe efficient irrigation is practiced with level furrows or basins 800 to 1000 meters long). Thus, with proper design taking into account property patterns, it is often possible to eliminate every other mesqa. The resulting farm road (2 meters wide) improves mechanization and removal of farm products from the field.

ON-FARM IRRIGATION IMPROVEMENT

With improvement of the branch canal and mesqa so that an increased quantity of water is available at the farm with sufficient head, an improved farm irrigation system is possible. This improved system is long level basin or long level furrow irrigation. Level is what the Americans call precision level or dead level. The land is leveled within ± 5 cm.

This long level system (length of furrow or basin 100 to 200 meters long) will allow for mechanization of land leveling, seed bed preparation, planting, cultivating and harvest even with Egypt's small farms. EWUP has shown that it works and that it improves the use of machinery. And if Egypt is to take her proper place as supplier of food for the Mediterranean region she must mechanize. The long basins or furrows eliminates the construction and use of marwas and small bunds. Only a head marwa is needed. This saves labor, land and water. EWUP has measured 40% and 50% water losses in marwas in the Kafr El-Sheikh area. This lost water was then pumped into the sea.

The change from the traditional small basins to long level basins or furrows requires, as stated before, improved mesqas and branch canals. In addition, it requires professional help to the farmer and the availability of farm machinery. It is proposed that the professional help to the farmers on the improved irrigation system be supplied by an advisory service in the MOI working along with the Extension Service of the MOA. That farm machinery and land leveling equipment be made available for purchase by village contractors on a long term loan (5 years). That village contractors do the land leveling with Engineering help from MOI.

That seed bed preparation, planting, pest control, fertilizer, cultivation, and professional advice be provided by MOA. That tractor maintenance training for the village contractor be provided by the MOA or a private contractor.

The Irrigation Field Man (IFM) would be the mechanism whereby the farmer would request help from the advisory service. This advisory service will also be under the District Engineer.

MAIN CANAL IMPROVEMENT

As is well known, the main and secondary canals need maintenance and improvement. In NIIP the essential maintenance will be done by the Irrigation Management Systems (IMS) Project, but improvements to the system will be recommended by NIIP. However, major improvements are to be designed by the project planning unit in IMS.

It is recommended that the control of water in the main system be changed to volume measurement (M^3/S) from the present method of maintaining a given level in the canal. Constant levels will still have to be maintained but water will be measured in order to control the amount of water any area receives. To maintain the constant elevation in the main distributary system (this is necessary in order to have good control of the delivery of water in the branch canal) Nyripic upstream head control gates should be installed where feasible.

Another major recommendation is to change from rotation in the main canals to continuous flow. This change would provide for better matching of the irrigation supply with the water requirements of the plants which is essential for increased crop production.

A canal design for continuous supply of water to the branch canal will take a smaller cross-section than the present rotation system. It takes a larger canal to supply a volume of water in a short time period than over a longer time. The smaller cross-section will decrease the cost of lining, of maintenance, of constructing bridges and will provide space for road improvement and/or cropping land.

It is recommended that lining only be done where there are large seepage losses as lined concrete canals cost more to clean than unlined and the old land canals have to be cleaned. Under this program canals to be improved first will be recommended by the U/S of State for Irrigation in each Governorate based on the branch canal, mesqa, farm irrigation system improvement program.

MINISTRY OF AGRICULTURE (To be Written)

PRIVATE SECTOR PROGRAM (To be Written)

SURVEY DEPARTMENT USE

Canal and mesqa profiles and cross-sections, maps of the branch canal command areas giving branch canal and mesqa locations, ownership boundaries and cropping patterns are essential for NIIP. Maps of the main canal system are essential for their improvement. This material must be available in a timely manner. Therefore, it is essential that a modern mapping capability be provided to the MOI and field surveying capability be provided in each Governorate under the supervision of the U/S of State for irrigation and control of NIIP.

This program provides for modern mapping capabilities in the MOI. A special section will be installed in the IMS project to provide this service. It requires the MOI to pay incentives, and recruit qualified Egyptian Catagraphers and donors to furnish technical assistance and equipment. The TA to be provided through NIIP with temporary duty (TDY) help from one of the small map-making firms in the United States. To provide maps on a timely basis requires that this map making section have its own small airplane and precision mapping camera in addition to the office equipment. The TA & equipment are in the budgets. The map making service will be programmed to provide the basic map of a given area (3 or 4 branch canals or a main canal) in 3 or 4 days time.

In addition to the main mapping service, each Governorate will have a field survey team to provide (1) ground control for mapping, (2) cross-sections and profiles of branch canals and mesqas and (3) cross-sections and profiles of the main system. The MOI is to furnish the necessary engineers by providing incentives, EWUP of the Water Research Center will provide training under control of NIIP and AID furnishing TA and equipment. These items are included in the two budgets.

IMPLEMENTATION PLAN

The NIIP will be implemented by establishing Interdisciplinary Teams consisting of Engineers, Economists, Sociologists and Agronomists, in each Governorate under the control of the U/S of State for Irrigation; the technical direction and budgetary control to be under a directorate for Upper Egypt and the Delta. These directorates are under direct technical and budget control from Cairo. These Irrigation Improvement Teams will determine what is to be done, provide the necessary designs and supervise construction. The NIIP team will utilize the MOI Survey Department and private construction companies. An improved and enlarged section will be established in the present Survey Department in the MOI, to prepare maps, including ownership maps of the command area of any branch canal selected for improvement. Construction companies in each governorate will be provided equipment and technical assistance so that they can efficiently do mesqas, and branch canal improvement. The organization structure is in Figure 2. The personnel number and equipment are in the cost estimate breakdown.

The implementation time plan would be to start in three Governorates the first year and to expand into other Governorates in succeeding years as

trained personnel became available. A tentative time frame is as follows:

1st year	3 Governorates
2nd year	5 Governorates
3rd year	8 Governorates
4th year	14 Governorates
5th year	20 Governorates

It is proposed that EWUP will provide the initial personnel along with personnel from the Ministry and the maintenance companies. EWUP will provide the initial control over technical activities and the budget but within the five years it will be transferred to the irrigation sector. EWUP then would continue its research and development of improved farm irrigation practices including delivery system improvements along with inspection and approval of the NIIP Projects and training.

It is estimated that about 10% of the L.E. and 10% of the AID budget for NIIP will be provided to EWUP for its research and development inspection and training activities. EWUP's estimated budget is in the appendix.

The speed of phasing into Governorates would depend on the number of trained personnel available to staff improvement teams and mobilization of equipment and supplies. The budget for EWUP has a large component for training and by conducting on-farm-water-management research, would in new Governorates help speed up the implementation process.

FARM SUPPORT PROGRAM

If NIIP is to have the payoff of (1) Increased food production, (2) more efficient use of water, and (3) water saving for new land development, there must be a continuous farmer support program involving the MOA's extension services, experiment stations and cooperatives, the MOI district engineers, water research center and newly established farmer advisory service, and the private sector to provide tractors and farm implements for land leveling, land preparation, planting and harvesting.

MOI (To be Written)

MOA

These MOA activities are to bring the fruit of AID's Agricultural Projects to the farmer and Egypt. This will be obtained by NIIP keeping in close

contact with MOA agencies at all levels (District, Governorate, Field Offices and Main Offices) and coordinating its activities with the MOA activities.

PRIVATE SECTOR

The private sector is needed to provide farmer support by providing on a custom (for hire) basis the services of farm machinery for land preparation, planting and harvesting and land leveling. For the private sector to provide this necessary support, it will need low interest loans to hire and train people, purchase equipment and establish itself in an area. It is proposed that a program of loan financed help to establish this private sector support program be established in each Governorate. These private sector support companies be obtained at first by soliciting tender offers. The private sector companies being required to invest a certain percentage of the initial cost. This activity to be joint with NIIP, MOI and the MOA. An estimated budget per Governorates is in the Appendix.

COST ESTIMATE

It is estimated that this program will cost about 100 L.E. per feddan. Thus, for the total 5.8 million feddans the cost will be 580 million L.E.

To implement the program, 58 million L.E. should be appropriated in the next five year plan and donor help of 90 - 100 million dollars over the same period of time to provide technical assistance, equipment and training. These cost estimates are very preliminary as nothing like NIIP has been tried in the world. With this money, irrigation improvement will be made on 10% of the land area. However, the infrastructure, equipment and people will be in place so that in the next 5 year plan 25% to 30% of the system will be improved. Details of the cost implementation cost program are given in the Appendix.

BENEFITS AND COSTS OF NIIP

To evaluate NIIP; both on-site and off-site benefits and costs must be considered. Not all of the benefits and costs can be expressed in money terms at this time, but in all cases, the general magnitude of benefits and costs can be estimated. For example, the amount of water which will be saved by NIIP Projects can be estimated, but the value of the water saved depends on

how it will be used in the future. However, we do know that water saved can be one of the important benefits of NIIP Projects. The direct costs of NIIP Projects will depend on both the work to be done on a particular site and the way in which the Project is organized. In this report, the estimates of direct on-site costs will be based on the irrigation improvement programs for three EWUP case studies.

DIRECT ON-SITE BENEFITS AND COSTS

Three EWUP case studies will be presented for purposes of illustrating the nature of these costs and benefits. While the specific estimates presented here are of definite value, the most important aspect of this presentation is nature of the methodology used.

The Abuha Project in Minya Governorate contains 1200 feddans. At the present time, the Abuha Canal is being raised so that the water flowing into the area can be controlled more precisely and, if the mesqas are raised, the field in the area can be served by good gravity irrigation. In addition, the plan calls for the development of internal access roads. At present, the area is served by 31 mesqas. These mesqas can be reduced to 19 or 20 mesqas. The number of mesqas could have been reduced further from a technical standpoint, but out of respect for the ownership patterns of land and social problems unique to this site, the plan discussed above was developed.

The El-Hammami pipeline is being developed to serve 780 feddans near Cairo. The water will be pumped from the Mansuriya Canal and will be available to the fields as gravity flow. This is a small scale experimental pipeline and is designed to serve an area with fairly sandy soils.

The Beni Magoul Lined Canal was constructed in 1977 and delivers water on a continuous rather than a rotational basis to 800 feddans. In 1981-82, mesqa 10 was renovated as a lined elevated mesqa with a single pumping point at the head of the mesqa. The 54,6 feddans can now be served by gravity from a raised and lined mesqa which has a small cross-section.

These three case studies are evaluated in part in EWUP Technical Report No. 12, "Feasibility Studies and Evaluation of Irrigation Projects: Procedures for Analyzing Alternatives Water Distribution Systems in Egypt," July, 1982.

The MOI On-Site Investment Costs and Annual On-Site net Benefits are presented in Table 1 and Table 2 for three EWUP case studies. The information contained in these tables must be used carefully, but it can provide a basis for understanding the type of analysis which must be done.

Table 1 presents the estimates of the direct on-site investment required by the MOI. These investments do not represent the full cost of the system to the MOI as the annual costs associated with maintaining and operating the branch canals once they are improved are not included. In many cases, the operation and maintenance costs for the improved branch canals will be less than what these costs would be if the unimproved branch canals were maintained as they should be. However, at the present time, some unimproved branch canals may receive little maintenance but the improved branch canals must be maintained to function well. The investment costs in the El Hammami pipeline are high, but this is a small scale project and represents the first project of its kind in Egypt. As more is learned about pipelines, investment costs may be decreased and effectiveness increased. The irrigation water users would be responsible for maintaining the mesqas in all three cases once they are improved.

Table 2 presents the on-site net benefits. These net benefits do not include significant off-site benefits such as water saved, increasing the potential for the future development of Egyptian agricultures, and the more general benefits to the Egyptian economy. These important off-site benefits are discussed below. While it is important to conserve water to permit the horizontal expansion of Egyptian agriculture, no good estimates exist for the value of this water. Very recently, EWUP enterprise cost studies have included calculations of the residual on-farm value of water applied to the field. These enterprise cost studies are based on the actual data from farmers for a particular year. Therefore, if yields and/or prices are low and costs are high, an individual farmer can lose money on a crop during a particular year. In such cases, the calculated residual on-farm value of water will be negative. While the residual on-farm values vary from crop to crop, from farmer to farmer and from site to site, they are usually positive. While these figures are, preliminary the residual on-farm value for eleven cases at Mansuriya averaged 3.5 Piaster per cubic meter when only variable costs were subtracted from income and 2, 1 Piaster per cubic meter when all costs are subtracted from revenue.

The information from these three case studies should not be used to make final judgements about the best method of branch canal and mesqa improvement for all of Egypt. The on-site net benefits and on-site MOI investments are associated with particular sites. In the case of the Abyuha canal, the crops were primarily field crops, many of which are sold at prices fixed by the government. In the case of Beni Magdul canal, the crops are primarily high

Table 2. Annual On-Site Benefits Per Feddan for Three EWUP Case Studies^{d/}

	Abyuha <u>b/</u>	El Hammami <u>c/</u>	Beni Magdul <u>a/</u>
Decreased Lifting Costs	L.E. 19,00	(-L.E. 16,30)	
Other reduced Costs (net)	L.E. 11,00	L.E. 5,70	(L.E. 36.60)
Increased Production Yields and Rotation Change	L.E. 20,000	L.E. 38,46	(L.E. 183.15)
Increased land In Production	<u>L.E. 8,000</u>	<u> </u>	<u> </u>
Total On-Site Net Benefits Per <u>Feddan</u>	L.E. 58,000	L.E. 28,86	L.E. 219,75

a/ Based on Mesqa 10 (Beni Magdul) results - 54.6 feddans

b/ Based on Mesqa 26 (Abyuha) results - 39.6 feddans

c/ Based on El Hammami feasibility study

d/ See EWUP technical Report No. 12

value cash crops and crops where productivity can be increased significantly if the proper package of agronomic practices are combined with an improved irrigation system. While the investment costs per feddan for Abyuha are lower than for Beni Magdul, the on-site net benefits per feddan for Beni Magdul are considerably higher than for Abyuha.

The information presented in Tables 1 and 2 illustrate two important principles. First, although a complete benefit cost studies have not been completed, properly designed irrigation improvement programs in conjunction with good parallel agronomic programs can be of significant benefit to Egypt. Second, the best type of irrigation improvement program to implement will depend on the characteristics of both the physical nature of the site and the type of agriculture production. The Implementation Teams, with help from the National Office must consider both of these characteristics when they select the best type of irrigation improvement for a particular site.

Over half of the investment costs presented in Table 1 are associated with improving the branch canal. It may be possible to accomplish the objectives at considerably lower cost. Implementation Teams must pay particular attention to keeping these major costs as low as possible while still building an efficient branch canal.

OFF-SITE BENEFITS

There are three major categories of off-site benefits. First, water saved will make possible the development of new lands in the future. In this presentation, an estimate will be made of the quantity of water saved, but no attempt will be made to place a value on this water which is saved. Second, by developing a well designed system for irrigation water delivery and internal access, Egyptian agriculture can take advantage of the potentials for mechanization and modern farming systems which exist now and which will develop in the next 50-100 years. Development of an adequate and flexible internal access is necessary if Egyptian agriculture is to be oriented towards the future with its mechanization and biological potentials rather than oriented towards the past with emphasis on the use of animals and people to provide the energy used by agriculture. Third, by increasing the ability of Egyptian agriculture to produce more new wealth each year because of both vertical and horizontal expansion, Egypt's overall economy will perform better and all Egyptians will benefit from a higher standard of living. While this third category of off-site benefits may ultimately be the most important, it will not be discussed further, but its importance should not be forgotten.

WATER CONSERVED

Inability to have adequate control over the water distribution system is the reason why so much water has to be diverted. At both Kafr el- Sheikh and Abuyha (Minya), perhaps as much as half of the water diverted goes directly to the drains without being applied to the land. This amounts to as much as 10,000 cubic meters per feddan per year. Using the type of systems presented above, the control system would be good enough so that annual diversions on their sites may be reduced by as much as one half. Because of the heavy soils on the Abyuha site, conveyance efficiencies are fairly high once direct flow through to the drains is stopped. Field application efficiencies vary considerably. If the farmer has (1) a water flow with a head of 20 - 25 cm, (2) a well designed field system, and (3) knowledge about good irrigation practices, high levels of field efficiency are achieved. Field efficiencies as high as 85 per cent have been recorded in the Abyuha area. High field efficiencies can be achieved with low heads if a great deal of irrigation labor is used. If the average field efficiency in an area such as Abyuha could be increased by 20 percentage points by the type of development described, (a conserving estimate of the potentials) annual diversions could be decreased by up to 2000 cubic meters per feddan. In other words, in two of the EWUP fields sites, annual diversions could be decreased by as much as 60 percent by improving water management and on-farm water use. Return flows from excessive diversions in Upper Egypt can be reused downstream although the cost of pumping from drains and maintaining a large drainage network must be incurred. In much of Lower Egypt, return flows cannot be reused and are lost to the irrigation system. Some of the return flows in Lower Egypt are pumped back into the canal system and return flows in the northern Delta must be pumped in order for drain water to flow to the seas. Many of these pumping costs could be decreased and the cost of constructing new pumping stations could be also be avoided if return flows were decreased by increasing irrigation efficiencies. In the extreme northern Delta, lower levels of irrigation efficiency may be desirable to prevent salt water intrusion.

ACCESS AND POTENTIAL AGRICULTURAL DEVELOPMENT

Access studies done by EWUP staff indicates that only 40 percent of the land under Abu Raya Branch Canal (Kafr el Sheikh) is accessible by a tractor with an implement while only 10 - 15 percent of the land under Abuyha (Minya) is accessible. The land is accessible if the tractor crosses other fields (which is only possible if the fields are not wet), but during much of the

year, this would mean damaged crops belonging to some other farmers. Well over 50 percent of the irrigated land in Egypt (perhaps as much as 75 percent) is not presently accessible (on a regular basis) to modern machinery and wheeled transport. By improving the current internal road system, this figure may be reduced to no more than between 30 and 50 percent. In other words, unless a new internal roads system is developed, perhaps as little as 50 percent the irrigated land in Egypt would be accessible to modern machinery and wheeled transport in the future. That would mean that the other half of the land in Egypt would face a future where the full potentials of increased production levels and decreased production and marketing costs could not be realized. A system for internal access could be developed separate from the irrigation system, but it would take additional land out of production. By developing the type of irrigation water delivery and internal access system proposed for the Abyuha system, food production could be increased, unit production costs decreased, water saved and the amount of land cultivated could actually be increased.

It seems imperative that internal access be improved significantly if the potential for future agricultural development is to be realized. The findings of EWUP point out that the simultaneous and joint development of internal-access and a more efficient water management and on-farm water use system is the best approach to these two problems. The best way to deal with these two issues will depend on the particular site being considered. Dealing with these two issues in an effective manner will be one of the crucial problems that NIIP Implementation Teams face. While internal access is discussed here under the heading of "Off-Site Benefits", many benefits will in fact (ultimately) be to those people who farm the land.

OFF-SITE COSTS

The MOI off-site costs will consist of staffing, equipment and operation costs for the implementation teams, the Regional Offices and the Main Cairo office. Initially, the Regional Offices may not be developed and the Minya and Kafr el Sheikh EWUP teams could serve as the initial Implementation Teams and later evolve into Regional Offices as additional Implementation Teams are developed.

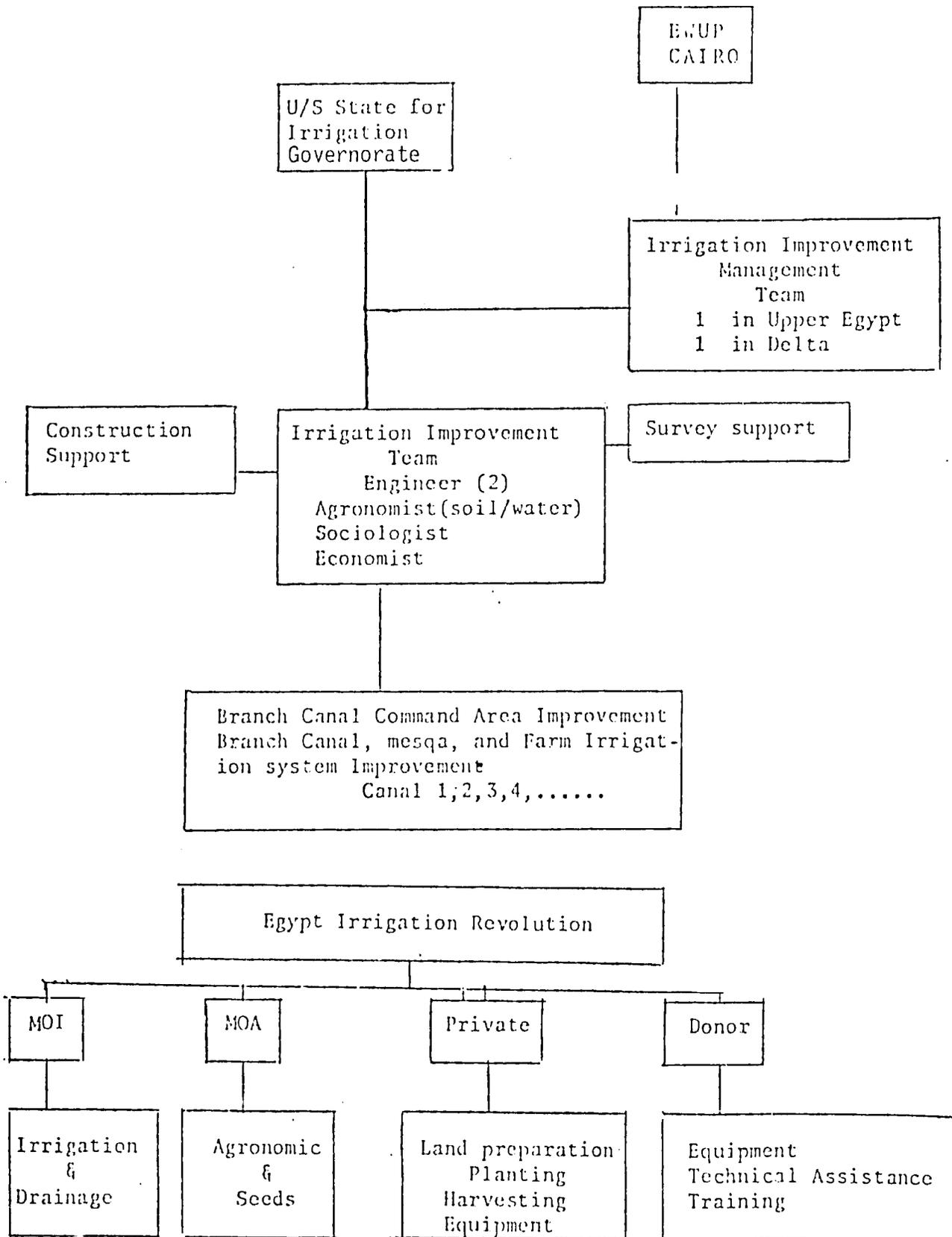
Details on the costs of the Implementation Teams and National Office are presented in appendix A. The off-site cost per feddan will depend on the amount of the area improved per team. The greater the area developed, the lower the per feddan off-site costs will be, an estimate of the off-site costs to the MOI are presented in Table 3.

Table 3. Estimates of MOI 1st Year - Off-Site Costs a/b/

	Implementation Team #1	Implementation Team #2	EWUP
	_____	_____	_____
Salaries	L.E. 140,000	L.E. 140,000	L.E. 160,000
Operations	L.E. 100,000	L.E. 100,000	L.E. 25,000
Investments	L.E. 440,000	L.E. 440,000	L.E. 80,000
	_____	_____	_____

a/ Cost the following years will depend on how fast the program is expanded.

b/ The MOI off-site cost per feddan will depend on the total number of feddan under an Irrigation Improvement Project. The greater the number of feddans, the smaller this cost will be.



I. G.O.E. RESOURCES

	NIIP GOVERNORATE <u>1/</u> Per	FIELD OFFICE <u>2/</u> VALLEY (2) DELTA	MAIN OFFICE <u>2/</u> CAIRO	EWUP ^{3/} R & D FIELD & CAIRO
<u>A. Personnel (Man years)</u>				
Professional:				
Engineer	2	2	1	5
Agronomist	1	2	1	5
Sociologist	1	2	1	5
Economist	1	2	1	5
Agr. Eng.	1	2	1	5
Trainer	<u>1</u>	<u>-</u>	<u>1</u>	<u>1</u>
	7	10	6	26
Technicians, etc.:				
Mechanic	2	-	1	1
Clerk/Typist	2	4	2	7
Tractor Oper.	4	-	-	4
Misc. Drivers	10	5	4	10
Irr. Field Man	<u>16</u>	<u>-</u>	<u>-</u>	<u>-</u>
	34	9	7	22
<u>Salaries</u>				
Professional*	42,000	96,000		104,000
Technicians*	<u>98,000</u>	<u>48,000</u>		<u>56,000</u>
TOTAL:	140,000	144,000		160,000

*Includes incentives.

B. Operations.

Offices	10,000	5,000		10,000
Field				
Fuel	30,000	10,000		10,000
Maintenance	10,000	3,000		2,000
Repairs	10,000	3,000		3,000
Supplies ^{4/}	<u>40,000</u>	<u>4,000</u>		<u>10,000</u>
TOTAL:	100,000	25,000		35,000

^{4/} Biodegradable herbicides, cement, etc.

C. Investments

Furniture	1,000	3,000	-
Soils Lab	1,000	-	-
Headgates	20,000	-	5,000
Flumes	4,000	-	3,000
Vents	10,000	-	5,000
Meas. Weirs	4,000	-	2,000
Pumps	60,000	-	10,000
Const. Contracts	300,000	-	40,000
Equipment	20,000	-	5,000
Misc.	20,000	7,000	10,000
TOTAL:	<u>440,000</u>	<u>10,000</u>	<u>80,000</u>
TOTALS A,B,C:	680,000	179,000	275,000

Total for 20 Governorates and 5 years. Each operating from the start.

20 Governorates @ 680,000 x 20 =	13,600,000
Field and Main Office	179,000
EWUP R & D	<u>275,000</u>

TOTAL 1 YEAR:	14,054,000
	<u>x 5</u>

TOTAL 5 YEARS:	70,270,000
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Phased into Governorates.

1st Year	3 x 680,000 =	2,040,000
2nd Year	5 x 680,000 x 1.2 ^{4/}	4,080,000
3rd Year	8 x 680,000 x 1.2 =	6,530,000
4th Year	14 x 680,000 x 1.2 =	11,420,000
5th Year	20 x 680,000 x 1.2 =	<u>16,320,000</u>

TOTAL:	40,390,000
5 x 439 ¹ x 10 ³ ^{5/}	<u>2,200,000</u>

TOTAL	42,590,000
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ESTIMATED 5 YEAR BUDGET AS 58 MILLION L.E.

- ^{1/} Implementation team working in each Governorate.
- ^{2/} Headquarters staff to coordinate and supervise work.
- ^{3/} Continuation of EWUP to develop and test new solutions, inspect program, and train personnel.
- ^{4/} Assumed 20% income for inflation and contingency.
- ^{5/} Budget for EWUP and supervision of implementation in main offices and two field offices.

II. US AID TECHNICAL ASSISTANCE

	Implementation Team Field Office (2)	EWUP Cairo or Field
<u>A. Personnel (Numbers)</u>		
Field		
Team Leader	2	1
Engineer	2	1
Sociologist	2	1
Economist	2	1
Agronomist	2	1
Trainer	-	1
Mechanical Engineer	<u>1</u>	<u>-</u>
	II	6
Home Office Support		
Project Director	.75	.75
Staff Assistant	1	1
Secretary	<u>1</u>	<u>1</u>
TDY Help		
Catagrapher/Surveyor	.50	-
Engineer	1.50	2
Agronomist	1	1
Sociologist/Trainer	1	1
Economist	<u>2</u>	<u>2</u>
TOTAL PROFESSIONAL:	8.75	8.75
TOTAL CLERICAL:	2	2
Egyptian		
Accountant	1	1
Secretarial	<u>2</u>	<u>3</u>
TOTAL:	3	4
<u>B. Personnel (Cost)</u>		
Field		
Salaries, Annuities, (140,000), Housing, Transportation, etc.	1,540,000	840,000
H.O. Support		
Professional, (40,000)	350,000	350,000
Clerical, (20,000)	40,000	40,000
Egyptian, (6,000) (Includes S.S.)	<u>12,000</u>	<u>12,000</u>
TOTAL:	1,942,000	1,242,000

	Implementation	EWUP
C. <u>Other Direct Costs</u>	600,000	300,000
D. <u>Travel & Transportation</u>	50,000	50,000
E. <u>Training (Persons)</u>	<u>-</u>	<u>1,000,000</u> ^{1/}
TOTAL: "	2,592,000	2,592,000
Contingency & Inflation (20%)	<u>518,000</u>	<u>518,000</u>
TOTAL:	<u>3,110,000</u>	<u>3,110,000</u>
Indirect Cost Profit (35%) (Not on Training)	1,438,500	738,000
	<u>4,548,500</u>	<u>3,848,000</u>
x 5	22,742,500	19,240,000
Equipment	<u>43,904,000</u>	<u>652,000</u>
TOTAL	<u>66,646,500</u>	<u>19,892,000</u> ^{1/}

IMPLEMENTATION		EWUP
Governorate	Field & Main	

F. Equipment

Office

Typewriters	1,000	3,000	3,000
Dictaphones, Calculators	2,000	6,000	5,000
Computer (mini)	5,000	15,000	15,000
Word Processor	-	20,000	20,000
Misc.	2,000	6,000	6,000
Air Conditioners (Offices & Guest Houses Private included in allowances)	(3) 3,000	(9) 9,000	(12) 12,000
Large Computer	-	-	100,000
SUB-TOTAL:	<u>13,000</u>	<u>59,000</u>	<u>161,000</u>

Field

Vehicles	(4) 40,000	(9) 90,000	(10) 100,000
Trucks H.D.	(2) 40,000	-	(1) 20,000
Tractors			
4x4 100 H.P.	(4) 200,000	-	(1) 50,000
4x4 65 H.P. w/ditcher	(4) 80,000	-	(2) 40,000
65 H.P.	(2) 30,000	-	(2) 30,000
Laserland Level			
Tractor with scraper	(3) 45,000	-	(2) 30,000
Command Post	(3) 36,000	-	(2) 24,000
Receivers	(5) 50,000	-	(4) 40,000
Scrapers	(2) 4,000	-	(2) 4,000
Headgrader	(1) 100,000	-	(1) 65,000
Backhoe	(2) 100,000	-	(1) 50,000
Shop & Tools	(1) 50,000	-	(1) 50,000
Field Survey Equip.	25,000	-	25,000
Cement Mixers (1/2yd)	2,000	-	2,000
Misc. TBT	200,000	-	100,000
SUB TOTAL:	<u>1,002,000</u>	<u>90,000</u>	<u>630,000</u>

II. US AID Con't.

	IMPLEMENTATION		EWUP
	Governorate	Field & Main	
<u>F. Equipment Continued</u>			
Field			
<u>Carried Forward</u>	1,002,000	90,000	630,000
Readimix Cement*			
Trucks	(3)300,000	-	-
Main Plant	(1)200,000	-	-
Trucks Dump	(3) 60,000	-	-
Trucks Flat	(3) 60,000	-	-
Hoist	(1)100,000	-	-
4x4 tractor	(1)100,000	-	-
Misc. Water truck, pumps	100,000	-	-
TOTAL:	920,000		
Map Making	-	1,000,000	-
Communications (radio etc.)	-	1,000,000	-
Farm Equipment			
Plows, furrows, etc. L.E.	5,000	-	2,000
Pumps L.E.	10,000	-	-
Motocycles (IFM)	(65)130,000	(5) 10,000	(9) 18,000
TOTAL:	2,067,000	2,010,000	650,000
	x 20		
	41,340,000		
	3,770,000		
GRAND TOTAL:	45,110,000		

1/ Without the large training component, the budget would be about the same as EWUP's present budget.

2/ Could be a private sector company.

* The Readimix Cement Company could be a private company.

III. EQUIPMENT AID/CIP

(Public Sector Equipment under CIP for custom service)

Governorate

A. Custom Farm Service

Tractors	(100)	1,500,000	
Planters, Chisel Plow, etc.		50,000	
Land Leveler (4)			
Tractor plus	(5)	150,000	
Command	(5)	60,000	
Computer (Mini)		5,000	
Office		5,000	
Misc. Sprayers, etc.		100,000	
Small Trucks	(20)	200,000	
Small 4 Wheel Trailer	(40)	80,000	
Machine Shop		10,000	
Thrashing Machine		100,000	
Large Truck	(10)	800,000	
		<u>3,060,000</u>	per Governorate

TOTAL 20 x 3,000,000 = \$60,000,000.

ITINERARY FOR EGYPTIAN EXCHANGE PARTICIPANTS

Mr. Abdel Rahman Shalaby

Mr. Salem Abdel Ghaffar

October 16 - November 27, 1982

Ahlan Wa Sahlan - Welcome

Saturday, October 16 - Water Staff

10:30 AM	Don Davis	Pick up guests at airport
11:30	"	Check into apartment Remainder of day free

Sunday, October 17

Weekend Free

Monday, October 18 - Water Staff

8:30 AM	Don Davis	Pick up guests
8:45	"	Orientation film
9:30	"	Overview of program Questions and answers
10:00	Jim Gardner	Tour Interactive Drafting & Design
11:15	Don Davis	Tour Administration Building History Center
11:45	Don Davis	Lunch - Cafeteria

12:45 PM	Manota Sylvester	Tour Files & Reproduction
1:45	Reid Teepler	Welcome to SRP Room 1209
3:00	Don Davis	Pera Club
4:00	Don Davis	Familiarization to Valley Questions & Answers
4:45	Don Davis	Return Guests

Tuesday, October 19 - Water Construction & Maintenance

7:30 AM	Bryan Brooks	Pick up guests. Tour Roosevelt Dam facilities and the typical construction and maintenance activities done by our forces
3:30 PM	"	Return guests

Wednesday, October 20 - Water Operations

8:30 AM	Bob Hensley	Pick up guests
8:45	Sid Friar	Overview of Water Operations Dept.
10:00	"	Discuss Water Operations mission and functions, amount of water delivered, summer demand, Table of Organization, Budget, Questions and Answers
11:00	"	Lunch
12:00	Bob Hensley	Brief tour of Association Dispatch Center (ADC) - overview of transmission system, supervisory control, communication equipment and responsibilities
1:00 PM	"	Travel to Granite Reef Dam - Discuss river and transmission system
4:30	Bob Hensley	Return guests

Thursday, October 21 - Information Systems

8:30 AM Will Munsterman Pick up guests

8:45 Phil Sawyer Instruction in data processing concepts, including hands-on exercises on CRT. Tour Data Processing.

12:00 Will Munsterman Lunch

12:30 PM " Instructions on how present data processing applications are maintained. Demonstrations and tours of terminals in use.

4:30 " Return guests.

Friday, October 22 - Water Construction and Maintenance

7:30 AM Dennis Erickson Pick up guests and return to PAB

7:45 Tom Bawden Discuss in detail:
Water C&M mission and function
Operation & Maintenance (O&M) Budget
Key Indicators

9:45 " Discuss in detail:
Storm Control responsibilities
Table of Organization and Manager's responsibilities, and staff responsibilities

10:30 Dennis Erickson Take guests to Southside C&M to begin training program

11:00 Eddie Arnold Greet guests and introduce to Southside staff

Review of Southside C&M's mission and function regarding maintenance of canals, laterals, drainage ditches, etc

11:30 " Lunch

12:30 PM Eddie Arnold Review manpower and equipment needs for construction and maintenance at Southside C&M

2:00 " Return guests

Saturday and Sunday October 23-24

Weekend Free

Monday, October 25 - Water Construction and Maintenance

7:30 AM	Buddy Moore	Pick up guests and return to Southside C&M
8:00	"	Field trip to observe various construction and maintenance performed during canal dryup
11:30	"	Lunch
12:30 PM	"	Continue field trip
2:00	"	Return guests

Tuesday, October 26 - Water Construction and Maintenance

7:30 AM	Wes Farley	Pick up guests and return to Southside C&M
8:00	"	Review maintenance Areas 4 and 5
9:00	"	Tour equipment and yard and various applications of equipment
		Tour precast yard and observe setup and pouring techniques
10:15	"	Field trip to observe typical irrigation repairs and various cleaning operations
11:30	"	Lunch
12:30 PM	"	Continue maintenance
2:00	"	Return guests

Wednesday, October 27 - Water Construction and Maintenance

7:30 AM	Dave Derka	Pick up guests and return to Southside C&M
8:00	"	Field trip to observe typical irrigation construction projects. Exposure to men and equipment used to perform the work
11:30	"	Lunch
12:30 PM	"	Continue field trip to observe typical irrigation construction jobs
2:00	"	Return guests

Thursday, October 28 - Water Construction and Maintenance

7:30 AM	Winn Winkyaw	Pick up guests and return to Water C&M (Crosscut)
7:45	"	Overview of Weed Control Program (Aquatic and Terrestrial) Review weed spray training program.
9:45	"	Review all chemicals used and method of application
11:30	"	Lunch
12:30 PM	"	Visit field locations where weed problems are evident, and areas where maintenance results can be seen. Observe canal mowing operations
2:15	"	Return guests

Friday, October 29 - Water Construction & Maintenance

7:00 AM	Winn Winkyaw	Pick up guests and travel to maintenance division (Southside or Western)
7:30	"	Observe the mixing of chemicals in spray trucks. Explain the different mixes, the expected results, and proper storage of chemicals.

10:15	"	Familiarize them with spray trucks and observe spraying operation
11:30	"	Lunch
12:30 PM	"	Visit Acrolein demossing site. Observe setup procedure and equipment requirements.
		Observe results of demossing from previous applications
2:15	"	Return guests

Saturday and Sunday, October 30-31

Weekend Free

Monday, November 1 - Water C&M

7:30 AM	Winn Winkyaw	Pick up guests
8:00	"	Visit site where fish are being used for moss control in canal system
11:30	"	Lunch
12:30 PM	"	Return to Crosscut Office and tour Chemistry Lab operation and observe testing programs
2:15	"	Return guests

Tuesday, November 2 - Water Construction and Maintenance

7:30 AM	Tom Frost	Pick up guests and travel to Groundwater/Building C&M
7:45	Paul Peters	Greet guests and introduce to office staff
		Review Groundwater/Building's mission and function

		Overview of deep well pump operations
8:30	John Biggs	More detailed review of wellsite maintenance and operation program
10:30	Leon Johnson	Field trip to observe typical wellsite and maintenance and/or construction
		Review canal structure maintenance program
11:30	"	Lunch
12:30 PM	"	Observe automatic trash rack in operation
		Visit Filter Plants on SRP canal system
2:15	"	Return guests

Wednesday, November 3 - Civil Engineering

8:30 AM	Alex Richards	Pick up guests - Department Introduction
9:00	"	Overview of Water Civil Division
10:00	Bob Larchick	Transmission Design Bridge Design Canal Lining Design Radial Gates Design Lateral Headgate Design
12:30 PM	"	Lunch
1:30	Steve Tanis	Broadcrested Weir Design (Trip to weir site or Water Conservation Lab)
4:30	"	Return guests

Thursday, November 4 - Civil Engineering

8:30 AM	Alex Richards	Pick up guests
9:00	Art Moore	Quality Control (Arrange field trip to observe compaction testing, concrete tests, concrete pipe testing, etc., as activities are available)

12:00	"	Lunch
1:00 PM	Roger Hasse	Distribution Design Pipeline Design Criteria Lining Design Criteria Structure Design Criteria
4:30	"	Return guests

Friday, November 5 - Special Studies

8:30 AM	Ed Kirdar	Pick up guests
8:45	"	Overview major functions of Special Studies Group including Central Arizona Project (CAP) and Central Arizona Water Control Study (CAWCS) Plan 6 objectives and operations. This will be accomplished by utilizing video tape, slide and maps with the discussion in Room 1268
10:45	"	Visit Salt-Gila Pumping Plant and the CAP Aqueduct construction. Lunch in route
2:30 PM	Tom Sands	Overview of computer applications related to Special Studies that includes HEC-5R and SRPSIM computer programs
3:30	Don Davis	Review and evaluate the Orientation Program with Egyptians. Recommend changes, if any. Overview remainder of the program
4:30	"	Return guests

Saturday and Sunday, November 6-7

Weekend Free

Monday, November 8 - Water Operations

7:30 AM	Bob Hensley	Pick up guests. Travel to Western Irrigation operations pointing out facilities enroute
8:30	"	Explain Northside Irrigation, Table of Organization, Responsibility of Superintendent, mission and functions

10:30	Bill Hancock	Responsibilities of Chief Clerk, office procedures, accounting, auditing, water order preparation, direct entry, audit charge cards, etc.
11:30	Bob Hensley	Lunch
12:30 PM	Watermaster	Meet Watermaster and review responsibility of Watermaster. Discuss area audits, construction problems, water orders, etc.
1:30	Zanjero	Meet Zanjero and review scheduling for Area 23
3:00	Bob Hensley	Return guests

Tuesday, November 9 - Water Operations

6:30 AM	Bob Hensley	Pick up guests. Travel to Western Operations
7:15	"	Meet zanjero on Area 23
		Explain schedule which was completed yesterday, gate operation, emphasis on measuring, trouble calls, etc.
11:00	"	Lunch
12:00	"	Ride with zanjero on Area 23, continue to discuss zanjero responsibilities and measuring
2:30 PM	"	Return guests

Wednesday, November 10 - Water Operations

8:30 AM	Ron Grosch	Pick up guests
9:00	"	Review organization structure and mission
10:00	"	Supervisory system operation
11:00	"	Control room operation
12:00	"	Lunch

1:00 PM	"	Field tour at 2-4.1, 2-0 and 1-3
2:00	"	Field tour at Indian Bend
3:00	"	Review of day - Questions & Answers
4:00	"	Return guests

Thursday, November 11

Veterans Day - Holiday

Friday, November 12 - Water Operations

8:00 AM	Watermasters, Paul Carney and Hank Gerlach	Pick up guests
8:30	"	Console operation explained
9:30	"	Hands on operation
10:00	"	Take readings
11:00	"	One hour with ADC operation
12:00	"	Lunch
1:00 PM	"	Scheduling explained/observed
3:00	"	Wrap-up - Questions & Answers
4:00	"	Return guests

Saturday and Sunday, November 13-14

Weekend Free

Monday, November 15 - Water Resources & Services

8:30 AM	Brian Crouse	Pick up guests
8:45	"	Review Customer Service functions
10:15	Bob Cocks	Review Accounting and Collection functions
11:30	Bruce Mack	Lunch
12:30 PM	"	Groundwater Planning
2:45	Darrell Jordan	Hydrology, Pumps and Special Contract Records
4:30	"	Return guests

Tuesday, November 16 - Water Resources and Services

8:30 AM	Ken McTeer	Pick up guests
8:45	"	Head of Lateral Measurement (HOLM) overview Records of improvement Charts and graphs of results
10:00	"	Lateral Standard Determination (LSD) overview. Records, charts and graphs
10:45	"	Specialized studies, projects and measurements
11:30	Sid Wilson	Agriculture program, watershed management
12:30 PM	"	Lunch
1:00	Cecil Pendergast	Agriculture Program - Field Demonstration
4:30	"	Return guests

Wednesday, November 17 - Water Resources and Services

7:30 AM	Ken McTeer	Pick up guests
7:45	Martin Richards	Demonstration of current meter measurement of Arizona Canal at Arizona Falls
12:00	Ken McTeer	Lunch
12:30 PM	"	Additional demonstrations of irrigation gate measurement techniques using probe, calipers, weir stick and Hatcher calculator
3:30	"	Return guests

Thursday, November 18 - Water Resources & Services

7:30 AM	Ken McTeer	Pick up guests
7:45	"	Demonstration at Hydraulics Laboratory
11:00	"	Demonstration of Irrigation gate measurement
12:00	"	Lunch
12:30 PM	"	Demonstration of broad-crested weirs and flumes
3:30	"	Return guests

Friday, November 19 - Water Construction and Maintenance

7:45 AM	Mike Francis	Pick up guests and return to Western C&M
8:30	Phil Gaiser	Greet guests and introduce office staff Review Western's mission and function Provide overview of program at Western
10:15	Bill Bobb	Discuss maintenance Areas 1, 2, and 3 Cover Foreman's responsibilities Cover crew makeup and type of work performed by each Discuss the types of equipment and their uses

		Storm conditions and duties
		Tour maintenance yard and sho
11:30	"	Lunch
12:30 PM	Larry Harding	Review, coordination required with irrigation operations
		Observe vector jet cleaning operation, if possible. If not, observe typical repair and machine cleaning operation
2:00	"	Return guests

Saturday and Sunday, November 20-21

Weekend Free

Monday, November 22 - Water Construction and Maintenance

7:45 AM	Mike Francis	Pick up guests and return to Western C&M
8:30	Jack White	Brief overview of how we get our construction work and coordinate dryups, etc.
		Visit various construction projects such as:
		1. I-10 work
		2. CIPP Job
		3. Arizona Canal Relocation
11:30	"	Lunch
12:30 PM	"	Continue tour of construction activities
2:00	"	Return guests

Tuesday, November 23 - Water Operations

7:30 AM	Al Risinger	Pick up guests. Travel to Southside Irrigation
8:00	"	Explain Southside Irrigation, Table of Organization, area of responsibility

10:30	Watermaster	Explain watermaster responsibilities
11:30	Al Risinger	Lunch
12:30 PM	Watermaster	Tour of Southside Irrigation, farm tours, irrigation methods, measuring, different structures
3:30	Al Risinger	Return guests

Wednesday, November 24 - Water Operations

8:30 AM	Don Davis	Pick up guests
9:00	"	Review program and comments solicited from Egyptians
10:30	Reid Teeples	Meeting for Egyptians to inform Salt River Project management of their experience at SRP, and how they may use the information in their work in Egypt
		Presentation of Zanjero Certificate
11:30	Don Davis	Lunch - Cafeteria
12:30	"	Orientation film (in Arabic language) to reinforce their understanding of SRP
1:00	"	Afternoon free for special requests of Egyptian guests

Thursday, November 25

Thanksgiving Day - Holiday

Friday, November 26

Day after Thanksgiving - Holiday

Saturday, November 27

Leave Phoenix - To California

- End Program at Salt River Project -

ABDEL RAHMAN SHALABY
SALAM ABDEL GHAFFAR

November 27 - December 3, 1982

ITINERARY

Please make sure that you have your ticket restickered for the Los Angeles/Cairo portion of your travel. Cairo/Los Angeles fare \$1005.63, Cairo/Phoenix, fare \$1071.64, there should not be any problem changing from Phoenix to L.A. because the Phoenix ticket would cost more, you should get a \$66.01 refund coupon on your ticket. Please cancel all hotel reservations by 5:00 p.m. if you decide to stay someplace else. These rooms have been guaranteed and we will be charged for them, whether or not you stay there. Reservations are under Shalaby's name. I have reserved 1 double room at each motel.

November 27, 1982 (Saturday)
Free Day in Phoenix

November 28, 1982 (Sunday)
Travel Phoenix to Yuma by Greyhound bus. (Cost of ticket is \$16.70). Motel reservations in Yuma are at the Royal Motor Inn, 2941 South Fourth Avenue (602/344-0550), rate is \$ 30.00 per night for 2 people. When you get to the bus station in Yuma call the Royal Motor Inn someone will come and pick you up. You will visit the Wellton Mohawk Project on Monday.

November 29, 1982 (Monday)
Travel to the Bureau of Reclamation, about 1/2 mile from where you are staying. Ken Sidebottom at the Bureau will take you out to the Wellton Mohawk Project.

November 30, 1982 (Tuesday)
Visit Wellton Mohawk Project in the morning. You need to go to the airport in the afternoon to catch your flight from Yuma to El Centro. Leave on SunAire 526 at 5:00 p.m. arrive El Centro at 4:20 p.m.

Your motel reservations are at the Airporter Inn (714/355-2411) which can be seen from the airport, rate is \$26.95 for 2. You will visit the El Centro Water District (Imperial Valley) tomorrow.

December 1, 1982 (Wednesday)
El Centro Water District (Imperial Valley). Richard Taylor contact (714/352-2462) has made arrangements for your tour. Call the El Centro Water District after 8:00 a.m. to come and pick you up at the your motel. You need to get back to the airport in the afternoon to catch your flight out of El Centro to Los Angeles. Leave El Centro on SunAire 526 at 4:35 p.m.

arrive Los Angeles at 5:30 p.m. Your reservations is at the Airport Century Inn, 5546 W. Century (213/649-4000), rate is \$ 45.00 for 2. You can take a taxi to Disneyland tomorrow.

December 2, 1982 (Thursday)

Free Day

December 3, 1982 (Friday)

Take shuttle service from Airport Century Inn to Los Angeles International Airport. Your flight TW840 leaves Los Angeles at 8:30 a.m. arrives New York (JFK) at 4:34 p.m. Leave New York (JFK) on TW840 at 7:15 p.m. arrive Cairo on December 4, 1982 at 4:35 p.m.

Please call Pam Hobbs (303/491-8655) if you have any problems or questions.