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QUARTERLY REPORT

October 1, 1984 to December 31, 1984

Contract No. AID/NE-C-1351 (Egypt)
Project No. 263-017

Consortium for International Development
Executive Office
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Tucson, Arizona 85711

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I. STATUS OF WORK IN EGYPT

This period (Oct. 1 - Dec. 31, 1984) was characterized by the continuation of work already initiated during the Project time at the three sites. Major emphasis was also given to finalizing and printing Technical Reports, whether in Cairo or Fort Collins.

The main event during this quarter was the Minister of Irrigation's visit to EWUP sites, accompanied by Dr. Hassan Wahby and Dr. Mona El-Kady. In all three sites Mansuriya, Kafr El-Sheikh and El-Minya, a slide show was presented to explain the progress of work before and after EWUP interventions. This was followed by a description of the measurement equipment and the results obtained during the Project time.

The Minister was then invited for a field trip in each of the three sites where he saw practically how the improvement of *mesqas* was implemented. He also discussed with the farmers the benefits they gained from such a Project and to what extent they are convinced and contented.

In Mansuriya, H.E. Minister of Irrigation appreciated very much the work done in El-Hammami pipeline system, being one of the pioneer projects in the country. In Kafr El-Sheikh he listened to a detailed explanation about precision land leveling and its impact on reducing overirrigation. Lastly, in Minya he commented on the success of work on *Mesaa # 26* which is considered a model on whose positive results improvement of the whole area was started, as well as improvement of other areas like Serry Canal.

It is believed that due to the Minister's successful visit to EWUP sites, he decided to transfer the Irrigation Project Departments into Irrigation Improvement Authorities in the different Governorates. This is a good start on the way of executing the National Program which begins by the Regional Irrigation Improvement Project (RIIP).

His excellency also wrote a written compliment about his appreciation of the tremendous work done by EWUP through the Water Dist. & Irrig. Systems Institute and decided to consider the Institute personnel as Technical Consultants in the field of irrigation improvement.

Following is a more detailed description of the work at the three Project sites, the four disciplines and the specific administrative tasks.

PILOT PROGRAMS

Kafr El Sheikh Site: Daqalt Canal
On-Farm Work

El Mansuriya Site: El Hammami Pipeline
Mesqa #10 Raised Channel
Beni Magdul Canal

El Minya Site: Abyuha Canal
Serry Canal

MANSURIYA

I. Accomplishments

A. Beni Magdul Canal Area

- Mesqa #7: Meetings were held with the farmers and they agreed to purchase the necessary material for maintenance of the *mesqa* which amounted to about L.E. 350. Technicians followed up the work for reparation of any damage.
- Mesqa #3: The farmers themselves fixed the outlets and blocked the tail of the *mesqa* with ordinary concrete.
- Mesqa #10: The farmers purchased the cement and provided laborers for *mesqa* maintenance during the winter closure period.
- Mesqa #9: The farmers collected about L.E. 250 up till now to replace a length of 100 m of the *mesqa* which passes in front of the houses with a pipeline of 50 cm in diameter.
- Mansuriya Irrigation Engineering Department and the General Authority for Irrigation at Giza were contacted for cleaning of Beni Magdul Canal. Approval for starting the work was given to the Contractor but he did not start as yet.
- The Ministry of Electricity has sent a German expert to fix the solar pumps. The work has actually started though the discharge meter needs to be changed.

- Studies on *Mesqa* #6 were conducted according to schedule.
- Measurements were being regularly recorded in the region.
- Constructions were made for installing two recorders on *Mesqa* #6 for measuring the inflow.

B. El-Hammami Area

- The Company has terminated the work in the second and third reaches and the pipeline was tested. However, the Company is rather behind schedule.
- The Company has already finished installing Pump Stations (1) & (2).
- The winch and gliding door of Pump Station (1) were installed.
- The old El-Remali pipeline was tested for fixation and maintenance.
- The Sociology Team surveyed the location of outlets and attempted to have the farmers' approval for each outlet and its location.
- Irrigation rotations and measurements were recorded on two farms at present.
- Mansuriya Team conducted a crop survey for the winter crops.

II. Work Plan for the Next Quarter

- Reparation and maintenance of Beni Magdul *mesqas* will continue.
- A bid for reparation of Beni Magdul Canal will be declared.
- Installation works for Hammami pipeline system will continue.

III. Personnel Assigned to Mansuriya

Professionals

Wadie Fahim	Team Leader	Sabah Mahmoud	Agronomist
Ahmed Tahoun	Agronomist	Mahmoud Khidr	Agronomist
Farouk Abdel Al	Sociologist	Ahmed Abdel Al	Agronomist
Gamal Fawzy	Economist	Tarif Zeitoun	Engineer
Hossam El Naggar	Economist		

Non Professionals

Ibrahim Hussein	S. Tech.	Cherifa El Yazeed	S. Tech.
Ibrahim Abdou	S. Tech.	El Said Kamal	S. Tech.
Ibrahim Zakaria	S. Tech.	Moh. Abdel Hamid	S. Tech.
Adel Abdel Moneim	S. Tech.	El Said Hamed	S. Tech.
Mohamed El-Dash	S. Tech.	Mohamed Farrag	S. Tech.
Abdel Rahim Mohamed	J. Tech.	Shawky El Awady	J. Tech. Lab.
Abdel Maaboud Ibrahim	J. Tech.	Abdel Rahman Eid	J. Tech.
Mohamed A. El Mounem	J. Tech. Lab.	Ahmed Ragab	J. Tech. Lab.
Hamed Aly Tahoun	J. Tech. Lab.	El Shimi Ismail	J. Tech. Lab.
Mohamed Rezk	S. Tech.		

Drivers

Abdel Latif El Tawil	El-Shimi Ismail
Salah Sadek	Aly Habashy
Nagy Hassan	

KAFR EL SHEIKH

I. Progress of Work

A. Field Sites

- Continuation of on-farm operations twice a week for following up the work in the sites after elimination of the flume measurements.

B. Water Budget

- Routine data collection was carried out for the water budget at Om-Sen and Daqalt.

- Meteorological data were analyzed.
- Urgent need for recorder charts to proceed with the water budget works.
- Termination of the water budget report for 1984.

C. Daqalt Canal Studies

- The main points for the Daqalt report were agreed upon. The team began to write the different sections of the report for evaluation.

D. Farm Records

- Filling in and summarizing the data for the 1983/84 farm records.
- Starting new farm records for Daqalt.
- Regular recording of data in the 1984/85 winter farm records.

E. Special Studies

- Routine work and studies were conducted at Menufiya and Inshass.

II. Work Plan

- Continuation of all field operations and water budget.
- Finalizing the Daqalt evaluation report.
- Continuation of all routine works and special studies at Menufiya and Inshass.

III. Training Status and Changes

1. Econ. Ragy Darwish terminated his academic training at CSU and returned early in January 1985.
2. Eng. Kamal Ezz El-Din attended a training program on Soil and Water Conservation and returned on October 7, 1984.
3. Agronomist Mohamed Meleha is still on his long training program in Pada, Italy.

IV. Personnel Assigned to Kafr El-Sheikh

1. Professional Staff

Kamal Ezz El-Dir	Team Leader	Ahmed A. Monsef	Engineer
Abdel Fattah Metawie	Asst. T.L.	Esam Ezz El Din	Sociologist ^{3/}
Magdy Awad	Agronomist	Safaa Fahmy	Engineer
Ahmed Ismail	Agronomist	Hoda Hussein	Sociologist ^{4/}
Mohamed I. Meleha ^{3/}	Agronomist	Ragy Darwish ^{3/}	Economist
Magdi Padawi	Economist	Saad H. Zaki	Engineer
Mahmoud Moh. Said ^{2/3/}	Agronomist	Sobhi Elewa ^{1/}	Economist

2. Technicians

Hammad Group

Moh. Ahmed Badr
Moh. Omer Abdel Meguid
Kamal Moh. Abu-Omar

El-Manshiya Group

El-Said Abdel Hamid
Salah El Sayed Abdel Hafeez
Moheb Abdel Sama El-Sawy
Kamal Moh. Abu-Omar

Water Budget

Farag El-Masry
Hassan El-Rafaey

Laboratory

Atef Hamed Sayed Ahmed

Equipment & Cars

Abdel Hamid Sayed

3. Secretary & Administrative

Mohamed Ahmed Abu Omar	Admin. Assistant
Nadia Mahmoud Arafa Ali	Secretary
Esmat Mostafa ^{4/}	Secretary

1/ Vehicles

2/ Laboratory and Karda station manager

3/ On training leave

4/ Temporary leave

MINYA

I. Summary of Accomplishments

1. Preparations for concrete lining of *Mesqa* #13 were done. Approval to borrow the loader belonging to Minya Irrigation Department was obtained. Attempts were also made to obtain the necessary equipment for transferring soil for *mesqa* filling from outside the area.
2. Approval of the Irrigation Department for East Minya to clean and purify Abyuha Canal at the expense of the Irrigation Department was obtained. Expenses were calculated to be approximately L.E. 11,000. The resulting soil will be made use of in strengthening the canal banks.
3. Approval of the Minya Irrigation Department was obtained for constructing a check structure in the midst of Abyuha Canal in place of the present bridge. This will cost about L.E. 20,000 and work will start in February 1985.
4. Constructions were made for measuring discharges and recorders were located behind the inlet to Abyuha Canal for obtaining water budget data and regularly measuring the water levels.
5. Maintenance of the *mesqa* headgates was performed; damaged or eroded parts were replaced by new ones and all headgates were painted and greased.
6. Sociologists encouraged and urged the farmers to clean the *mesqas* during the winter closure period. Improved *mesqas* were cleaned under the supervision of the Minya Team.
7. Many visitors, Egyptians and Americans, accompanied by Dr. Hassan Wahby were invited to visit the field sites at Minya. In Abyuha Main Office, a slide show was presented to explain the different improvements introduced to the area. This was followed by a 2 km-walk in the area and discussions with the farmers about the real benefits they gained.

II. Work Needed to be Accomplished

A. Economics Discipline

Economic feasibility studies should be conducted to evaluate the following interventions:

- Effect of land leveling on crop productivity.
- Effect of transferring the irrigation of 500 *feddans* in the area from lift to gravity feed.
- Effect of constructing 3 roads in the area of total length about 3 km, two of which replaced existing *mesqas*.
- Re-evaluation of *Mesqa #26* after 4 years of regular work.

B. Sociology Discipline

Condensed meetings with the greatest number of farmers is required in order to determine the possibility of proceeding in *mesaa* improvement during the next harvest time. This will help preparing the necessary equipment in the light of the volume of work required.

C. Agronomy Discipline

Work plan for Abyuha area is urgently needed.

D. Computer Training

Training of selected personnel from the Minya Team should be arranged as soon as possible.

III. Personnel Assigned to Minya

Professionals

Esmat Wafik	Team Leader	Abdalla Saber	Sociologist
Farouk Hassanein	Sociologist	Mohamed Awad	Agronomist
Ahmed Abdel Naim	Engineer	Nabil Farag	Economist
Elia Sorial	Economist		

Technicians

Abdel Kany Hafiz
Nashat Younis
Mahmoud Noman
Bekhit Nazer
Mohamed Allah

Drivers

Khalaf Moh. Khalaf
Farouk Hassan
Mohamed Esawy

Laborers

Khalaf Saad
Kamel Ahmed
Hemid Said
Said Abdel Fattah

DISCIPLINE ACTIVITY

Engineering Discipline

1. As requested by the Minister of Irrigation during his visit to Kafr El-Sheikh site, an Arabic Technical Report is being prepared for the improvement program of Daqalt Canal suggested by EWUP Team. This report will include the hydraulic design and the operational system control structure design.
2. Another Technical Report (in Arabic) has been prepared about the new design of Branch 4, El-Arous Canal, for utilization of ground water instead of surface water for solving the problems of the area. The report will include a complete hydraulic design to provide the system with a gravity feed on the farm level. It was submitted to the Water Research Center and the Groundwater Research Institute.
3. Serry Canal reconnaissance survey and water measurement studies were started.
4. The new contractor started work on El-Hammami pipeline. The following items were accomplished:
 - The concrete super structure of Pump Station No. (1).
 - Installation of the three units of Pump Station No. (1).
 - Installation and testing of 300 m of pipeline No. (1) which represents reaches (1) & (2).
 - Work has been going on for completing the super structure of Pump Station No. (2).
 - Checking of pipeline No. (2) to fix any inappropriately installed pipes.

It is to be noted that the new contractor is using a well point system for dewatering for the pipeline installation site.

5. 60% of the work of Abyuha *Mesqa* renovation was completed by the contractor.
6. Routine water budget studies have been continued in the three sites.

7. Routine on-farm water management data and activities have been continued.

Names of Personnel Assigned to the Main Office Engineering Discipline During the Past Quarter:

Dr. Mona El-Kady

Agronomy Discipline

Activities during the past quarter were as follows:

- 1) Supervising the agronomy work in the three sites.
- 2) Visiting the sites to follow up the activities carried out.
- 3) Revising and discussing the previous available data as well as the new collected data.
- 4) Cooperating with the other disciplines in carrying out the plan of work.

Names of personnel assigned to the Main Office Agronomy Discipline:

Ahmed Taher and Moheb Semaika.

Economics Discipline

- 1) Continued to keep farm record books with the selected farmers for the new agricultural year 1984/1985 to evaluate the alternative farming systems.
- 2) Continued working on the enterprise cost studies for the main crops at the three sites.
- 3) Worked on the IBM program for the 1983/1984 farm record summary and analysis at the three sites.
- 4) Worked with the interdisciplinary team at Serry Canal area for the irrigation improvement program.

- 5) Followed and reviewed the survey sheet for the water requirement experiment stations (Bahtiem, Shebin El-Kom, El Zankaloon, Sakha, Inshass, Wadi El-Natrun, Mallawy, and King Osman). The survey sheets will help develop an economic evaluation for water irrigation and the systems used in these experimental stations.

Names of personnel assigned to the Main Office Economics Discipline during the past quarter:

Farouk Abdel Al & Gamal Ayad

Sociology Discipline

Activities of the Sociology Team in each of the three EWUP sites could be summarized as follows:

El-Mansuriya

A. Beni Magdul

- *Mesqa* # 10 farmers were persuaded to continue scheduling of irrigation in winter, using the new elevated *mesaa* and were promised to have enough water in summer.
- Work on lined *mesaas* has been going on, meetings were held with farmers for solving their problems and organizing them to clean and maintain their own *mesaas* with their personal efforts.
- Attempts were made to persuade the localities and local officials to participate in water management and improvement of irrigation practices.

B. El-Hammami

Farmers were very pleased and convinced with the installation of the pipeline by the new contractor and signed their approval of the valve's location.

Kafr El-Sheikh

- Work in two of the old sites on Daqalt Canal was still going on to make an evaluation which is to be completed in a month's time.
- Two new sites on Daqalt Canal were selected for work in order to perform the evaluation.
- Daqalt Canal data was collected, processed and analyzed and a report will be prepared.

El-Minya

A. Abyuha

- New *mesqas* were improved after the harvest time at Abyuha in addition to those which have already been completed.
- Improved *mesqas* were cleaned and maintained regularly by farmers.
- Meetings were held with the farmers and leaders to keep the farmers' organization effective.

B. Serry Canal

Five villages were selected for study, one of which was chosen for starting the work in.

In all three sites, Mansuriya, Kafr El-Sheikh and El-Minya the sociological routine work has been going on and contact farm records were kept.

Names of personnel assigned to the Main Office Sociology Discipline:

Mohamed Naguib.

Publications Report

The activity of the Editorial Office has become very diverse in the last quarter of 1984. Besides the original assignment of completing all EWUP Technical Reports and following up their progress in Cairo and Fort Collins, other tasks have been assigned to the Editor. These included:

1. Review of the report "Actions for Modernization of El-Hammami Delivery System." To be presented by Dr. Mona El-Kady in the ICID Congress.
2. Review of the report "Lining of Egyptian Canals Techniques and Economic Analysis." To be presented by Dr. Mona El-Kady in the ICID Congress.
3. Review of the report "Improvement of Irrigation Management with special reference to Developing Countries." To be presented by Dr. Hassan Wahby in the ICID Congress.
4. Preparation of a set of transparencies and slides that summarize EWUP Goals, Role and Accomplishments for presentation to H.E. Minister of Irrigation and in any other future occasions.
5. Correspondence and letter writing for the Project Director and Deputy Director.
6. Translation of any documents from Arabic to English and vice versa according to need.
7. Assist in the proofreading of most of the reports after typing.
8. Follow-up of the printing process at the AUC Printer.

To conclude, an updated status report of EWUP Technical Reports is attached. Also attached is a complete list of all EWUP publications (TRs and Manuals) that were produced by the end of Project (December, 1984).

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STATUS REPORT (Dec. 31, 1984)

LIST OF PROPOSED EWUP TECHNICAL REPORTS

(Titles are preliminary)

Proposed	Title	Author	Status	Care of
16	Irrigation System Improvement by Simulation & Optimization, I. Theory II. Application	J.M. Reddy & W. Clyma	Completed. Original sent from F.C. to Cairo.	E.V.R.
17	Optimal Design of Border Irrigation System	J.M. Reddy & W. Clyma	Completed. Original sent from F.C. to Cairo.	E.V.R.
25	Problem Identification Report for El-Minya	R. Prooks & W. Schmehl	Completed. Original sent from F.C. to Cairo.	E.V.R.
39	On-Farm Irrigation Practices for Winter Crops at Abu Baya	A.F. Metawie N.L. Adams & T.A. Tawfic	Ready for printing in Cairo	Mary
48	A Method for Evaluating and Revising Irrigation Rotations	R. L. Tinsley, A. Ismail & M. El-Kady	Needs minor editing (in Cairo)	Mary
49	Farming System of Egypt: With Special Reference to EWUP Project Sites	G. Fawzy, M. Skold, F. Abdel Al & R. L. Tinsley	With Dr Tinsley for finalizing	Tinsley
52	Zinc Fertility Status of the Soils in Project Sites.	M. Abdel Naim	Completed and printed in Cairo & Fert Collins.	Tinsley
53	Crop Management Studies by the Egypt Water Use & Management Project.	A. Abdel Naim	With Dr. Schmehl for review. To be retyped in F.C. 50 copies are requested for dist. in Cairo	E.V.R.

Proposed No.	Title	Author	Status	Care of
54	Criteria for Determining Desirable Irrigation Frequencies & Requirements, and Comparisons with Conventional Frequencies and Amounts Measured in EWUP	M. El-Kady, J. Wolfe, & M. Semaika	Completed and printed in Cairo & Fort Collins.	
55	Design and Evaluation of Water Delivery System Improvement Alternatives	T. K. Gates, J. Andrew, J. Ruff, B. Martella, J. Layton, M. Helal & A. Nasr	With T.K. Gates for Review. Not yet submitted to Ed. Office.	Gates
59	Management Plan of a Distributary Canal System	A. Early, E. Wafik, T.K. Gates & J. Layton	With A. Early for review in F.C.	Mary
64	Influence of Soil Properties on Irrigation Management in Egypt	A.T. Moustafa & R.L. Tinsley	Completed. Original sent from F.C. to Cairo.	Tinsley
66	The Irrigation Advisory Service: A Proposed Organization for Improving On-Farm Irrigation Management in Egypt	J. Layton and Sociology Team	Completed. Original sent from F.C. to Cairo.	Layton
67	Sociological Evaluation of the On-Farm Irrigation Practices Introduced in Kafr El-Sheikh	J. Layton, A. El-Attar, H. Hussein, S. Kamal & A. El-Masry	Completed. Original sent from F.C. to Cairo.	Layton
68	Developing Local Farmer Organizations: A Theoretical Procedure	J. B. Mayfield & M. Naguib	Completed. Original sent from F.C. to Cairo.	Layton
69	The Administrative and Social Environment of the Farmers in an Egyptian Village	J. B. Mayfield & M. Naguib	Completed. Original sent from F.C. to Cairo.	Layton

Proposed No.	Title	Author	Status	Care of
71	Impact of Mesqa Intake Size and Condition on Water Management on Farms	E. Hanson, M. El-Kady & K. Litwiller	To be reviewed in F.C.	Hanson
72	Baseline Data for Improvement of a Distribution Canal System.	K. Ezz El-Din K. Litwiller & Kafr El-Sheikh Team	Completed. Original sent from F.C. to Cairo.	K.L.
74	Farmers' Irrigation Practices in El-Hammami Sands.	T. A. Tawfic R. L. Tinsley	Completed and printed in . Cairo and F.C.	Mary
77	El-Hammami Farm Record Summary & Analysis.	M. Haider, M. Skold E. Abdel Ali, H. El-Naggar & G. Ayad.	Completed. Original + 50 copies sent from F.C. to Cairo.	Haider

LIST OF EWUP TECHNICAL REPORTS AND MANUALS

- TR 1. "Problem Identification Report for Mansuriya Study Area, October 1977 to October 1978," Egyptian & American Field Team. EWUP, 1979.
- TR 2. "Preliminary Soil Survey Report for the Beni Magdul and El-Hammami Areas," A. D. Dotzenko, M. Zanati, A. A. Selim & A. M. Keleg. EWUP, 1979.
- TR 3. "Preliminary Evaluation of Mansuriya Canal System, Giza Governorate, Egypt," Egyptian & American Field Team. EWUP, 1979.
- TR 4. "On-farm Irrigation Practices in Mansuriya District, Egypt," M. El-Kady, W. Clyma & M. Abu-Zeid. EWUP, 1979.
- TR 5. "Economic Costs of Water Shortages Along Branch Canals," S. A. El-Shinnawi, M. Skold & M. L. Nasr. EWUP, 1980.
- TR 6. "Problem Identification Report for Kafr El-Sheikh Study Area," Egyptian & American Field Team. EWUP, 1980.
- TR 7. "A Procedure for Evaluating the Cost of Lifting Water for Irrigation in Egypt," H. Wahby, G. Quenemoen & M. Helal. EWUP, 1981.
- TR 8. "Farm Record Summary and Analysis for Study Cases at Abu Raya and Mansuriya Sites, 1978/1979," F. Abdel Al & M. Skold. EWUP, 1981.
- TR 9. "Irrigation and Production of Rice in Abu Raya, Kafr El-Sheikh Governorate," Kafr El-Sheikh Team as Compiled by T. W. Ley & R. L. Tinsley. EWUP, 1983.
- TR 10. "Soil Fertility Survey of Kafr El-Sheikh, El-Mansuriya and El-Minya Sites," M. Zanati, P. N. Soltanpour, A. T. A. Moustafa & A. Keleg. EWUP, 1982.
- TR 11. "Kafr El-Sheikh Farm Management Survey, Crop Enterprise Budgets and Profitability Analysis," M. Haider & F. Abdel Al. EWUP, 1982.

TR = Technical Report

- TR 12. "Feasibility Studies and Evaluation of Irrigation Projects: Procedures for Analysing Alternative Water Distribution System in Egypt," R. J. McConnen, F. Abdel Al, M. Skold, G. Ayad & E. Sorial. EWUP, 1982.
- TR 13. "The Role of Rural Sociologists in an Interdisciplinary Action-Oriented Project: An Egyptian Case Study," J. Layton & M. S. Sallam. EWUP, 1982.
- TR 14. "Administering an Interdisciplinary Project: Some Fundamental Assumptions upon which to Build," J.B. Mayfield & M. Naguib.
- TR 15. "Village Bank Loans to Egyptian Farmers." G. Ayad, M. Skold & G. Quenemoen. EWUP, 1982.
- TR 16. "Irrigation System Improvement by Simulation & Optimization, I. Theory II. Application," J. M. Reddy & W. Clyma.
- TR 17. "Optimal Design of Polder Irrigation System," J. M. Reddy & W. Clyma.
- TR 18. "Population Growth and Development in Egypt: Farmers' and Rural Development Officials' Perspectives," M.S. Sallam, F. C. Knop & S. A. Knop.
- TR 19. "Rural Development and Effective Extension Strategies: Farmers' or Officials' Views," M. S. Sallam, E. C. Knop & S. A. Knop. EWUP, 1982.
- TR 20. "The Rotation Water Distribution System vs. The Continual Flow Water Distribution System," M. El-Kady, J. Wolfe & H. Wahby. EWUP, 1982.
- TR 21. "El-Hammami Pipeline Design," Fort Collins Staff Team.
- TR 22. "The Hydraulic Design of *Mesqa* 10, An Egyptian Irrigation Canal," W. D. Ree, M. El-Kady, J. Wolfe & W. Fahim. EWUP, 1982.
- TR 23. "Farm Record Summary and Analysis for Study Cases at Abyuha, Mansuriya and Abu Raya Sites (1979/80)," F. Abdel Al & M. Skold. EWUP, 1982.
- TR 24. "Agricultural Pests and Their Control: General Concepts," E. Attalla. EWUP, 1982.

- TR 25. "Problem Identification Report for El-Minya," R. Brooks.
- TR 26. "Social Dimensions of Egyptian Irrigation Patterns," E. C. Knop, M. S. Sallam, S. A. Knop & M. El-Kady. EWUP, 1982.
- TR 27. "Alternative Approaches in Extension & Rural Development Work: An Analysis of Differing Perspectives," M. S. Sallam & E.C. Knop.
- TR 28. "An Economic Evaluation of Wheat Trials at Abyuha Area, El-Minya (1979/80 and 1980/81)," N. K. Farag, E. Sorial & M. Awad. EWUP, 1982.
- TR 29. "Irrigation Practices Reported by EWUP Farm Record Keepers (Abyuha and Abu Raya Sites, 1979/80 & 1980/81)," F. Abdel Al, M. Skold & D. Martella. EWUP, 1982.
- TR 30. "The Role of Farm Records in the Egypt Water Use and Management Project," F. Abdel Al & D. Martella. EWUP, 1982.
- TR 31. "Analysis of Farm Management Data from Abyuha Project Site," E. Sorial, M. Skold, R. Rehnberg & F. Abdel Al.
- TR 32* "Accessibility of EWUP Pilot Sites," A. El-Kayal, S. Saleh, A. Bayoumi & R. L. Tinsley.
- TR 33. "Soil Survey Report for Abyuha Area, Minya Governorate," A. A. Selim, M. A. El-Nahal & M. H. Assal. EWUP, 1983.
- TR 34. "Soil Survey Report for Abu Raya Area, Kafr El-Sheikh Governorate," A. A. Selim, M. A. El-Nahal, M. A. Assal & F. Hawela. EWUP, 1983.
- TR 35. "Farm Irrigation System Design, Kafr El-Sheikh, Egypt," Kafr El-Sheikh Team, as Compiled by T. W. Ley. EWUP, 1983.
- TR 36. "Discharge and Mechanical Efficiency of Egyptian Water-Lifting Wheels," R. Slack, H. Wahby, W. Clyma & D. Sunada.
- TR 37. "Allocative Efficiency and Equity of Alternative Methods of Charging for Irrigation Water: A Case Study in Egypt," R. Bowen & R.A. Young.

* In Progress

DWP = *Draft Working Paper*

- TR 38. "Precision Land Leveling on Abu Raya Farms, Kafr El-Sheikh Governorate, Egypt," T. W. Ley.
- TR 39* "On-Farm Irrigation Practices for Winter Crops at Abu Raya," A. F. Metawie, N. L. Adams & T. A. Tawfic.
- TR 40. "A Procedure for Evaluating Crop Growth Environments for Optimal Drain Design," D.S. Durnford, E.V. Richardson & T. H. Podmore
- TR 41. "The Influence of Farm Irrigation System Design and Precision Land Leveling on Irrigation Efficiency and Irrigation Water Management," T. W. Ley, M. El-Kady, E. Hanson, W. S. Braunworth, K. Litwiller, A. El-Falaky & E. Wafik.
- TR 42* "Mesqa Renovation Report," N. Illsley & A. Bayoumi,
DVP
- TR 43. "Planning Irrigation Improvements in Egypt: The Impact of Policies and Prices on Farm Income & Resource Use," M. Haider & M. Skold. EWUP, 1983.
- TR 44* "Conjunctive Water Use - The State of the Art and Potential
M. 3 for Egypt," V. H. Scott & A. El-Falaky.
- TR 45. "Irrigation Practices of EWUP Study Cases - Abyuha and Abu Raya Sites for 1979-1980, 1980-1981 and 1981-1982," F. Abdel Al, D. Martella & R. L. Tinsley.
- TR 46. "Hydraulic Design of a Canal System for Gravity Irrigation," T. K. Gates, W. O. Ree, M. Helal & A. Nasr.
- TR 47. "Water Budgets for Irrigated Regions in Egypt," M. Helal, A. Nasr, M. Ibrahim, T. K. Gates, W. O. Ree & M. Semaika.
- TR 48* "A Method for Evaluating and Revising Irrigation Rotations," R. L. Tinsley, A. Ismail & M. El-Kady.
- TR 49* "Farming System of Egypt: With Special Reference to EWUP Project Sites," G. Fawzy, M. Skold & F. Abdel Al.
- TR 50. "Farming System Economic Analysis of EWUP Study Cases," F. Abdel Al, D. Martella & O. W. Lybecker.

M = Manual

- TR 51. "Structural Specifications and Construction of a Canal System for Gravity Irrigation," W. R. Gwinn, T. K. Gates, A. Raouf, E. Wafik & E. Nielsen.
- TR 52. "Status of Zinc in the Soils of Project Sites," M. Abdel Naim.
- TR 53. "Crop Management Studies by the Egypt Water Use & Management Project," M. Abdel Naim.
- TP 54. "Criteria for Determining Desirable Irrigation Frequencies & Requirements, and Comparisons with Conventional Frequencies and Amounts Measured in EWUP," M. El-Kady, J. Wolfe & M. Semaika.
- TR 55. "Design and Analysis of Water Delivery System Improvement Alternatives," T. K. Gates, J. Andrew, D. Martella, J. Layton, M. Helal & A. Nasr.
- TR 56. "Egyptian Canal Lining Techniques and Economic Analysis," Mona El-Kady, J. Andrew & H. Wahby.
- TR 57. "Infiltration Studies on Egyptian Vertisols," K. Litwiller, R. L. Tinsley, H. Deweeb & T. Ley.
- TP 58. "Cotton Field Trials, Summer 1980, Abu Raya," Kafr El-Sheikh DWP Team as compiled by M. Awad & A. El-Kayal.
- TR 59* "Management Plan for a Distributary Canal System," A. Saber, E. Wafik, T. K. Gates & J. Layton.
- TR 60. "Hydraulic Conductivity and Vertical Leakage in the Clay-Silt Layer of the Nile Alluvium in Egypt," J. W. Warner, T. K. Gates, W. Fahim, M. Awad & T. W. Ley.
- TR 61. "The Effect of Irrigation Water Management on High Water Tables in Egypt," E. Hanson, M. El-Kady, T. K. Gates & K. Litwiller.
- TR 62. "On the Water Quality of Irrigation Canals, Drains and Ground-water in Mansuriya, Kafr El-Sheikh & El-Minya Project Sites," A. El-Falaky & V. H. Scott.
- TR 63. "Watercourse Improvement Evaluation (Mesqa # 26 & Mesqa # 10)," R. McConnen, E. Sorial & G. Fawzy.
- TR 64. "Influence of Soil Properties on Irrigation Management in Egypt," A. T. A. Moustafa & R. L. Tinsley.

- TR 65. "Experiences in Developing Water Users' Associations," J. Layton and Sociology Team.
- TR 66. "The Irrigation Advisory Service: A Proposed Organization for Improving On-farm Irrigation Management in Egypt," J. Layton and Sociology Team.
- TR 67. "Sociological Evaluation of the On-Farm Irrigation Practices Introduced in Kafr El-Sheikh," J. Layton, A. El-Attar, H. Hussein, S. Kamal and A. El-Masry.
- TR 68. "Developing Local Farmer Organizations: A Theoretical Procedure," J. B. Mayfield & M. Naguib.
- TR 69. "The Administrative and Social Environment of the Farmers in an Egyptian Village," J. B. Mayfield & M. Naguib.
- TR 70. "Factors Affecting the Ability of Farmers to Effectively (Cancel-Irrigate: A Case Study of the Manshiya *Mesaa*, Kafr El-Sheikh," led) M. Naguib & J. Layton.
- TR 71* "Impact of Turnout Size and Condition on Water Management on Farms," E. Hanson, M. El-Kady & K. Litwiller.
- TR 72 "Baseline Data for Improvement of a Distributary Canal System," K. Ezz El-Din, K. Litwiller & Kafr El-Sheikh Team.
- TR 73. "Considerations of Various Soil Properties For the Irrigation Management of Vertisols," C. W. Honeycutt, R. D. Heil, 1984.
- TR 74. "Evaluation of Farmers' Irrigation Practices in El-Hammami Sands," T. A. Tawfic, R. L. Tinsley, 1984.
- TR 75. "Abyuha Farm Record Summary and Analysis Over Years (1979-83)," D. W. Lybecker, E. Sorial, F. Abdel Al, N. Farag, 1984.
- TR 76. "Farm Record Summary and Analysis; 5 years, 1978/79 - 1982/83," Rex Rehnberg, G. Ayad, S. Elewa, M. Badawy, 1984.
- TR 77. "Farm Record Summary and Analysis; El-Hammami (1978-1983)," El-Shinnawy, M. Haider, M. Skold, H. El-Naggar, F. Abdel Al, 1984.
- TR 78. "Farm Record Summary and Analysis; Peni Magdul (1978-1983)," M. Haider, G. Fawzi, L. Nasr, F. Abdel Al, 1984.

- TR 79. "A Technical Report and Economic Analysis of Low Lift Irrigation Pumping in Egypt," H. R. Horsey, E. V. Richardson, M. D. Skold, D. K. Sunada, 1984.
- M 1 "Trapezoidal Flumes for Water Management," A. R. Robinson, EWUP, 1982.
- M 2 "Programs for the HP Computer Model 9825 for EWUP Operations," M. Helal, D. Sunada J. Loftis, G. Quenemoen, W. Ree, R. McConnen, R. King, A. Nasr & R. Stalford. EWUP, 1982.
- M 5 "Precision Land Leveling Data Analysis Program for HP 9825 Desktop Calculator," T. W. Ley. EWUP, 1983.
- M 8 "Thirty Steps to Precision Land Leveling." A. Bayoumi, S. Boctor & N. Dimick. EWUP, 1982.
- M 9 "Alphabetical List of Some Crops & Plants with Their English, Egyptian, Botanical & Arabic Names, and Vocabulary of Agricultural and other Terms Commonly Used," G. Ayad. EWUP, 1983.
- M 3 = TR 44
- M4, 6, 7 cancelled

MAIN OFFICE

The following is a complete list of personnel assigned to the Main Office as of Sept. 30, 1984.

Hassan Wahby	Project Director
Farouk Abdel Al	Economics Discipline Leader
Gamal Ayad	Senior Economist
Ahmed Taher	Agronomy Disc. Leader
Assia El-Falaky	Senior Agronomist
Moheb Smaika	Senior Agronomist
Mona El-Kady	Engineering Disc. Leader
Mohamed Naguib	Sociologist Disc. Leader
Mohamed Helal	Computer Engineer
Azza Nasr	Computer Engineer
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
Farida Abdel Meguid *	Engineer - Water Requirements
Mohamed Ahmed Salem	Senior Adminis. Personnel
Abdel Aziz El-Kady	Senior Adminis. Expeditor
Ahmed Zaki	Junior Adminis. Expeditor
Salah El-Din Salem	Junior Adminis. Secretary
Sayed Sakr	Junior Adminis. Storekeeper
Zeinab Abdel Ghany	Junior Adminis. Inventory
Ekhlas Abdel Ghaffar	Junior Adminis. Secretary
Ashgan Abdel Zaher	Junior Adminis. Photocopier
Bamba Shaarawy	Junior Adminis. Photocopier
Hoda Salama	Junior Adminis. Photocopier

* On leave without pay.

Nahed El-Husseiny	Junior Adminis. Photocopier
Iman Abdel Gaber	Junior Adminis. Accountact
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.
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 *	Eng.-Water Laboratory
Ahmed Ghanem	Techician-Water Lab.
Abdalla Gad	Techician-Motor Pool
Ahmed	Guard-M.P.
Moustafa Mahmoud Mahran	Electrician-M.P.
Nawal Abdallah Ahmed	Accountant - Main office
Mervat Hassan	Ex. Secretary - Main Office
Mary Halim	Editor - Main Office

* On leave without pay.

II. BACKSTOPPING

Planning and Coordinating Committee

During this quarter the Project Planning and Coordinating Committee continued on reviewing and rewriting, where needed, the technical reports summarizing the Project findings, and continued to assist in the transfer of the Project to the Egyptian Ministry of Irrigation. The committee also continues to advise the Egyptian Project personnel who are completing training programs at Colorado State University, and continues to meet to review Project activities and provide technical and management support when needed.

Fort Collins Staff

The advising, reviewing and publishing activities of the Fort Collins Staff continued during the quarter. Bob Vandenberg and Henry Horsey continued to provide support for the IBM software and hardware sent to Egypt in the last year.

Publishing of the Project reports continued during the quarter and a schedule detailing the status of all reports is given in the Appendix.

American TDY's

Jim Layton, Sociologist - September 16 - November 19, 1984. TDY report in Appendix.

Jim Ruff, Engineer - November 26 - December 10, 1984. TDY report in Appendix.

Irrigation Management Systems Tour

This activity overlapped into the fourth quarter. See third quarter report for details.

Equipment

Automobile parts were purchased and hand carried to Egypt.

Shipping

One air freight shipment was made to Egypt containing project technical reports.

Reports

Work continued on the writing, editing, typing, printing and distribution of project reports. A complete list showing status of all reports is given in the Appendix.

III. PERSONNEL

Field Staff

None.

Campus

James Ruff went TDY this quarter as shown under American TDYs.

EWUP TR PUBLICATIONS

The following reports have been printed and distributed:

Manual #10 - EWUP Farm Record System

TR #14 - Administering an Interdisciplinary Project: Some Fundamental Assumptions Upon Which to Build

TR #16a - Irrigation System Improvement by Simulation and Optimization, I. Theory

TR #16b - Irrigation System Improvement by Simulation and Optimization, II. Application

TR #17 - Optimal Design of Border Irrigation Systems

TR #18 - Population Growth and Development in Egypt: Farmers' and Rural Development Officials' Perspectives

TR #27 - Alternative Approaches in Extension and Rural Development Work: An Analysis of Differing Perspectives

TR #31 - Analysis of Farm Management Data From Abyuha Project Site

TR #40 - A procedure for Evaluating Crop Growth Environments for Optimal Drain Design

TR #41 - The Influence of Farm Irrigation System Design and Precision Land Leveling on Irrigation Efficiency and Irrigation Water Management

TR #44/Manual #3 - Conjunctive Water Use - The State of the Art and Potential for Egypt

TR #45 - Irrigation Practices of EWUP Study Cases - Abyuha and Abu Raya Sites for 1979 through 1982.

TR #46 - Hydraulic Design of a Canal System for Gravity Irrigation

TR #47 - Water Budgets for Irrigated Regions in Egypt.

TR #50 - Farming System Economic Analysis EWUP Study Cases

TR #56 - Egyptian Canal Lining Techniques and Economic Analysis

TR #57 - Infiltration Studies on Egyptian Vertisols

TR #60 - Hydraulic Conductivity and Vertical Leakage in the Clay-Silt Layer of the Nile Alluvium in Egypt

TR #61 - The Effect of Irrigation Water Management on High Water Tables in Egypt

TR #62 - The Water Quality of irrigation Canals, Drains and Groundwater in Mansuriya, Kafr El-Sheikh and El-Minya Project Sites.

TR #63 - Watercourse Improvement Evaluation

TR #65 - Engineering in Developing Water Users' Associations

TR #68 - Developing Local Farmer Organizations: A Theoretical Procedure

TR #73 - Considerations of Various Soil Properties for the Irrigation Management of Vertisols

TR #75 - Abyuha Farm Record Summary and Analysis Over Years 1979-1983

TR #76 - Kafr El-Sheikh Farm Record Summary

TR #77 - El-Hammami Farm Record Summary and Analysis

TR #78 - Beni Magdul Farm Record Summary and Analysis

TR #79 - A Technical and Economic Analysis of Low Lift Irrigation Pumping in Egypt

The following reports have been printed but not distributed as of December 31, 1984, distribution will be complete by March 1, 1985.

TR #25 - Problem Identification Report for El Minya

TR #51 - Structural Specifications and Construction of a Canal System for Gravity Irrigation

TR #64 - Influence of Soil Properties on Irrigation Management in Egypt.

TR #66 - The Irrigation Advisory Service: A Proposed Organization for Improving On-Farm Irrigation Management in Egypt, Dr. Layton is working on this report.

TR #67 - Sociological Evaluation of the On-Farm Irrigation practices Introduced in Fakr El-Sheikh

TR #69 - The Administrative and Social Environment of the Farmers in an Egyptian Village

TR #72 - Baseline Data for Improvement of a Distribution Canal System.

TR #74 - Farmers' Irrigation Practices in El-Hammami Sands.

The following reports have been sent to printing and will be complete and distributed by March 1, 1985.

TR #52 - Zinc Fertility Status of the Soils in Project Sites.

TR #53 - Crop Management Studies by the Egypt Water Use and Management Project, Dr. Schmehl is working on this report.

TR #71 - Impact of Mesqa Intake Size and Condition of Water Management on Farms, Dr. Early is working on this report.

The following reports are in available in draft form only from the Fort Collins office:

TR #49 - Farming System of Egypt: With Special Reference to EWUP Project Sites.

TR #55 - Design and Evaluation of Water Delivery System Improvement Alternatives.

TR #59 - Management Plan of a Distributary Canal System.

The following reports are available in the Cairo office only:

TR #39 - On-Farm Irrigation practices For Winter Crops at Abu Raya.

TR #48 - A Method for Evaluating and Revising Irrigation Rotations.

TR #54 - Criteria for Determining Desirable Irrigation Frequencies and Requirements, and Comparisons with Conventional Frequencies and Amounts Measured in EWUP.

The following reports have been approved as DWP only and will not be published as TR publications per Cairo Publication Office:

TR#32 - Accessibility of EWUP Pilot Sites

TR#42 - Renovation Report

TR#58 - Cotton Field Trials, Summer 1980 Abu Raya

The Final Administrative Report is in the final stages of editing.

TDY REPORT
JAMES LAYTON
AUGUST 16 - NOVEMBER 19, 1984

My TDY in Egypt consisted of four major activities:

- 1) working with Harza Engineering;
- 2) performing various administrative tasks for the Water Management Institute;
- 3) completing unfinished technical reports; and
- 4) working with the sociology discipline in the continuance of their work with EWUP.

For one month of my time I was assigned to work with Harza Engineering in Tanta. The purpose of my job was to consult with them as to the feasibility of establishing water users' associations in the North Zifta Region where a canal reconstruction plan is being devised.

The other three activities I performed were with EWUP. I was assigned by Hassan Wahby to conduct three district administrative tasks. The first task was to write a research proposal to be submitted to AID whose objective was to evaluate three irrigation techniques (sprinkler, drip and surface) in three "new lands" agricultural areas.

For the second task I was asked to write a Table-of-Organization for a proposed "Water Use Authority" to be instituted in the Ministry of Irrigation. I was working with different Egyptian personnel in the completion of both of these tasks. The third task was to write the Quarterly Report from July to September, 1984.

During my TDY period I was able to complete the writing of PTR#67, titled, "Sociological Evaluation of the On-Farm Irrigation Practices Introduced in Kafr El Sheikh," and I completed the first draft of PTR #66, "The Irrigation Advisory Service."

My fourth TDY activity was involved in working with the sociology discipline. I helped Mohamed Naguib design workplans for the three field sites. we held two sociology seminars focusing on research methodology. The field contact record books were reconstructed to make them more effective data gathering instruments, and a new reconnaissance survey instrument was developed. Naguib and I analyzed the Menofiya Pipeline survey data; and I helped both Naguib and Farouk Abdel Al Omar on their M.S. Theses.

In addition to the specific activities assigned to me during this period of time, I spent some time working with Mohamed Sallam at his Extension Research Institute helping some of his staff with M. S. theses and Ph.D. dissertations. I also did some follow-up on the status of the new project with AID. The rest of my time was consumed with different small administrative tasks relevant to the sociology discipline in the project.

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TDY REPORT
JAMES J. LAYTON
August 16, 1984 - November 19, 1984

8/16 Leave for Egypt

8/17-23 Assigned to Tanta to work for Harza Engineering on the North Zifta Project

8/24 Friday Holiday

8/25 Met with Hassan Wahby and Mohamed Naguib to discuss my workplan for EWUP.

8/26-30 Worked for Harza Engineering

8-31 Friday Holiday

9/1-3 Worked in the main office with Naguib determining the status of the project field sites. Talked with Joe Carmack about the new project.

9/4-8 Worked on the Institute Research Proposal for evaluating irrigation methods in the New Lands. This period was the Korban Holiday.

9/9 Turned in the research proposal to Mona El-Kady.

9/10-11 Minya Field Trip

9/12-13 Completed the editing for the New Lands Research Proposal.

9/14 Friday Holiday

9/15 Drafted transparencies to be used by Hassan Wahby for a presentation of the New Lands Research Proposal to AID.

9/16-20 Worked for Harza Engineering

9/21 Friday Holiday

9/22 Started work on creating a Table of Organization for a new Water Use Authority in the MOI. Assigned by Hassan Wahby. Prepared TDY action memos for E. V. Richardson and James F. Ruff.

9/23-27 Completed work for Harza Engineering

9/28 Friday Holiday

9/29-10/4 Completed the Water Management Authority T/o.

10/5 Friday Holiday

10/6 Holiday

10/7-8 Worked on the Quarterly Report for the time period between July and September, 1984.

10/9 Kafr El Sheikh Field Trip.

10/10 Sociology Seminar

10/11 Monthly Staff Meeting

10/12 Friday Holiday

10/13 Completed the Quarterly Report

10/14 Visited Mohamed Sallam at the Extension Research Institute

10/15-18 Completed revision of PTR #67

10/19 Friday Holiday

10/20-22 Worked on PTR#66

10/23 Worked with Mohamed Sallam

10/24-25 Worked with Naguib on general sociological concerns with the project.

10/26 Friday Holiday

10/27 Designed sociology discipline workplan with Naguib

10/28-31 Completed the new farmer contact record format to be used by the field sociologists in collecting sociological data.

11/1 Completed the new sociology reconnaissance survey instrument.

11/2 Friday Holiday

11/3 Worked with Naguib on his MS Thesis.

11/4 Worked on PTR#66

11/5-6 Minya Field Trip

11/7 Met with Ed Stains of AID and worked on Farouk Abdel Al's MS Thesis.

11/8 Monthly Staff Meeting.

11/9 Friday Holiday

11/10 Performed some administrative work for Mahmoud Abu Zeid.

- 11/11 Started the data analysis for the Menofiya Pipeline survey.
- 11/12 Kafr El Sheikh Field Trip
- 11/13-14 Continued Menofiya data analysis.
- 11/15 Sociology Seminar
- 11/16 Friday Holiday
- 11/17-18 Completed workplans for the sociology discipline with Naguib
- 11/19 Returned to the United States.

Egypt Water Use & Management Project

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Colorado State University Ft. Collins, CO 80523
Phone (303) 491 8655, TWX 910-930-9000

December 8, 1984
Cairo, Egypt

TO: Dr. Hassan Wahby
Dr. Mona El-Kady

FROM: James Ruff



SUBJECT: TDY Report (Nov. 26 to Dec. 10, 1984)

REMARKS: The emphasis of this trip was to assist the Kafr El-Sheikh Team. The team is working on the rehabilitation of the Daqalt canal. The objective of the rehabilitation is to provide irrigation water to the farmers under the following conditions, as much as is possible:

- 1) Equal distribution,
- 2) Adequate supply,
- 3) Proper timing,
- 4) Maximum utilization of water in the system with a minimum amount passing through to the drains.

In review of the objectives, we discussed the existing system, the constraints within the system, the potential improvements, and the means to evaluate the system performance for purposes of design. The existing system consists of the Daqalt canal and 24 *mesqas*. The Daqalt is divided into 3 sections by the Wezaria and the Helal regulators. The major part of the water is applied to the farm by pumping, either by *saqia* or by diesel pumps. A small area is irrigated by gravity. The rehabilitated system will supply water so that the method of obtaining water from the *mesqas* will be primarily by pumping as before.

Review of the data obtained by the EWUP project shows the water levels in the canals drop rapidly from about 8:00 a.m. to about 2:00 p.m. Farmers tend to irrigate from about 7:00 or 8:00 a.m. to about 4:00 or 5:00 pm, approximately 8 to 10 hours per day. The system is operated by a gate keeper adjusting the water level in the Daqalt canal in the morning at the regulators and maybe once or twice more during the days.

This type of operation or regulation does not account for actual demand throughout the system or for the time lag of the system. Therefore, adjustment at the regulators by the gate keepers reflect the demands in the system resulting 2 to 6 hours before the regulator adjustment. Therefore, the major constraint in the systems is regulation based upon a water level near the regulator which does not reflect the actual water demand either in quantity or in time.

Improvement requires a forecast of water demands and an operational procedure that is based upon quantities of water and upon this time of travel of the water to get to the point of use. Using this information and the objectives first stated, a model was formulated to evaluate the system performance either as it exists or as proposed for improvement.

The model will use the information and data collected by the EWUP project and incorporate existing computer programs and calculations. The model is a beginning point and initially will be simplified to develop an understanding of the system performance in response to the water demand and system operation. A flow chart of the model is given in the Appendix.

The data has been collected to formulate all the parts of the model. Somethings will be required in a different format than they are presently and a number of the items will require judgement based upon subjective observations made in the field by the EWUP team.

The following items are required for inclusion in the model. The storage versus the elevation relationship for all the *mesqas* and the 3 sections of the Daqalt canal. These should be tabulated and for the initial model formulated into a mathematical expression. The *mesqa* storage versus elevation relationships can be determined directly from the cross sectional survey data.

The storage versus elevation in the Daqalt will be found using the backwater curve program. It is assumed that each *mesqa* receives its allocation or a direct proportion of its allocation under all conditions. This assumes that the objective of equitable distribution is achieved. The improvement program will resize the outlets to achieve this or will install a different outlet and gates to be able to adjust for equitable distribution. Therefore, the backwater curves for several discharges will be developed and the calculations will be

storage in the canal. This storage would then be a function of the discharge and would provide the elevations at all the stations along the canal.

The irrigation demand as a function of time must be developed for each *mesqa*. This will be required for several different crop patterns and crop water requirements. The information has been collected and/or developed by the KES team. For the first cases just the maximum requirement is needed. For example, take one *mesqa*. This will indicate the volume of irrigation water required for a day or for the period the model will simulate. The numbers of *saqias* and pumps on the *mesqa* will be counted and the demand formulated for the period on a two-hour basis. Suppose the *mesqa* had 4 pumps ($Q_p = 0.05 \text{ m}^3/\text{s}$) and 8 *saqias* ($Q_s = 0.025 \text{ m}^3/\text{s}$), and that where the farmers started irrigating in the morning that for the first 2 hours, 2 pumps and 4 *saqias* were operating. The next 6 hours, all units were pumping and then the next 2 hours, 8 *saqias* and 2 pumps operated and they all stopped pumping after that until the next day. The required volume of irrigation water supplied would be the area under the demand curve shown in Figure and are:

$$D_{0-2} = [4(0.025)+2(0.05)][2 \text{ hrs (3600 sec/hr)}] \\ = 0.2 [7200] = 1440 \text{ m}^3$$

$$D_{2-6} = [8(0.025)+4(0.05)][6(3600)] = 0.4[2160.0] = 8640 \text{ m}^3$$

$$D_{6-8} = [8(0.025)+2(0.05)][2(3600)] = 0.3[7200] = 2160 \text{ m}^3$$

$$D_{8-24} = 0$$

$$\text{Total water volume} = 12240 \text{ m}^3$$

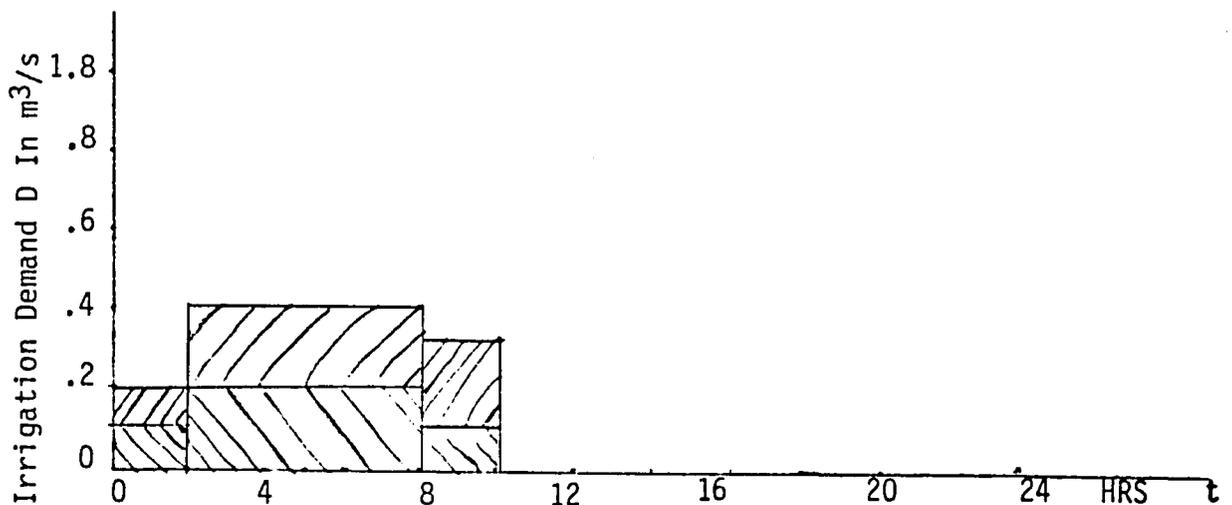


Figure 1. One *mesqa* irrigates demand curve for one day.

The discharge relationship for the regulators has been developed as a function of difference in heads upstream and downstream and of the gate opening. This information will be required as input for the operations procedures. The relationship will be required as a function of time if the gate is opened or closed during the simulated period of operation. This is accomplished by making the gate opening a function of time and assuming the discharge coefficient remain constant.

$$Q = K (G.O.) (W) \sqrt{E_{us} - E_{ds}}$$

where,

- K = discharge coefficient
- G.O. = gate opening
- W = width of gate
- E_{us} = upstream head
- E_{ds} = downstream head

The gate opening time relationship may require a trial and error effort to determine the correct sequence to supply water to all sections of the canal with as equitable distribution as is possible. Conversely, we may want to specify the discharge as a function of time and determine what the gate opening should be to supply the discharge as specified.

The program can be termed a routing or operations program. It attempts to include the effect of lag time in the system. It should demonstrate the difficulties of operation of the system and the possible means to overcome those difficulties. Briefly, the model will work as follows:

The initial conditions will be established and input to the model. Model operation will begin with a change in one of the parameters, for example, the irrigation demand. The time interval of the model will be 2 hours initially. The 2 hour period is based upon review of water level charts at the regulators. It appears that the lag time between regulators is about 2 hours. This would also correspond to a velocity on the order of 0.5 m/s. Consider a similar change in the *mesqa* demand that only occurs for 2 hours. Therefore, the first two hour period would reflect the initial conditions. If the irrigation water demand function indicated a change in the second 2 hour period that change would only be reflected in the *mesqa* as a change in storage and a change in water surface elevation in the *mesqa* during that same two hour period. The next two hour period, this change would be reflected in the

Daqalt canal as a difference in discharge because of the lower head in the *mesqa* and only in the canal section from which the *mesqa* is supplied. It would also result in a change in the *mesqa* discharge because of the change head in the *mesqa*. The following two hour period, the change in storage in the affected section of canal would indicate a change in water surface elevation and would be reflected to the adjacent sections of the main canal and back to the *mesqa* again. This would continue until some time where the change in water surface was established by a tolerance level between the preceding and present water levels or discharges.

The assumptions used to develop the model will be that the change in storage is reflected by a uniform change in the water surface throughout a section of the canal. The storage elevation relationship for the Daqalt canal will be based upon uniform flow between *mesqas* and determined from the backwater curve for the total flow downstream from the regulators and assuming the flow to the *mesqas* is proportionately divided. This is because of the slow response of the canal system to changes in discharge/water surface elevations.

The factors that drive the program are the storage elevation relationships for the three sections of the Daqalt canal and the 24 *mesqas*, and the discharge relationships for the regulators, tail escape, and the outlets to the *mesqas*.

Initially, the formulation of the model will consider summing all the *mesqas* in a section into a simple lumped storage/elevation function. This procedure is to reduce the complexity of the program. However, it increases the complexity of formulating the storage elevation relationship. The data input for the one *mesqa* model would be much less than for the case of 24 *mesqas*.

The program should be used as a tool to evaluate the system as a function of time, and to forecast the results of changes that could be made to the system. These changes could be in the form of controls such as gates, or in gate operations, or in changes in crop patterns and seasonal crop water requirements, or in canal changes which effect the canal storage.

Conclusions and Recommendations

The data, observations ^{sufficient} and information obtained by the Kafr El-Sheikh team are efficient to develop the model discussed in this report. The storage elevation relationship must be formulated from the original data obtained for the *mesqas* and Daqalt canal and the backwater computer program developed for FWUP. The decision to use all the *mesqas* or to lump the *mesqas* for one canal sector together into one relationship per sector must be made as experience with the program develops. One constraint may be computer capacity if all *mesqas* are incorporated into the model. This constraint will not be known until the program is written and executed.

The program, when completed, should provide a method of evaluating the changes in canal geometry, regulation gate operations, demands for irrigation water, and effects of weeds on maintenance. This effort will require the assistance of all team members.

The model should be viewed as one of the tools to forecast demands to simulate operations that satisfy the demands, and to evaluate changes in design and storage. Future requirements must be based upon a water supply keyed to the measurement of water discharges and, thus, volumes which are supplied at the correct time to meet the demands that occur and that can be forecast. The supply of water can not be based upon a water level measured near the regulator and set by a gate operator who has no knowledge of the response of the system or the true water demands. Presently, water level settings reflect conditions that occurred 2 to 6 hours prior to the change.

Several things may be required to improve operation of the systems. Training, communications, and transportation are all key elements of an efficient and productive water supply system. Training of the gate operators and technical information transfer are required to provide knowledgeable, informed technician. Improved telephone communications or even frequency modulated (FM) hand held radios will allow data and information to be transferred from the field or gate to the irrigation engineers office so decisions can be made in a timely manner. Transportation improvements such as improved paths or roads

included in the program to determine the to gates and *mesqas*, as well as some type of transportation such as a bicycle, will be required to improve the operation and response of the systems.

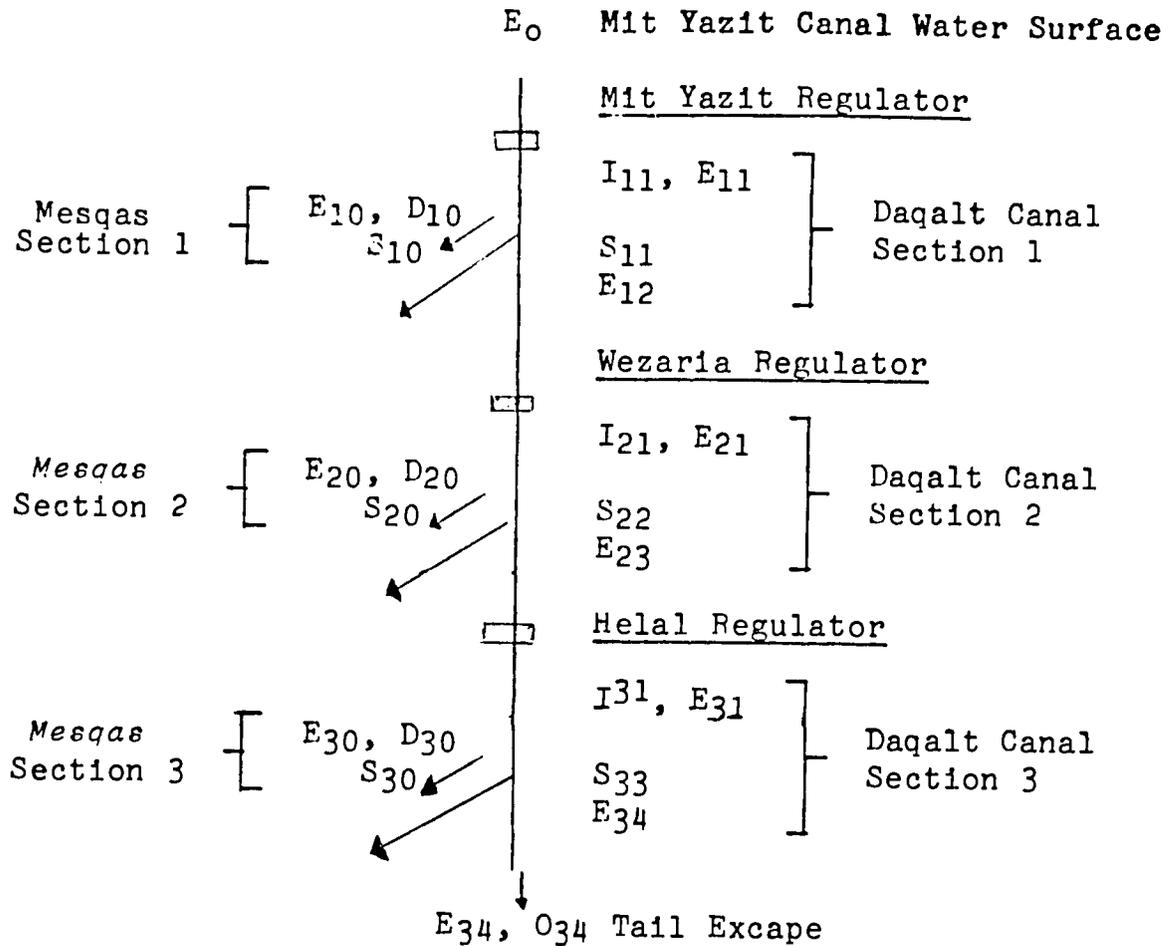
If this model is successfully developed to evaluate the operator and response of the Daqalt canal, it can be used for other systems also. Each canal will have to studied and evaluated to determine its response time and to determine its storage capacity - elevation relationship, but a minimal amount of data would be needed to provide a predictive tool for water management decisions throughout Egypt.

cc: E. V. Richardson

APPENDIX A

Daqalt Canal Irrigation Water
Routing Program

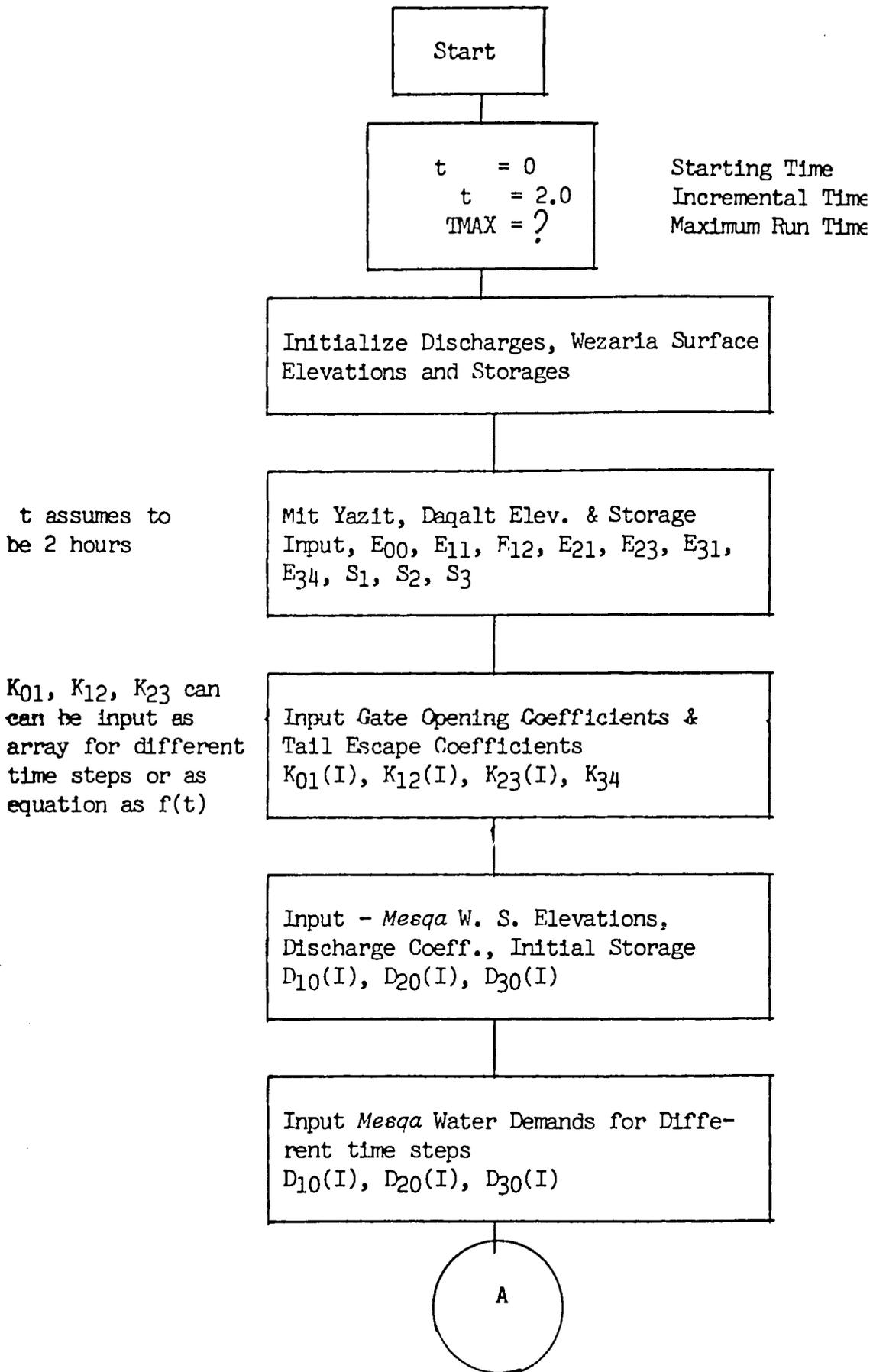
A schematic representation of Daqalt is shown below with an definition of the variables following:



Definition of variables shown in schematic figure:

- E_0 = water surface elevation in Mit Yazit Canal in (m)
- E_{11} = water surface elevation downstream from Mit Yazet Regulator in (m)
- E_{12} = water surface elevation upstream from Wezaria Regulator in (m)
- I_{11} = inflow to section 1 in (m^3/s)
- S_{11} = storage in section 1 canal in (m^3)

- E₁₀ = Water surface elevation in *mesqa* (s) in section 1
in (m)
- D₁₀ = Demand for irrigation water in section 1 in (m³/s)
- S₁₀ = Storage in *mesqa* (s) in section 1 in (m³)
- E₂₁ = Water surface elevation downstream for Wezaria
Regulator in (m)
- E₂₃ = Water surface elevation upstream from Helal
Regulator in (m)
- I₂₁ = Inflow to section 2 in (m³/s)
- S₂₂ = Storage in section 2 in (m³)
- E₂₀ = Water surface elevation in *mesqa* (s) in section 2
in (m)
- D₂₀ = Demand for irrigation water in section 2 in (m³/s)
- S₂₀ = Storage in *mesqa* (s) in section 2 in (m³)
- E₃₁ = Water surface elevation downstream from Helal
Regulator in (m)
- E₃₄ = Water surface elevation upstream from tail escape
in (m)
- I₃₁ = Inflow to section 3 in (m³/s)
- S₃₃ = Storage in section 3 in (m³)
- E₃₀ = Water surface elevation in *mesqa* (s) in section 3
in (m)
- D₃₀ = Demand for irrigation water in section 1 in (m³/s)
- S₃₀ = Storage in *mesqa* (s) in section 3 in (m³)
- O₃₄ = Discharge flowing out tail escape in (m³/s).



(B)

If $t = 0$ then go to 1000
(may have to use $t < 0.01$)

Calculate Changes

Calculate Change for New Storage in Each *Mesqa*

$$S_{10} [I_{10}(I) - D_{10}(I)] \Delta t; S_{10} = S_{10} + S_{10}$$
$$S_{20} [I_{20}(I) - D_{20}(I)] \Delta t; S_{20} = S_{20} + S_{20}$$
$$S_{30} [I_{30}(I) - D_{30}(I)] \Delta t; S_{30} = S_{30} + S_{30}$$

From Tabulation of Data or Equation Relating Storage and Elevation, Determine Elevation in *Mesqas*

$$S_{10} \rightarrow E_{10}$$
$$S_{20} \rightarrow E_{20}$$
$$S_{20} \rightarrow E_{20}$$

(C)

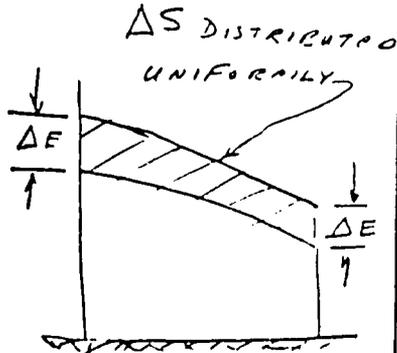
C

May want to include evaporation and canal losses

Calculate New Storage in Daqalt

$$S_{11} [I_{01}(I) - D_{10}(I) - I_{21}(I)] \Delta t; S_{10} = S_{10} + S_{11}$$

$$S_{22} [I_{21}(I) - D_{20}(I) - I_{31}(I)] \Delta t; S_{22} = S_{22} + S_{22}$$

$$S_{33} [I_{31}(I) - D_{30}(I) - O_{34}(I)] \Delta t; S_{33} = S_{33} + S_{33}$$


Determine New Water Surface Elevations from Storage Vs Elevation Curves

S_{11}	\longleftrightarrow	E_{11} & E_{12}
S_{22}	\longrightarrow	E_{21} & E_{23}
S_{33}	\longrightarrow	E_{31} & E_{34}

Comment: If you use all *mesqas*, you could take D/s water level and run backwater curve - compare storage with that calculated above and adjust elevation - rerun B.W. curve. Continue to adjust to some tolerance and then use elevations at each *mesqa* determined from B.W. curve to calculate discharges to *mesqas*.

1000

Print Values

t = hours

Mit Yazit Water Surface Elevation $E_{00} = \underline{\hspace{2cm}} \text{ m}$

<p style="text-align: center;"><u>Mesqas</u></p> <p style="text-align: center;"><u>Section 1</u></p> <p>$E_{10} = \underline{\hspace{2cm}} \text{ m}$ $D_{10} = \underline{\hspace{2cm}} \text{ m}^3/\text{s}$ $S_{10} = \underline{\hspace{2cm}} \text{ m}$</p> <p style="text-align: center;"><u>Section 2</u></p> <p>$E_{20} = \underline{\hspace{2cm}} \text{ m}$ $D_{20} = \underline{\hspace{2cm}} \text{ m}^3/\text{s}$ $S_{20} = \underline{\hspace{2cm}} \text{ m}^3$</p> <p style="text-align: center;"><u>Section 2</u></p> <p>$E_{30} = \underline{\hspace{2cm}} \text{ m}$ $D_{30} = \underline{\hspace{2cm}} \text{ m}^3/\text{s}$ $S_{30} = \underline{\hspace{2cm}} \text{ m}^3$</p>	<p style="text-align: center;"><u>Daqalt Canal</u></p> <p style="text-align: center;"><u>Section 1</u></p> <p>$E_{11} = \underline{\hspace{2cm}} \text{ m}$ $E_{12} = \underline{\hspace{2cm}} \text{ m}$ $I_{11} = \underline{\hspace{2cm}} \text{ m}^3/\text{s}$ $S_{11} = \underline{\hspace{2cm}} \text{ m}^3$</p> <p style="text-align: center;"><u>Section 2</u></p> <p>$E_{21} = \underline{\hspace{2cm}} \text{ m}$ $E_{23} = \underline{\hspace{2cm}} \text{ m}$ $I_{21} = \underline{\hspace{2cm}} \text{ m}^3/\text{s}$ $S_{22} = \underline{\hspace{2cm}} \text{ m}^3$</p> <p style="text-align: center;"><u>Section 2</u></p> <p>$E_{31} = \underline{\hspace{2cm}} \text{ m}$ $E_{34} = \underline{\hspace{2cm}} \text{ m}$ $I_{31} = \underline{\hspace{2cm}} \text{ m}^3/\text{s}$ $S_{33} = \underline{\hspace{2cm}} \text{ m}^3$</p>
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Tail Escape

$E_{34} = \underline{\hspace{2cm}} \text{ m}$
 $O_{34} = \underline{\hspace{2cm}} \text{ m}^3/\text{s}$
Volume Out = $O_{34} * t = \underline{\hspace{2cm}} \text{ m}$

Increment Time
 $t = t + t$

If t < TMAX then go to 200
If t > TMAX then stop