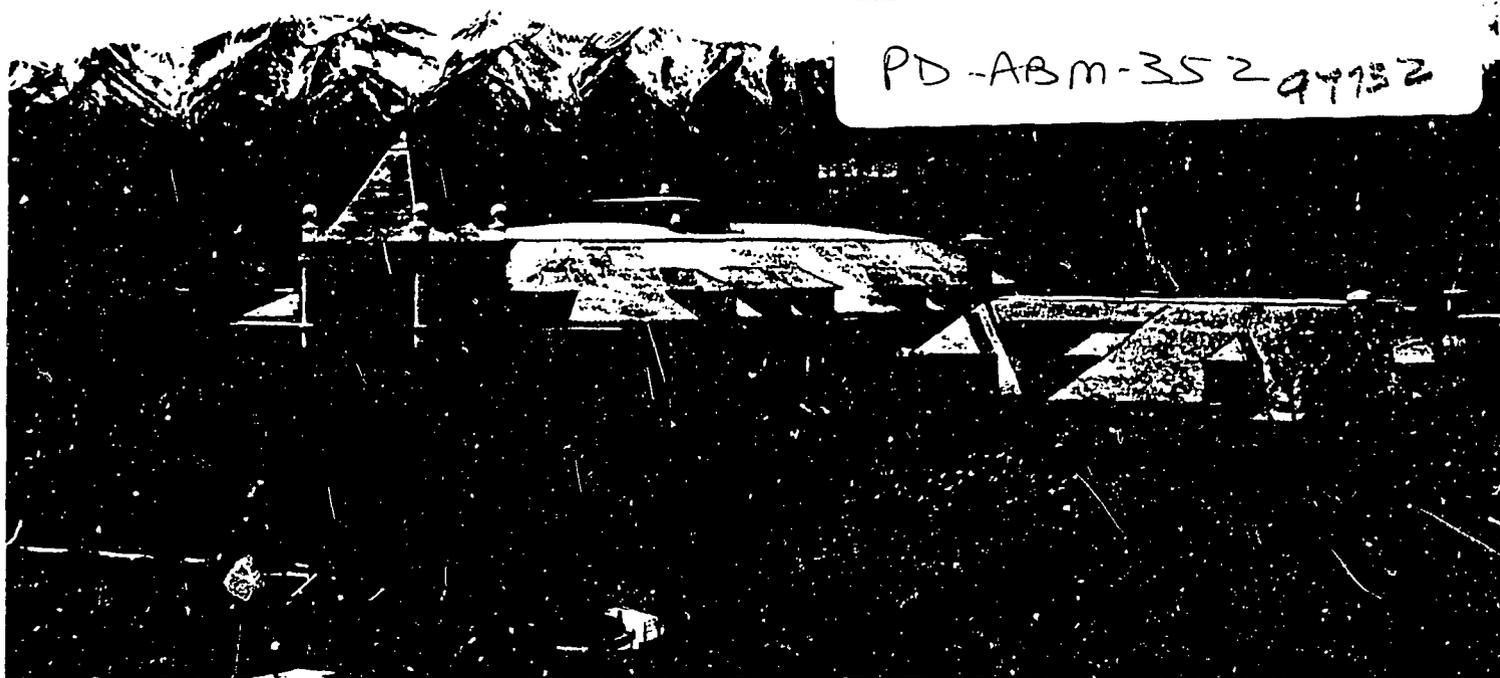


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## Final Report

Submitted to

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by

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Utah State University, Logan, Utah

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## **Introduction**

Cooperative Agreement (CA) No. 263-0132-C-00-4038-00 between the U.S. Agency for International Development (USAID) and Utah State University (USU) was signed August 1, 1994. It was written to cover the period of April 1, 1995 through September 21, 1995. On October 16, 1995, the ending date of the agreement was extended to November 15, 1995.

The effort summarized by this report began on April 27, 1992 under Contract No. 1425-2-CS-81-17000 with the Bureau of Reclamation, U.S. Department of the Interior. The Bureau was participating in the Planning Studies and Models (PSM) component of the Irrigation Systems Management (ISM) Project under a PASA agreement with USAID. The original contract period was from April 27, 1992 to September 21, 1995. In the spring of 1994, the PASA agreement with the Bureau of Reclamation was terminated and USAID assumed the USU contract. During the period from about April to June, the USU Project Coordinator and the USAID Project Officer initiated a series of discussions regarding revisions to the contract work plan. USAID decided to change the contract to a cooperative agreement, and together with a revised work plan, initiated this agreement August 1, 1994. As noted, the agreement extended from April 1, 1994 to allow USU to recover the project costs incurred during the transition.

This report is described in the CA, Section 1E.2.(l) with specific contents enumerated under Sections 1E.2.(b) through Section 1E.2.(f). To be consistent with the CA and to simplify the review by USAID, the sections in this report will be labeled in the same fashion. The contents of each section are drawn from earlier USU submissions, however, to present this report in a coherent format, these original documents have been edited and summarized herein as appropriate.

## **Section 1.E.2.(b) Annual Workplan**

### **1. Software Maintenance**

As part of this CA, the Planning Distribution Model (PDM), the Command Area Model (COMMOD), the STEADY Hydraulic Simulation Model (STEADY), the CANALS Canal Hydraulic Simulation Model (CANALS), and the Water Management Model (WMM) software will continue to be maintained by USU. USU will correct errors in the software as they are discovered, and will attempt to accommodate recommended additions to the PDM and COMMOD.

### **2. Model Evaluation in Bahr Mashtoul**

USU will work with its two local contractors and the Planning Sector (PS) to obtain additional calibration data from the Bahr Mashtoul pilot area for completion of PDM evaluation

work<sup>1</sup>. This will include completion of the calibration of seven mobile telemetry sites at Bahr Mashtoul. Most of the data collection and all of the field calibration work will be performed by USU's local consultants and by the PS. However, USU will be actively involved in the analysis and modeling application of these data.

Evaluation of the PDM in Bahr Mashtoul will include comparisons of model-generated water requirements with measured hydrographs from the mobile telemetry sites. Calculated crop water requirements from the PDM will be compared to COMMOD results. Output will include an analysis of current operational practices in Bahr Mashtoul and possible areas of improvement. The evaluation of the PDM in Bahr Mashtoul will take place in five steps: (1) "desktop" evaluation to check feasibility of results; (2) initial calibration; (3) final calibration; (4) analysis of operational scenarios; and (5) suggest improved operating procedures. USU will write a report that summarizes the evaluation process and provides results and conclusions of the PDM evaluations in Bahr Mashtoul, and application of the PDM in the Sharkia Directorate.

In evaluating the PDM and COMMOD software, simulations will include parameter variations to establish the sensitivity of results to key input and assumptions. In applications beyond the Sharkia and Bahr Mashtoul studies under this contract, it is likely that some data would not be available without considerable cost. The sensitivity analysis will be used to forecast and assess the consequences of data that would have to come from other areas, country-wide conditions, or experiential sources rather than direct field measurements. The accuracy and applicability of the software to both small and large scale evaluations can be evaluated under this analysis.

### **3. Irrigation Command Area Study**

#### **a. Draft Operations Manual for the Sharkia Command Area**

USU will prepare a draft operations manual that will include:

- i. Detailed procedures for operation of the Bahr Mashtoul command area, prepared on the basis of recommended improved operating procedures developed under the model evaluation activity (see 2 above); and
- ii. Detailed procedures for operating the "main stem" of the system, including the Bahr Mowais/Hanoot and Bahr Akhdar/Faqoos/Samana canals.

The Bahr Mashtoul operations manual will serve as an example of how Directorate staff could, over time, expand the manual to include operating procedures for all lateral canals in the

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<sup>1</sup>In order to facilitate field data collection needed for the model evaluations, USU initiated two subcontracts with professors at Zagazig University and Cairo University. These individual and their staffs then assisted USU and the PS in collecting the necessary field data. Two open file reports summarizing the data are available in the PS and USAID/Cairo.

system<sup>2</sup>.

These steps will be followed in developing the manual:

- i. Improved operating procedures will be developed. This will be done within the framework described in Annex 2<sup>3</sup>. The procedures will also reflect the availability of telemetry data.
- ii. The improved operating procedures identified in step 1 will be articulated in the form of a comprehensive step by step procedures for operations. This will include all procedures for planning, monitoring, decision-making, etc.
- iii. On the basis of the improved technical procedures noted in step 2 above, organizational responsibilities will be described for all MPWWR staff involved in Sharkia "main stem" operations, as well as those involved in Bahr Mashtoul canal operations (see Annex 3, attached)<sup>4</sup>.
- iv. Also on the basis of the improved technical procedures developed, the manual will briefly present the policy framework for system operations, and related operational objectives (see Annex 3).

USU will collaborate with others involved in improving operations in the Sharkia command area in accordance with guidance from USAID. It is understood that this may include staff from the IMS Project MSM component and Harza Engineering, staff from the International Irrigation Management Institute, and staff from the IMS Project IIP component and Louis Berger International. Although these organizations may provide information that will assist USU in completing the operations manual, USU understands that it is fully responsible for manual preparation regardless of whether or not others provide useful input.

Regarding step 1 above, USU will determine the extent to which the MSM telemetry data are useful in day-to-day irrigation water delivery operations for the Sharkia Directorate. USU will study a variety of options and possibilities for use of the telemetry data in daily irrigation system operations. Of these, USU intends to explore the idea of using "wedge storage" in the conveyance and distribution system to facilitate daily operations and delivery adjustments (see Annex 2). In this

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<sup>2</sup> Annex 1 of the original workplan presented a brief statement outlining the purposes of the draft operations manual. This annex is included in this report by reference since it is fully developed in the project report "Improved Operating Procedures Manual for the Sharkia Directorate," November 1995.

<sup>3</sup> Annex 2 of the original workplan presented a framework outlining a strategy for improving water management in the delivery system of Egypt. This annex is included in this report by reference since it is fully developed in the project report "Opportunities for Improving Water Management in the Sharkia Command Area," November 1995.

<sup>4</sup> Annex 3 of the original workplan briefly outlined a series of organizational and policy improvements that could be evaluated in terms of improved operational practices in the Sharkia Directorate. This annex is included in this report by reference since it is fully developed in the project report "Opportunities for Improving Water Management in the Sharkia Command Area," November 1995.

way, the water levels currently available (and those that will be available at new sites in the coming months) from the telemetry system can be used to estimate volumetric storage in canals and drains, given approximate channel cross-sections and elevation indices at each telemetry site. Storage capacities for the major canals in the Sharkia Directorate will be estimated using existing data sources. It is envisioned that this approach would allow the telemetry data to be used almost "as-is" without requiring hydraulic calibrations for discharge measurement.

On the basis of this assessment, a methodology will be formulated for integration of telemetry system data into other management processes. This methodology will then be incorporated into the draft operations manual.

#### **b. Command Area Study Report**

After completing the draft operations manual, USU will prepare a report that, as stipulated in the CA:

- i. summarizes the analyses undertaken;
- ii. related to (3.a.i) above, specifically discusses the suitability of the MSM telemetry system for use in day-to-day command area operations; and
- iii. suggests general operational procedures that can be applied to other command areas in Egypt.

At this stage, it appears that the suggestions noted in (3.b.iii) above will be a refinement of the concepts contained in Annex 2.

USU will undertake and include in a report a discussion of the potential impact of using the Planning Distribution model (PDM) for analysis, planning, and operation of command areas the size of Bahr Mashtoul and Sharkia. To demonstrate the level of this potential impact, USU will undertake and include in the report a comparative analysis of the value of agricultural production in both Bahr Mashtoul and the entire Sharkia command area for the following situations:

- i. Existing operational procedures, as they can best be described and incorporated in the PDM by USU with assistance from Directorate staff; and
- ii. Improved operational procedures provided in the draft operations manual.

In both cases, and at the level of both command areas, USU will use the PDM to determine the value of agricultural production for either the winter or summer growing seasons (or both) for a selected one year period. The results and conclusions will be provided in the report.

To facilitate applications and extensions of the PDM software to other command areas in Egypt, the report will include estimates of various implementation costs, including the costs of collecting necessary field data.

#### **4. Coordination of Colorado State University (CSU) Subcontracts<sup>5</sup>**

The two CSU subcontracts will allow continuation of the previous IPA work in Egypt by each of the respective parties. USU will provide administrative, but not technical oversight to the CSU subcontractors, and will forward reports and requests for information to the PS and USAID.

#### **5. Training on Model Application**

USU will organize training workshops during trips to Egypt for the purpose of establishing in-country capability for application of the models. Between trips these training activities will be conducted by USU's local contractors (Drs. Mohamed Fawzy Helwa and Talaat Owais) who are responsible for collecting and analyzing some of the required modeling data. Details on training responsibilities of the local contractors are provided in their respective contracts with USU (see Annex 4)<sup>6</sup>. The training workshops will emphasize practical application of the models in Egypt.

Training on the application of PDM and COMMOD will take place in November 1994 (3 days on the PDM), January 1995 (3 days on COMMOD), March 1995 (3 days in Zagazig, in the Sharkia Directorate), and in the August 1995 during trips to Egypt by Merkley, Hill, and Walker. In between these trips, and in conjunction with these trips, the two local consultants to USU will hold brief workshops (in addition to any informal exchange) at the PS in Imbaba and in the Sharkia Directorate to update PS and other invited personnel on the progress of data collection and analysis work, and to assist PS personnel in their own data collection and analysis activities. One visit to USU will be undertaken by an engineer from the PS group to evaluate the PDM during the preparation of the final reports.

#### **6. Travel Schedules**

The travel schedules are subject to change on the basis of mutual agreement between USU and USAID and are summarized below. Table 1 gives the estimated personnel time for each trip.

##### **a. Summary of Trip Objectives**

##### Aug 94 Merkley and Hill

**Purpose:** Initiate discussions with PS and USAID about the terms of reference for one or more local consultants, who would be responsible for some data collection tasks; identify possible

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<sup>5</sup>There were several parallel efforts under the Bureau of Reclamation PASA agreement similar to USU's contract. Two of those with Colorado State University. To continue these, USAID included funds in the USU CA for these activities which were then subcontracted to CSU. The CSU reports and a brief summary of progress are given in later sections.

<sup>6</sup>Appended by reference. The full text of the subcontracts are available in the offices of USAID/Cairo and at USU.

candidates for local consultant contract(s); collect weather, salinity, and other data from the field; to settle various contracting issues with USAID; and meet with PS engineers to discuss applications of the USU models.

Training: Only informal training of PS staff will be conducted during this trip. This will include issues related to model designs, application, data requirements, and interpretation and analysis.

Table 1. Estimated Personnel Time for Project Travel.

Dates	Personnel	In-Country (days)	
		Working	Total
Jul 94	Merkley	12.0	15.0
	Hill	12.0	12.0
Nov 94	Merkley	12.0	15.0
	Walker	3.0	4.0
Jan 95	Hill	12	15
Mar 95	Merkley	12.0	15.0
	Hill	12.0	15.0
Jun 95	Engr. Mosen	12	15
Sep 95	Merkley	12.0	15.0
	Hill	12.0	15.0
	Walker	7.0	8.0

Nov 94 Merkley and Walker

Purpose: Complete the contract with Dr. Fawzy Helwa; negotiate a second contract with a consultant in the Sharkia Directorate; install a new version of the PDM; discuss problems in application of the PDM with PS staff; conduct a 3-day training course on the new version of the PDM; collect additional data for the PDM and COMMOD, including new weather data from the Bahr Mashtoul station; and discuss contractual and budgetary issues with USAID.

Training: Conduct a 3-day workshop on the design and application of the PDM, including data requirements and hands-on experience with the model. Also, update workshop participants on the status of data collection for the Sharkia Directorate, and to deliver a slide set to the PS for future training exercises with the PDM by the PS.

Jan 95 Hill

Purpose: Complete the contract with Dr. Talaat Owais; to review the progress of Dr. Helwa and Dr. Owais on data collection; conduct training on the COMMOD software, with participation

from Drs. Helwa and Owais; collect additional weather and other data from the Sharkia Directorate; meet with MPWWR and other officials to obtain information about the irrigation system operation, and about the MSM project; take care of minor contractual issues with USAID; and meet with PS officials and PC engineers about USU progress and any current problems.

Training: Conduct a 3-day workshop on the design and application of the COMMOD software, including data requirements and hands-on experience with the model. Also, update workshop participants on the status of data collection for the Sharkia Directorate, with participation from the local consultants, Drs. Helwa and Owais.

#### Mar 95 Merkley and Hill

Purpose: Meet with USAID about USU progress and contract issues; meet with PS officials about USU progress and any current implementation problems; work on draft reports; meet with Drs. Helwa and Owais on data collection progress; and collect additional weather and other data from the Sharkia Directorate.

Training: Conduct a joint training workshop in Zagazig with Drs. Helwa and Owais (and their colleagues) on progress of data collection for the Sharkia Directorate; and on future activities. The training will also include an overview and update of the current versions of PDM and COMMOD.

#### Jun 95 Engineer Mosen

Purpose: To assist USU in evaluating the PDM and COMMON software in preparation for final revisions and corrections. Data being used to evaluate the software will also be reviewed and assistance will be given to sensitivity analyses.

Training: One-on-one.

#### Sep 95 Merkley, Hill and Walker

Purpose: Finalize all three of the project reports; meet with USAID about USU progress and contract issues; to meet with PS officials about USU progress and any current implementation problems; meet with Drs. Helwa and Owais on wrapping up data collection; and collect final weather and other data from the Sharkia Directorate. USU will submit copies of its draft final reports prior to the visit and then present final results of the PDM evaluation and the operations manual during the visit. Revisions to the reports will be made during the trip and final copies submitted shortly thereafter.

Training: Conduct a workshop on the results of the PDM and COMMOD evaluations in Bahr Mashtoul and the Sharkia Directorate, on the results from the other studies on irrigation systems operations and use of MSM telemetry data, and on application of the models in Egypt.

## **7. Project Milestones**

### **a. Evaluation of the PDM in Bahr Mashtoul**

- Aug 94 Resume data collection and analysis on Bahr Mashtoul. Resume model testing and validation.
- Jun 95 Completion most of the data collection. Finish first draft of the report.
- Jul 95 Work on modifications to the report.
- Aug 95 Finish the report.

### **b. Draft Operations Manual for the Sharkia Directorate**

- Jul 94 Conduct preliminary interviews and collect some data to determine current operational practices. Begin collecting data to run the PDM for the Sharkia Directorate.
- Jan 95 Continue data collection and analysis, and concurrent testing of the PDM for various operational scenarios. Begin formulation of a draft of the manual.
- Mar 95 Develop a draft of the manual on operation of the irrigation system in the Sharkia Directorate.
- Jul 95 Finish the revised draft operations manual.
- Sep 95 Terminate analysis activities. Finish the final draft operations manual.

### **c. Command Area Study Report**

Note: The activities leading to the finalization of this report parallel and are the same as those in (b), above.

- Jul 95 Develop a the draft report.
- Sep 95 Finish the revised report.

## **Section E.2.(c) Quarterly Reports**

### **1. April 1, 1994 - June 30, 1994**

#### **Activities and Accomplishments**

a. A USU graduate student, Mr. Somkiat Prajamwong, worked on the project in Cairo from January 20 through April 29, 1994, then returned to USU at Logan, Utah. This student is the principal programmer for the COMMOD software, and his responsibilities in Egypt included training of MPWWR and other Egyptian engineers, final development and testing of the software, and assistance with data collection and analysis for all of the USU models delivered under the project. The student worked with Dr. Gary Merkley to complete the user's manual and technical

documentation for the COMMOD software. This was sent to USAID/Cairo on June 3. The COMMOD software was further reviewed and tested in Logan, Utah after the student's return from Cairo.

b. USU corresponded with USAID on the drafting of a cooperative agreement to complete the ICM and PDM software, evaluate the PDM and COMMOD packages, develop an operations manual for one command area, determine suitability of the MSM telemetry data in daily operations, identify general operational improvements in the irrigation system, and coordinate with their continuing IPA work. An agreement was reached on the scope of work in mid-June.

c. The USAID Project Officer, Mr. Russel Backus, visited USU in Logan, Utah on June 20 to coordinate administrative and procedural details under the new cooperative agreement between USAID and USU. USU personnel met with the Project Officer for approximately 2½ hours. The specific issues discussed included how to handle the IPAs with Colorado State University, definition and clarification of program objectives, implementation details to achieve the objectives, and contracting of a local engineering consultant in Egypt.

d. Dr. Gary Merkley, performed various programming corrections and modifications to the PDM on an intermittent basis from April through June. New additions to the model included a zoom-in feature for the system layout display, and a node summary window. The new additions were made at the request of the MPWWR.

### Future Activities

a. Dr. Merkley and Dr. Robert Hill have made arrangements to travel to Egypt in mid-July to consult with USAID officials, MPWWR officials, MSM project personnel, and candidates for a local technical consultant to support USU's work in Egypt. Drs. Merkley and Hill will also plan to travel to the Bahr Mashtoul site near Zagazig in the delta to meet with local MPWWR officials, inspect the weather station and seven mobile MSM stations, and retrieve data from the weather station. It is also expected that an agreement can be reached on the location of a command area for application of the models before they leave Egypt.

b. Dr. Merkley has begun adding direct printing capability to the PDM, and will continue work on this feature through July and August. It will be possible to print simulation results directly in tabular form, and it may also be possible to directly print graphical results. Work will be initiated for three other features, as requested by the MPWWR, on the following items:

- i. Editing of system layout node coordinates in a user-definable coordinate system.
- ii. Ability to link supply system terminus nodes to supply system return flow nodes (e.g. to accommodate the return flow from Bahr El Hagar in the Bahr Mashtoul area).
- iii. Ability to route excess water from command area and M&I nodes back into the supply system (rather than having the water enter drains).

## Difficulties

None to report.

## Cumulative Expenditures

Table 2 shows the USU expenditures during the quarter. To provide a point of reference, the final CA budget is shown in Table 3.

Table 2. Expenditures April 1 1994 - June 30, 1994.<sup>7</sup>

<b>Budget Category</b>	<b>Cost</b>
Personnel	\$42912.71.00
International Travel	\$21,723.73
Other Direct Costs	\$2,998.78
Subcontracts	
CSU - Groundwater	\$0.00
CSU - Nile River	\$0.00
Helwa	\$0.00
Owais	\$0.00
Total Subcontracts	\$0.00
Equipment	\$0.00
Total Direct Costs	\$67,635.22
Indirect Costs	\$22,951.09
<b>TOTAL</b>	<b>\$90,586.31</b>

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<sup>7</sup>The CA budget was revised several times during the course of the agreement. These figures are referenced to the final budget. The subcontracts with CSU and the local consultants were initiated later and therefore do not show any expenditures during this time period.

Table 3. Final CA Budget .

<b>Budget Category</b>	<b>Cost</b>
<b>Personnel</b>	
Staff	\$77,166.14
Staff Benefits	\$34,531.83
Students	\$9,000.00
Overseas Personnel	\$22,526.84
<b>Total Personnel</b>	<b>\$143,224.81</b>
<b>International Travel</b>	<b>\$66,413.48</b>
<b>Other Direct Costs</b>	
Printing/Publishing	\$2,337.60
Telephone/Fax	\$3,097.34
Misc. Supplies	\$2,564.76
Shipping/Mailing	\$2,830.75
<b>Total Other</b>	<b>\$10,830.45</b>
<b>Subcontracts</b>	
CSU - Groundwater	\$99,067.00
CSU - Nile River	\$99,488.00
Helwa	\$23,100.00
Owais	\$24,700.00
<b>Total Subcontracts</b>	<b>\$246,355.00</b>
<b>Equipment</b>	<b>\$9,747.00</b>
<b>Total Direct Costs</b>	<b>\$476,570.74</b>
<b>Indirect Costs</b>	<b>\$114,429.26</b>
<b>TOTAL</b>	<b>\$591,000.00</b>

## 2. July 1, 1994 - September 30, 1994

### Activities and Accomplishments

a. Internal USU accounting procedures have been simplified by collapsing the previous task-based arrangement into a single account. This was accomplished after the signing of the CA with USAID.

b. Two separate subcontracts between USU and Colorado State University (CSU) were negotiated in August and were signed on September 1, 1995. One contract is headed by Dr. John Labadie and the other by Dr. Jose Salas, both professors of Civil Engineering. Both subcontracts represent continuations of PSM work formerly conducted under IPAs with the Bureau of Reclamation.

The subcontract with Dr. Labadie will complete work on a Decision Support System (DSS) for devising optimal strategies for minimizing the impact of drought through conjunctive use of ground and surface waters in the Nile Delta. In addition to the DSS that will be delivered and installed in the computer systems of the Planning Sector, the CSU investigators will port the software to the IBM-pc environment, refine the graphical interface, and prepare a report assessing the tradeoffs of a number of management and operational strategies in the Nile Delta. Planning Sector Staff will be trained to use the software.

The subcontract with Dr. Salas will complete work on a simulation model of the Nile River System in which several alternative techniques for estimating the parameters of the stochastic model will be developed and tested for simulating the monthly flows of the Nile River. In addition to the model and analyses thereof, the software will be delivered and installed in the computer systems of the Planning Sector. Planning Sector Staff will be trained to use the software.

As noted in the CA Workplan both of the CSU subcontracts involve continuing activities from the previous Bureau of Reclamation PASA agreement with USAID. As a result USU will monitor progress and coordinate the subcontracts but not attempt to provide technical review. Progress reports on this activity will be sent to USAID/Cairo and the Planning Sector directly. Copies sent to USU will be briefly summarize in the USU series of progress reports.

c. Dr. Merkley worked on the PDM at USU in August and September to correct various programming errors and to add new features at the request of the Planning Sector of the MPWWR. Errors that were corrected include a problem with the insertion of bifurcation nodes in the system layout, printing of graphical results, and others.

Additions to the PDM include the ability to print the system layout, the ability for M&I nodes to take water from both the supply system and groundwater, the ability to link Terminus nodes in the supply system to Return Flow nodes in the supply system, the return flow of excess water to the supply system when no drain linkage exists, and others.

Pie graphing routines in the PDM were modified to improve robustness. Previously, the 3-D pie graphs had flaws when the PDM was running under some computers. Automatic file conversion routines were added to accept old file formats from data entered on earlier versions of the model. A third version of the PDM user's guide was completed and reproduced in the last week of September.

d. Following additional testing, Dr. Merkley also made corrections to the STEADY hydraulic model in September. The STEADY user's guide has not required any changes.

e. Drs. Merkley and Hill were in Egypt on project business from July 17 through August 2, 1994. They met several times with Dr. Bayoumi Attia of the Planning Sector and Dr. Wadie Fahim of USAID to work out administrative and contract details for the Cooperative Agreement. Drs. Hill and Merkley also traveled to Zagazig twice to visit the weather station at Bahr Mashtoul and inspect the equipment, and to meet with Sharkia Directorate officials. They also traveled to Kafr El Sheik and Sakha to take salinity measurements in canals and drains, and to collect weather data from a government research station in Sakha.

#### Future Activities

a. USU has made a number of written and verbal requests to the Planning Sector of the MPWWR for suggestions on possible sub-contractors in the Zagazig area. A verbal agreement between USU, MPWWR and USAID was reached in early August in Cairo to divide the technical subcontracting tasks between a Cairo-based and a Sharkia-based consultant. There is not much remaining time to negotiate and begin this subcontracting arrangement. Therefore, during Dr. Merkley's planned trip to Egypt in November, consulting arrangements between one or more engineers in the Sharkia Directorate (possibly from Zagazig University) will be actively pursued.

b. Dr. Merkley will continue to test and debug the latest version of the PDM at USU. Two USU graduate students are also assisting Dr. Merkley in the testing of the PDM and ICM software. It is expected that a new version of the PDM will be sent to USAID in late October, together with the new version of the user's guide.

c. The new version of the STEADY hydraulic model will be submitted to USAID and the Planning Sector with the PDM in late October.

d. Dr. Merkley will travel to Egypt November 8-20, 1994. Dr. Wynn Walker will visit Egypt November 15-18, 1994. Both will attend the PSM workshop, which has reportedly been scheduled by the Planning Sector of the MPWWR for the November 16, 1994. Dr. Merkley will conduct a half-day training workshop on the new version of the PDM in Egypt, at a location to be agreed upon after consultation with the Planning Sector and USAID. He will also spend time with Planning Sector engineers and the Cairo-based consultant to assist in further progress toward data collection and analysis, and application of the PDM and COMMOD in Egypt.

e. Dr. Hill has made plans to go to Egypt in January to check on the data collection and analysis progress, conduct interviews for some of the project reports that are described in the Cooperative Agreement, and deal with administrative matters. He will conduct training on the COMMOD during this trip.

f. Following extended cost and scope-of-work negotiations, a subcontract between USU and a Cairo-based technical consultant, Dr. Mohamed Fawzy Helwa, is expected to be signed by USU in October. Dr. Helwa will review and sign the final contract with Dr. Merkley in Cairo in November. The subcontract will make Dr. Helwa directly responsible to USU for some of the data collection, data analysis, and in-country training activities required for implementation and testing of the PDM and COMMOD software in the Sharkia Directorate of the Nile delta.

### **Difficulties**

The most significant difficulty at this time is that USU is concerned with the delays in contracting with one or more local consultants to assist in the model data collection and analysis. These delays are the result of extensive consultations with USAID and PS officials, consultations that are required because of the collaborative nature of the project. It is necessary that data collection begin as soon as possible to avoid delays and inadequacies in the final reports and in the final project results.

### **Cumulative Expenditures**

A Letter-of-Credit was initiated between USU and USAID in August. Amendment No. 1 to the Cooperative Agreement was signed in October, authorizing a second installment in the incremental funding for the project. Cumulative expenditures under the CA are shown in Table 4.

## **3. October 1, 1994 - December 31, 1994**

### **Activities and Accomplishments**

a. USU finalized a subcontract with Dr. Mohamed Fawzy Helwa of the Hydraulics & Irrigation Department at Cairo University for performing data collection and analysis services for application of the PDM and COMMOD in Bahr Mashtoul and the Sharkia Directorate. Dr. Helwa has been working on the data collection activities since mid-November, and has met with PS and USAID officials regarding the work to be accomplished. At the request of Dr. Helwa, USU paid a \$5000.00 advance to Dr. Helwa in November. USU has been in frequent communication with Dr. Helwa through electronic mail services.

b. USU also initiated discussions with Dr. Talaat Owais of Zagazig University for performing data collection and analysis services for most of that which was not already covered under the Helwa contract. This was done after extensive consultations with USAID and PS officials. Dr. Owais signed the contract on November 20, and it is under review by the USU Contract & Grant

Table 4. Cumulative Expenditures April 1, 1994 - September 30, 1994.

Budget Category	Cost
Personnel	\$64,714.02
International Travel	\$26,544.06
Other Direct Costs	\$4,978.66
Subcontracts	
CSU - Groundwater	\$0.00
CSU - Nile River	\$0.00
Helwa	\$0.00
Owais	\$0.00
Total Subcontracts	\$0.00
Equipment	
Total Direct Costs	\$96,236.74
Indirect Costs	\$32,762.33
<b>TOTAL</b>	<b>\$128,999.07</b>

Office. It is fully expected that the required USU signatures on the Owais contract will be obtained in time for Dr. Hill to take an original to Egypt in late January, with copies for USAID and the PS.

c. USU requested bids from several computer vendors for the purchase of three identical computers with the following technical specifications: Intel 60 MHz Pentium microprocessor, 16 MB DRAM (70 ns SIMMS), 256 KB SRAM cache, 730 MB IDE 10 ms hard disk drive with 128 KB multi segmented cache buffer, PCI local bus, double-speed CD-ROM drive, 5.25-inch and 3.5-inch diskette drives, 17-inch color monitor, full tower case with 145 watt power supply, 124-key keyboard, Microsoft mouse, mouse pad, and various software, including MS DOS 6.22 and MS Windows 3.11. Three computers were ordered from the winning bidder, Gateway 2000, in late December 1994, and the computers are scheduled to be shipped to USU on or about January 20<sup>th</sup>.

d. Drs. Walker and Merkley discussed several contractual, budgetary, and procedural issues with USAID officials while in Egypt in November. Besides this, frequent USAID-USU communication has been maintained through phone calls, faxes, and electronic mail.

e. Dr. Merkley worked on the PDM during much of the month of October, adding new features and making corrections to the software where necessary. New features included: ability to directly print the system layout schematic; ability to link supply system terminus nodes to supply system return flow nodes; and M&I nodes can now take water from wells and or surface supplies.

All of the new features were at the request of the PS staff engineers, but most of the corrections were for errors discovered by USU during continuing testing of the software. Additional work on the PDM was accomplished in November while he was in Egypt, and at USU during the month of December.

f. Dr. Merkley was in Cairo from November 8 - 20, 1994 to coordinate with USAID and the PS, to meet with Dr. Mohamed Fawzy Helwa and to finalize his subcontract with USU, to meet with Dr. Talaat Owais in Zagazig about a second subcontract for data collection, to conduct training on the PDM, and to collect data for the models and project reports. He made three trips to Zagazig to collect data, and to meet with Dr. Owais and his associates. Dr. Walker stopped in Cairo for three days during this time to meet with USAID and PS officials.

g. Another purpose for Gary Merkley's trip to Egypt in November was to attend and participate in the scheduled PSM workshop; however, this workshop was postponed due to conflicting schedules within the PS.

h. Gary Merkley conducted a three-day workshop on the latest version of the PDM at the PS in Imbaba. Engineers from the PS, Irrigation Sector, Water Research Centre, Zagazig MPWWR office, Ismailia MPWWR office, and IIP projects were in attendance. The training included design philosophy of the PDM, limitations of the PDM, application of the PDM, data requirements, and hands-on practice with the model using PS computers. At the request of the PS, neither the software nor the user's manual for the PDM were given to the participants. A newly prepared set of slides for training on the PDM, developed by USU, were given to the PS for their use in future training exercises.

i. Dr. Merkley also sat down on several occasions during the two weeks with Eng. Mohsen El Arabawy and others of the PS to discuss application of the PDM, COMMOD, and CANALS models. Suggested enhancements to the models were received by Gary Merkley from PS engineers. He also briefed Dr. Helwa on the COMMOD and PDM software packages, and on their respective data requirements.

### **Progress on CSU Subcontracts**

Both Dr. Labadie and Dr. Salas visited Egypt in November to review progress with the PS and USAID. Work had been underway on the two subcontracts since September 1, 1994 and in both cases involved model development, refinement, and initial calibration work. Data requirements for both modeling activities were discussed with PS personnel and arrangements were made to obtain the data.

### **Future Activities**

a. USU is finalizing modifications to the draft Work Plan after having received USAID comments. The revised Work Plan will be sent to USAID/Cairo in January. USU is also sending

a revised Quarterly Progress report (July-September 1994) after having received comments from USAID in November.

b. Anticipating that the data collection subcontract with Dr. Owais is approved and signed in time by the USU Contract & Grant Office, Dr. Hill will carry one copy of the signed contract to Egypt in late January to delivery to Dr. Owais. Copies of the contract will also be delivered to USAID and the PS. However, it is noted that Dr. Owais and his associates at Zagazig University have begun data collection and field calibration.

c. USU will ship the three new computers to the PS in Imbaba after they arrive, are checked, have software installed, and repacked in the shipping boxes. USU will also ship the last remaining Gateway 66MHz 80486 computer (with 15-inch FS color monitor, keyboard and mouse) to the PS at the same time (this computer was purchased one year ago under the project, and was being used at USU for development and testing of the USU software, and for administrative and reporting tasks).

d. Dr. Merkley will make further improvements to the PDM software, and will forward it to USAID and the PS when ready. USU will continue testing of the PDM and COMMOD as new data for the Sharkia Directorate is obtained from the local consultants, the PS, and by USU directly during visits to Egypt. Testing of the models will be performed by selected USU faculty and graduate students.

e. Pending USAID approval, Dr. Hill will travel to Egypt on or about January 26, 1995 for a two-week period. The purpose of this trip will be to coordinate with USAID and the PS, conduct training on the COMMOD software, coordinate with the local contractors (Drs. Helwa and Owais), collect additional data, and meet with others to obtain information related to some of the required project reports. For the training on the COMMOD during this visit, USU will request that the two local consultants, Drs. Helwa and Owais, participate in this training and provide an update on their respective progress in data collection and analysis for the PDM and COMMOD. The collaboration of the local consultants will constitute compliance with their respective subcontracts to conduct quarterly workshops on the data collection for the models.

f. Dr. Merkley will travel to Egypt on or about March 14, 1995 for approximately two weeks to meet with USAID and PS officials, meet with the two local contractors, collect data, and conduct joint training on the PDM and COMMOD with the two local contractors. He will also submit draft reports on "Suitability of the MSM Telemetry Data in Daily Operations", and "Operations Manual for the Sharkia Directorate". He will conduct training jointly with the two local consultants to provide updates on the models and on the progress of data collection. This training will focus on application of the models to the Sharkia Directorate, making use of the most recent data available. If either or both of the local contractors will not be able to participate in the workshops by Drs. Hill and Merkley, they will be required to provide such training on data collection progress to the PS at another date, to be determined after consulting with the PS, USAID, and USU.

g. Drs. Merkley and Hill will travel to Egypt in June 1995 to conduct another workshop on the models, their application, and the status of data collection and analysis by the local consultants. They will also meet with USAID, PS, local consultants and others related to the project. The workshop for the PS will be on the status of the data collection, models, and application of the models in Bahr Mashtoul and the Sharkia Directorate. If schedules permit, one or both of the local contractors will also participate in this workshop. As with the training in March, application of the models to the Sharkia Directorate with the most recent data will be emphasized in this training. At this time it is expected that the majority of the data required for application of the models will have been collected, processed, and entered into the PDM and COMMOD

h. Drs. Merkley and Walker will travel to Egypt for a final workshop in August, beginning the wrap-up for the project, which should be completed by September 15, 1995. USU will make every effort to adjust planned travel schedules to meet the needs of USAID and PS officials. In particular, USU will attempt to be in Egypt during the next PSM workshop; however, to our knowledge no date has been set for the next workshop.

Drs. Merkley and Walker will conduct a closing workshop in Egypt, summarizing the various project accomplishments and model application, based on data collected from the field, analyzed, and entered into the models up to that point in time.

### **Difficulties**

The signing of subcontracts with the two local consultants was delayed beyond what USU had anticipated in June 1994. This was due to the extended discussions with USAID and the PS on the scope of work and other procedural issues, and on the difficulty in identifying suitable candidates for the subcontracts. These delays have caused consequent delays in the start of their data collection work; however, it is expected that they will be able to provide most of the required data within the time allotted in their respective contracts with USU.

There has apparently been some mis-communication and misunderstanding between USAID and USU concerning the requirements of the Work Plan and this has resulted in a delay in the acceptance of the Work Plan by USAID. Also, some of the original schedules for the submission of project reports were changed, and this has had an impact on the timely completion of an acceptable Work Plan.

USU has recently been informed from USAID and PS officials that they are concerned about the performance of the two local subcontractors to USU. This concern has apparently stemmed from a lack of communication between the local contractors and USAID, and between the contractors and the PS. USU is currently working to resolve this issue to the mutual satisfaction of all parties.

It has been difficult for USU to obtain substantive information regarding operation of the Egyptian irrigation system. However, in the past two trips to Egypt by USU personnel, some meetings were held with MPWWR officials and others to collect this information. Dr. Hill will attempt to collect additional information during his January-February trip to Egypt, and USU has

requested various printed materials which may assist in our understanding of the irrigation system operation. It will be difficult for USU to provide an in-depth review of the irrigation system operation in the report which USAID has requested to be submitted in March 1995, but every effort is being made to complete an acceptable draft report on schedule.

**Cumulative Expenditures**

Amendment No. 1 to the Cooperative Agreement between USU and USAID was signed in October 1994, authorizing a second installment in the incremental funding for the project. Table 5 shows a summary of the cumulative project expenses through December 31, 1994.

Table 5. Cumulative Expenditures April 1, 1994 - December 31, 1994.

Budget Category	Cost
Personnel	\$88,404.91
International Travel	\$35,895.36
Other Direct Costs	\$6,770.88
Subcontracts	
CSU - Groundwater	\$0.00
CSU - Nile River	\$0.00
Helwa	\$5,000.00
Owais	\$0.00
Total Subcontracts	\$5,000.00
Equipment	
Total Direct Costs	\$136,071.15
Indirect Costs	\$45,947.06
TOTAL	\$182,018.21

**4. January 1, 1995 - March 31, 1995**

**Activities and Accomplishments**

a. USU believes that the work is progressing well, in terms of the achievements of the local consultants to USU, and in terms of USU's efforts toward fulfilling the tasks set forth in the Cooperative Agreement (CA) with USAID. The required data for the Sharkia Directorate are coming in and are being entered into the models, the software is being tested and improved, and all parties are interacting well with each other. Reporting is essentially on schedule and the models are

finally nearing the point at which they will be applied to a large-scale area in the Nile delta using real data.

b. Drs Merkle and Hill met several times in the first three months of 1995 with the local consultants, Drs. Helwa and Owais, and their associates, in Cairo and Zagazig to discuss contractual issues, progress of data collection and analysis, and training needs. USU encouraged both of the consultants to communicate frequently with USAID and the PS on their achievements and future plans in data collection, data analysis, and training. USU personnel also met many times with USAID officials to coordinate activities and clarify misunderstandings. Frequent contact was maintained between USAID and USU by E-mail, telephone, fax, and letter.

c. Three new Gateway 2000 Pentium-based computers were purchased and shipped to the Planning Sector (PS) in Imbaba. An 80486-based Gateway 2000 computer which had been in use for model development, etc., at USU for approximately one year was also shipped to the PS at the same time. All four computers arrived at the ministry in Imbaba on March 23, 1995. Dr. Merkle was in Egypt at that time and assisted Eng. Mohamed Ezzat and Mahmoud Hassan of the PS in setting up one of the computers to check it and to go over the software that came with the computers.

d. Changes were made to the PDM by Dr. Merkle during the TDY to Egypt in March 1995 and in Logan during the months of January and February, 1995. Some changes were to accommodate the Dutch water quality project, as requested by the PS. These changes were also seen as beneficial to the current project with USAID because it enhanced the utility of the PDM for application in Egypt in general. It also helped to expand the scope of application of the PDM in Egypt. Some changes were made according to PS and local consultant suggestions, and others were errors that have been corrected in the model.

e. Dr. Hill was on TDY in Egypt from January 26 - February 10, 1995. The scope of work included: (1) conduct interviews with GOE and IMS component personnel, as arranged by USAID and PSM, toward developing an operations manual and determining the suitability of telemetry in daily operations; (2) provide training for PSM staff on the use and data requirements of the COMMOD model; (3) meet with the local consultants (Dr. Helwa and Dr. Owais) to review progress, obtain copies of collected data, coordinate their participation in the COMMOD training and to clarify some contractual details; and, (4) verify the operation of the agro-climatological station in the Bahr Mashtoul pilot area and review data analysis procedures.

Dr. Hill conducted three days of training on the COMMOD software in Cairo at the PS offices in Imbaba on February 6-8. Engineers from the PS, Zagazig University, MSM project, and Ismaylia Directorate attended the training. Training on the concepts, data requirements and use of the COMMOD model was provided by USU, the local consultants and PSM.

f. Drs. Merkle and Hill were on TDY in Egypt from March 12 - 30, 1995. The scope of work included the following objectives: (1) conduct interviews with GOE and IMS component personnel, as arranged by USAID and the PS, toward obtaining background information for the draft

operations manual for Sharkia and determining the suitability of telemetry in daily operations (objectives 2, 3 & 4 of the Program Description). Also, to visit the field to collect electrical conductivity samples from canals and drains in Bahr Mashtoul, and drive along the main stem canals in Sharkia; (2) provide training for Sharkia and PS staff, and for other participants from Ismaylia and elsewhere, at the Sharkia Directorate offices on the use and data requirements of the PDM and COMMOD; (3) meet with the local consultants (Dr. Helwa and Dr. Owais) to review progress, obtain copies of collected data, coordinate their participation in the training at Sharkia and for contractual administrative details; (4) perform requested modifications and needed corrections as software maintenance on PDM and other models; and, (5) meet with USAID to finalize the Work Plan and to clarify what was desired in the "Draft Operations Manual for the Sharkia Directorate", and for other administrative details.

g. Drs Merkley and Hill met with several Sharkia Directorate engineers and staff members in Zagazig to collect information for the Draft Operations Manual for Sharkia. A fairly detailed understanding of current operational practices was acquired by USU during the interviews. At the request of the PS, Dr. Merkley also met with Irrigation Improvement Project (IIP) engineers in Shoubra, accompanied by Mohsen El Arabawy, to learn about difficulties they had in applying the Canals hydraulic model, and to answer questions about its usage. IIP is applying the Canals model under the auspices of the PS. Also at the request of the PS, he met with Dutch engineers at the PS in Imbaba repeatedly to help coordinate application of the PDM with the water quality model. Drs. Hill and Merkley met briefly with representatives of the International Irrigation Management Institute (IIMI) at the request of USAID and IIMI.

h. Dr. Merkley conducted a three-day workshop on the latest versions of the PDM and COMMOD at the MPWWR offices in Zagazig. The workshop was held on March 20, 21, and 22, 1995. Engineers from the PS, Sharkia Directorate MPWWR engineers, Ismaylia MPWWR office, and Zagazig University were in attendance. Drs. Magdy (an associate of Dr. Owais) and Helwa each gave one-half day presentations during the workshop in Zagazig on their respective data collection and analysis work. At the request of the PS, neither the software nor the user's manual for the models were given to any of the participants.

i. Dr. Merkley also sat down on several occasions during the two weeks with Eng. Mohsen El Arabawy and others of the PS to discuss application of the PDM, COMMOD, and Canals models, and to answer questions about the model design and application. Suggested enhancements to the models were received by Dr. Merkley from PS engineers. Gary also briefed Dr. Helwa on the COMMOD and PDM software packages, received data and comments from Dr. Helwa and his engineers on the data collection work, and on their respective data requirements. Similar interactions occurred between the USU personnel and Dr. Talaat Owais, and his colleagues.

### **Progress on CSU Subcontracts**

The two investigators at CSU each submitted their respective progress reports directly to USAID and the PS, and then forwarded copies of the reports to USU. Work continued on model

development, testing and analysis. Data needed for the conjunctive use analysis under the subcontract with Dr. Labadie has not yet been provided by the Planning Sector.

### **Future Activities**

a. USU will pursue discussions with USAID and the PS to possibly bring one or two PS engineers to Logan in May so that they might assist in data analysis, entry to the models, model evaluation, and model application to planning and operational scenarios in the Sharkia Directorate.

b. Dr. Merkley will make further improvements to the PDM software during the months of April, May and June. Most of the improvements and corrections will be made to accommodate official PS requests for enhancing the usability and utility of the model. Some of the changes will be at the suggestion of the local consultants, and still others will be based on internal evaluations at USU. USU will continue testing of the PDM and COMMOD as new data for the Sharkia Directorate is obtained from the local consultants, the PS, and by USU directly during visits to Egypt. Testing of the models will be performed by selected USU faculty and graduate students.

c. Pending USAID approval, Robert Hill and Gary Merkley will travel to Egypt on or about June 15, 1995 for a two-week period. The purpose of this trip will be to coordinate with USAID and the PS, conduct training on the PDM and COMMOD software, coordinate with the local contractors (Drs. Helwa and Owais), collect additional data, and meet with others to obtain information related to some of the required project reports. During the June 1995 TDY, USU will complete drafts of the (1) Operations Manual for Sharkia Directorate; (2) Evaluation of the PDM in Bahr Mashtoul; and (3) Command Area Study Report.

### **Difficulties**

No particular problems are anticipated by USU at this time. All aspects of the CA appear to be going well and the long-anticipated field testing of the PDM is at hand.

### **Cumulative Expenditures**

Table 6 shows a summary of the project expenses through March 31, 1995.

## **5. April 1, 1995 - June 30, 1995**

### **Activities and Accomplishments**

a. Drs. Hill and Merkley began the first drafts of the draft operations manual for the Sharkia Directorate and the command area study report. Most of the data required for initial testing of the PDM and COMMOD software was communicated to USU by the local consultants and the

Table 6. Expenditures April 1, 1994 - March 31, 1995.

Budget Category	Cost
Personnel	\$106,826.78
International Travel	\$48,294.75
Other Direct Costs	\$7,615.30
Subcontracts	
CSU - Groundwater	\$9,961.69
CSU - Nile River	\$10,943.54
Helwa	\$5,000.00
Owais	\$5,000.00
Total Subcontracts	\$30,905.23
Equipment	\$9,822.00
Total Direct Costs	\$203,464.06
Indirect Costs	\$66,193.80
<b>TOTAL</b>	<b>\$269,657.86</b>

Planning Sector. For the specific data not yet available, generally accepted values were used to allow the model analyses to begin.

b. A revised work plan was developed and sent to USAID/Cairo. Revisions were made to reflect a decision made jointly between USU and USAID to cancel the June visit to Egypt by Drs. Hill and Merkley and to bring Planning Sector Engineer Mosen to USU to assist in the PDM evaluation.

c. The PDM model in some operational form has been available to PSM for quite some time, although with a number of needed corrections and improvements. Engineer Mosen and Dr. Merkley were able to exercise the PDM a lot more than had been possible before with the result that a number of flaws were identified and corrected. Full scale simulations were conducted of the Bahr Mashtoul command area and the Sharkia Directorate.

d. A number of errors and disfunctionalities in the COMMOD software had been reported to USU but these problems may be more from the lack of expertise in their use than inherent in the software. USU has tentatively decided not to do much more work on the COMMOD software at this time because most of its features have been folded into the recent versions of the PDM. In other words unless one is interested in the analysis of a mesqa level problem, USU would suggest the PDM be used rather than the COMMOD software. Since the analyses specified in the

CA deal with the Bahr Mashtoul command area and the Sharkia Directorate, the COMMOD analysis is relatively limited.

### **Progress on the CSU Subcontracts**

The two CSU subcontracts are moving slowly. At present they have only billed for 40% of the budget amounts. Dr. Salas has asked for a no-cost extension of 3 months but USU has already indicated its intention to conclude the CA in September 1995 and that he should not plan on an extension. Dr. Labadie is still waiting for groundwater data from Egypt as indicated in his recent progress reports. USU could share its Sharkia data with him, but it does not appear to the information needed. Given the difficulty in getting data, it would be my judgement that he is probably as far along as he will get under this project. USU is not aware of problems associated with the technical merit of the CSU work.

Given the qualification that the CSU models are outside the expertise of the USU personnel working on this project, it nevertheless appears that Dr. Salas is already doing hydrologic analyses of the Upper Nile and should be able to complete the work on schedule.

### **Future Activities**

a. Two draft reports will be sent to USAID/Cairo and the Planning Sector for review. The first of these will be the "Command Area Study Report" and the second will be titled "Opportunities for Improving Water Management in the Shakia Directorate."

b. Final field data will be delivered by the local consultants and revisions to the PDM evaluation in the Bahr Mashtoul command area and the Sharkia Directorate will be made as necessary.

### **Difficulties**

The field data collection and the PDM/COMMOD analyses are taking somewhat more time than anticipated. This is not viewed as a substantial problem but one that will be resolved during the next quarter.

### **Expenditures**

Table 7 shows a summary of the project expenses through June 30, 1995.

## **6. July 1, 1995 - September 30, 1995**

### **Activities and Accomplishments**

a. On August 7, 1995, USAID informed USU that the number and content of the project reports submitted during the previous quarter were unacceptable. A series of discussions ensued

Table 7. Cumulative Expenditures April 1, 1994 - June 30, 1995.

Budget Category	Cost
Personnel	\$126,267.09
International Travel	\$59,887.69
Other Direct Costs	\$11,207.60
Subcontracts	
CSU - Groundwater	\$50,517.24
CSU - Nile River	\$49,228.62
Helwa	\$15,015.00
Owais	\$15,020.00
Total Subcontracts	\$129,780.86
Equipment	\$9,747.00
Total Direct Costs	\$336,890.24
Indirect Costs	\$98,293.37
<b>TOTAL</b>	<b>\$435,183.61</b>

between the USU Project Coordinator and the USAID Project Officer to correct the problems. After reviewing the CA Workplan, USU proposed the earlier reports be restructured and revised into the following three reports:

**Report 1 "Evaluation of The Planning Distribution Model in the Sharkia Directorate"**

The materials in this report will satisfy section 2 in the work plan. They will be basically what is in the report previously submitted under the title "Command Area Study Report." This report will include data on calibrations and other field data collection efforts conducted by the two local consultants. USU was unable to include this material in the previous draft report at this time because apparently the consultants were not allowed to send diskettes through the mail.

**Report 2 "Draft Operations Manual for the Sharkia Command Area"**. This report will be fundamentally what USU had intended in the earlier submission titled "Opportunities for Improving Water Management in the Sharkia Command Area." USU accepts that it did not satisfy the work plan requirements under section 3a.

**Report 3 "Opportunities for Improving Water Management in the Sharkia Command Area"**. This will satisfy section 3b in the work plan. USU proposes a different title than "Command Area Study Report" to reflect what that document contains. This report focuses on the framework issues and utilization of MSM and PDM technologies (3b.2), outlines what USU feels

are the key improvements in operations(3b.3), and justifies the rationale for suggesting them. USU will include a discussion of the production impacts that we can determine as well as the costs of implementing the PDM in a directorate. This report contains the basis for the improved operational procedures we outline in the draft operations manual.

b. The three project reports were prepared and submitted to USAID. Drs. Merkley and Hill traveled to Egypt about August 23, 1995, met with USAID and received the second set of comments and suggestions for revisions. Dr. Walker traveled to Egypt on September 3, 1995.

c. The USU team met with USAID early in the TDY to receive written review comments on the drafts of the "Draft Operations Manual for the Sharkia Directorate Command Area" (retitled: "Improved Operations Manual for the Sharkia Directorate") and "Opportunities for Improving Water Management in the Sharkia Command Area". The majority of the TDY effort was directed toward reviewing and interpreting these comments and modifying the respective documents accordingly.

d. Separate meetings were held with both local consultants to discuss their draft reports. A detailed review of the reported data revealed several opportunities for improvement prior to submission and acceptance of final reports. Both were requested to complete their final report by September 10, 1995. This was done and the two data reports are listed in Section 1E.2.(f) below.

e. The USU team spent considerable time in preparing for the one day PSM seminar held in the Ramses Hilton hotel in Cairo (an agenda and list of invitees were presented in the USU trip report). The seminar began with an attendance of about 60 persons with 40 present for the discussion just prior to the afternoon break.

The seminar objectives as determined by the Planning Sector and USU were:

- i. To acquaint Ministry Administrators with the Software Tools Developed under the PSM subcomponent and solicit their support for further application in Egypt;
- ii. To serve as an introductory exercise preceding a more extensive future workshop sponsored by the Planning Sector, in which details on software application requirements and potential benefits are discussed;
- iii. To share the findings and accomplishments of the Planning Sector, Local Consultants, CSU subcontractors and USU at the conclusion of the Cooperative Agreement with USAID; and
- iv. To present and discuss the Policy Implications of these findings and to discuss the Opportunities for Improving Water Management in the Sharkia Command Area and in other Directorates of the Nile River Irrigation System.

Drs. Walker and Merkley both gave presentations summarizing accomplishments of this agreement and examining policy implications of findings while Dr. Hill assisted the Planning Sector in organizing the seminar and also served as the facilitator. Both Drs. Labadie and Salas from CSU participated in the seminar, reviewing their work and responding to questions.

f. Dr. Merkley was in the Planning Sector office in Imbaba on ten days during the TDY to be available to answer questions, assist planning sector engineers in PDM applications and to maintain software. Two changes were made in the PDM: (1) another column of data was added in the reach volume balance file and the output text file was reformatted to accommodate the requests of the PS and Dutch consultants to the PS; and (2) an error in a ground water data dialog box was corrected.

g. The weather station was visited on August 28, the data was downloaded, the sensors were checked and the pyranometer was cleaned. The solar radiation (Rs) measurement increased about 25% immediately after cleaning. A similar increase was noted in July 1994 after cleaning. The possible effect on Eto and crop water use due to under measurement of Rs may be that Eto is underestimated by about 10% for the periods just before cleaning. The observed clear day solar radiation is considerably less than the expected theoretical value (Rso). This may be due to air pollution from Cairo or elsewhere moving across the delta. Such reductions in Rs also imply crop yields below what could be realized with cleaner air.

h. On September 18, 1995 the USAID communicated its final comments on the three project reports. On September 20, 1995, USAID communicated the final Planning Sector Comments.

### **Progress on the CSU Subcontracts**

The previous problems with the delivery of data for the conjunctive use subcontract with Dr. Labadie have been resolved. The software has been completed and installed on the Planning sector computers.

The work of Dr. Salas was completed. The draft final reports on this activity were submitted, reviewed and accepted. USU will reproduce and submit final copies during the next quarter.

### **Future Activities**

a. Final copies of the three project reports and the final administrative report (this report) will be prepared and sent to USAID/Cairo.

### **Difficulties**

No further difficulties are anticipated.

## Cumulative Expenditures

Table 8 lists the expenditures under the CA through September 30, 1995.

Table 8. Cumulative Expenditures April 1, 1994 - September 30, 1995.

Budget Category	Cost
Personnel	\$143,435.94
International Travel	\$51,987.02
Other Direct Costs	\$12,137.88
Subcontracts	
CSU - Groundwater	\$68,945.77
CSU - Nile River	\$72,103.81
Helwa	\$15,015.00
Owais	\$20,025.00
Total Subcontracts	\$176,089.58
Equipment	\$9,747.00
Total Direct Costs	\$393,397.42
Indirect Costs	\$103,918.66
TOTAL	\$497,316.08

## 7. October 1, 1995 - November 15, 1995

### Activities and Accomplishments

- a. The following final project reports were submitted to USAID/Cairo:
  - i. "Improved Operating Procedures Manual for the Sharkia Directorate."
  - ii. "Opportunities for Improving Water Management in the Sharkia Command Area."
  - iii. "The Nile River System Streamflow Simulation Model." (From the CSU subcontract to Dr. Salas)
  - iv. "Analysis of Operations of the Nile River System." (From the CSU subcontract with Dr. Salas)

- v. "Stochastic Modeling and Simulation of the Nile River System Monthly Flows." (From the CSU subcontract with Dr. Salas).

### **Progress on the CSU Subcontracts**

- a. The subcontract with Dr. Salas has been completed.
- b. The subcontract with Dr. Labadie has been completed with the exception of submission of the final report. During this period, a draft final report was submitted to USAID/Cairo and the Planning Sector for review along with a users guide to the DSS software. Minor modifications to the software were made and new program files were sent to Egypt.

### **Future Activities**

- a. USU will complete the final revisions to the report entitled "Evaluation of the Planning Distribution Model in the Sharkia Directorate" and submit the final copies to USAID/Cairo.
- b. Dr. Labadie will complete the revisions to the final report entitled "Optimal Conjunctive Use of Surface and Groundwater Resources in the Lower Nile: Continuation of the DSS Development" and submit the final copies to USAID/Cairo and USU.
- c. USU will complete the Final Project Report.

### **Difficulties**

None to report.

### **Cumulative Expenditures**

Table 9 lists the expenditures under the CA through November 15, 1995.

## **Section 1E.2.(d) Special Reports**

None.

## **Section 1E.2.(e) Annual Activity Reports**

Although the period of the CA was April 1, 1994 to November 15, 1995, it was not initiated until August 1, 1994 and because the project was scheduled to terminate on September 21, 1995, no annual activity report was submitted. Substantial correspondence between USU and USAID/Cairo occurred in the August - September period and a one-day seminar was held in Cairo on September 7, 1995 in which an extensive review of the project accomplishments were presented and reviewed.

This seminar was therefore an oral presentation of the annual activity report and is summarized in the USU trip report.

Table 9. Expenditures October 1, 1995 - November 15, 1995.

Budget Category	Cost
Personnel	\$143,896.84
International Travel	\$64,620.01
Other Direct Costs	\$12,137.88
Subcontracts	
CSU - Groundwater	\$99,067.00
CSU - Nile River	\$99,488.30
Helwa	\$23,130.00
Owais	\$24,740.00
Total Subcontracts	\$246,425.30
Equipment	\$9,747.00
Total Direct Costs	\$476,827.03
Indirect Costs	\$114,172.55
TOTAL	\$590,999.58

## Section 1E.2.(f) Technical and Research Reports and Publications

Following is a list of the major reports produced under this CA:

1. "Planning Distribution Model," User's Manual and Technical Documentation. July 1995.
2. Helwa, Mohamed F. 1995. "Data Collection Activities Report." Open File Data Report. August.
3. Owais, Talaat. 1995. "Data Collection Activities Report." Open File Data Report. August.
4. Molnar, P., J. D. Salas, and J. A. Ramirez. 1995. "The Nile River System Streamflow Simulation Model." Technical Report 4. September.

5. Molnar, P., J. A. Ramirez and J. D. Salas. 1995 "Analysis of Operations of the Nile River System." Technical Report 5. September.
6. Salas, J. D., N. M. Saada and C. Chung. 1995. "Stochastic Modeling and Simulation of the Nile River System Monthly Flows." Technical Report 6. September.
7. Merkley, G. P., R. W. Hill and W. R. Walker. 1995. "Improved Operating Procedures Manual for the Sharkia Directorate." November.
8. Walker, W. R., R. W. Hill, and G. F. Merkley. 1995. "Opportunities for Improving Water Management in the Sharkia Command Area." November.
9. Labadie, J. W. and D. G. Fontane. 1995. "Optimal Conjunctive Use of Surface and Groundwater Resources in the Lower Nile: Continuation of the DSS Development." November.
10. Labadie, J. W. 1995. "Users Guide and Technical Documentation for the Lower Nile Conjunctive Use DSS." November.
11. Merkley, G. P., R. W. Hill, and W. R. Walker. 1996. "Evaluation of the Planning Distribution Model and the Command Area Water Management Model in the Sharkia Directorate." January.