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IRRIGATION SYSTEMS MANAGEMENT RESEARCH PROJECT

SECOND

SEMI-ANNUAL PROGRESS REPORT

JULY 1, 1987

UNIVERSITY OF IDAHO

# TABLE OF CONTENTS

1	PROJECT STATUS .....	1
2	TECHNICAL ASSISTANCE .....	1
	2.1 Long-term advisors .....	1
	2.2 Short-term advisors .....	2
	2.3 Level of effort .....	3
3	PROCUREMENT .....	4
	3.1 In process .....	4
	3.2 Identification .....	5
4	RESEARCH SUB-PROJECTS .....	5
	4.1 Integrated watercourse management .....	5
	4.2 Farm water management .....	7
	4.3 Irrigation systems outside the Indus Basin .....	8
	4.4 Beyond watercourse improvement .....	8
	4.5 Ground and surface water models .....	9
	4.6 Public and private tubewells .....	9
	4.7 Drainage and water table control .....	9
	4.8 Farmer involvement in water management ..	10
5	INSTITUTION BUILDING .....	10
	5.1 Documentation center .....	10
	5.2 Competitive grants .....	11
	5.3 Training .....	11
	5.3.1 In-country .....	11
	5.3.2 Abroad .....	13
6	COORDINATION .....	13
7	CONTRACTOR ACTIVITIES NEXT 6-MONTHS ...	13
8	CONCLUSIONS .....	17
	8.1 Observations .....	17
	EXHIBIT A GOVERNMENT PROPERTY IN CONTRACTOR'S CUSTODY.....	19

ISM/RESEARCH SEMI-ANNUAL PROGRESS REPORT  
JULY 1, 1987

The Semi-annual Progress Report, a contract requirement, is a management tool wherein the Contractor reports progress in satisfying contract requirements and in accomplishing specific tasks specified in the Annual Work Plan. It's objective is to report progress, to identify problems and constraints and to make observations and recommendations that will lead to a better Project.

## 1 PROJECT STATUS

This Semi-Annual Report is the second and covers the last six months of the first Project year. The Project was approved by ECNEC at its meeting on March 25, 1987. All WAPDA and PARC sub-projects are proceeding close to the Annual Work Plan. The PCRWR activities were unduly delayed due to administrative problems within the Council. Some projects, especially those in PARC, have been impeded due to lack of funds and most all are in need of equipment that is still under procurement. Training activities have been slow in starting; however, during the past six months progress has been excellent and henceforth training will be a major activity.

## 2 TECHNICAL ASSISTANCE

Technical assistance is specified in contract # 391-0467-C-00-5044-00 with the University of Idaho. All long-term advisors are provided for in the WAPDA PC-I. Short-term advisors are identified under each activity for which a need was anticipated; therefore they are provided for in each PC-I depending on sub-project.

### 2.1 Long-term advisors

On July 1, 1987 four long-term advisors were in country and the fifth, the Research Program Specialist, has yet to be selected. Two possible candidates have been identified and have been cleared to serve short-term assignments in order to be evaluated for the position.

All items in the contract scopes of work for the advisors in country are being adequately addressed. In fact, each advisor is carrying more responsibility than anticipated in design. This is partially due to the vacancy on the field team, but equally demanding is the call on the contractor, from many quarters, to give advice, review documents and provide assistance on all matters relating to irrigation management. This is a worthwhile and necessary function. It only emphasizes the need to fill the vacancy expeditiously and for advisors to plan their time carefully and efficiently.

All of the advisor planned activities in the 1986/87 Annual Work Plan have not been completed. In general, this was no fault of the advisors. The activities that have been completed are the initiation of all the WAPDA and PARC sponsored research, completion of staffing

the contractor's local office, appointment of an ISMR Advisory Committee, presentation of all required reports, procurement of computer equipment and vehicles and introduction of several in-country training programs.

PCRWR suffered many problems during the January-July, 1987 period and this affected the Annual Plan adversely. All four projects handled by PCRWR are about 6 months behind schedule. Hopefully, the problems have been relieved and real progress can be made during the next 6-month period. Many activities in the Social Scientist's work plan were related to PCRWR activities and therefore were not completed during the year.

## 2.2 Short-term advisors

Short-term technical assistance has been provided approximately according to the Annual Work Plan. There have been some delays due to slow approval of the Project and not having key research personnel in place. Following is a summary of short-term technical help provided during January 1, 1987 to June 30, 1987.

NAME	SPECIALITY	TASK ASSIGNED	MONTHS
-----			
Short-term advisor use prior to this report period			17.90
Short-term advisor use during this period			
Moden	Agri. Engineer	Integrated Watercourse	1.50
Dimick	Agri. Engineer	Integrated Watercourse	1.07
Ralston	Hydrologist	Groundwater & Wells	1.07
Naylor	Soil Chemist	Farm Water Management	0.50
TOTAL THIS PERIOD			----- 4.14
TOTAL TO DATE			22.04
BALANCE IN CONTRACT			86.46

### 2.3 Level of effort

This summary represents the levels of effort in the contract and the status on July 1, 1987. The contract termination date is October 1, 1989 so there are 27 months remaining after this report period.

CATEGORY	IN CONTRACT  (mos)	USED  (mos)	REMAINING JULY 1, 1987  (mos)
<b>FIELD OFFICE EXPATRIATE STAFF</b>			
Chief of Party	48.00	27.00	21.00
Social Scientist	46.00	22.00	24.00
Research Program Specialist	36.00	0.00	36.00
Hydrologist	40.00	9.00	31.00
Irrigation Agronomist	36.00	9.00	27.00
<b>TOTALS FIELD STAFF</b>	<b>206.00</b>	<b>67.00</b>	<b>139.00</b>
<b>LOCAL STAFF</b>			
Assistant to COP	48.00	0.00	48.00
Research officers	144.00	27.00	117.00
Statistician	24.00	0.00	24.00
Training officer	30.00	2.00	28.00
Administrative officer	48.00	17.00	31.00
Secretary/bookkeeper	48.00	22.00	26.00
Other Staff (1)	570.00	113.00	457.00
<b>TOTALS LOCAL STAFF</b>	<b>912.00</b>	<b>181.00</b>	<b>731.00</b>
<b>SHORT-TERM ADVISORS</b>			
Irrigation Agronomy	22.00	2.87	19.13
Agricultural Engineering	21.00	6.66	14.34
Agricultural Economics	15.00	1.37	13.63
Irrigation Engineering	12.00	2.67	9.33
Sociology	10.00	0.00	10.00
Hydrology	10.00	2.04	7.96
Information Management	6.00	1.70	4.30
Research Management	5.00	1.73	3.27
Computer Science	4.50	0.00	4.50
Civil Engineering	3.00	3.00	0.00
<b>TOTALS SHORT-TERM</b>	<b>108.50</b>	<b>22.04</b>	<b>86.46</b>
<b>HEAD OFFICE SUPPORT</b>			
Program Director	14.25	13.00	1.25
Training Officer	15.00	3.50	11.50
Program Assistant	48.00	13.00	35.00
Records Clerk	24.00	0.00	24.00
<b>TOTALS HOME OFFICE</b>	<b>101.25</b>	<b>29.50</b>	<b>71.75</b>

(1) Other Staff-Includes one accountant, one telephone operator, two janitors and five drivers.

The Program Director has actually spent 18.75 person months working on the Project. The amounts shown in the table is the time charged to the Contract. The University has supplemented the funding from other sources. Obviously the contracted level of effort for the Program Director is insufficient if the Project is to be managed according to past practices.

The Records Clerk position's level of effort has not been drawn upon because the Department of Agricultural Engineering Secretary has been keeping all Project records. In effect, to date the department of Agricultural Engineering has financed the record keeping activities of the Project.

### 3 PROCUREMENT

Procurement of equipment is through the sub-contract with Development Alternatives, Inc. Most equipment will be procured in the United States and shipped to Pakistan where it will be distributed to the concerned institutions. A small amount of locally made equipment will be procured in Pakistan. All equipment specifications are prepared in Pakistan in consultation with the concerned researchers. A data base program has been designed to track procurement and to inventory all equipment during the life of the project.

The current report of the Government Property in the Contractor's custody is attached as Exhibit A.

#### 3.1 In process

Most equipment items have been identified, specified and are under procurement. Preparation of specifications for a few specialty items has been slow because of the lengthy process of communicating back and forth between the U.S. and Pakistan. Most major items of equipment are now specified. There is a problem with some large items in that the cost is far above estimated and the total budget for equipment will be exceeded if purchased. This problem will be taken care of before final procurement of all equipment.

Project vehicles arrived in January 1987 and were distributed to all cooperators with the exception of PCRWR. One vehicle for the Contractor's office has yet to arrive but is due in July 1987. With this delivery the planned for vehicles will all be in place. There are one or two legitimate cases of additional vehicle needs and these should be dealt with in the next few months.

The computer equipment has arrived in Pakistan and has been tested with the finding that two computers are non-functional. These are being repaired under the warranty. The process of delivery of computers to the research stations has begun. This will be done over a two month period since there is no urgency. Training of computer operators will commence in August 1987.

Bids for photographic equipment were received in February 1987. It should arrive Pakistan shortly after July 1, 1987. The remaining field and laboratory equipment has been processed through bidding and will be received during the next six-month period.

During the next report period procurement should be essentially complete unless the Contractor is requested to assist with procurement of the Punjab Irrigation Research Institute equipment that is listed in the ISMR PC-I. The funding for this equipment, however, is presently not in the University's contract.

### 3.2 Identification

All items of equipment that were planned for in the PC-I's have been identified. There will undoubtedly be other requests for equipment and these will have to be taken case by case. Procurement will depend on need and the availability of funds.

## 4 RESEARCH SUB-PROJECTS

Progress was substantial during this report period. Most projects had funds available. Some problems with processing for reimbursement caused delays and there was one case where no funds were available to the project during the period. These problems have mostly been solved and all projects are fully underway as of July 1987.

### 4.1 Integrated watercourse management

Five activities have begun as follows:

Buried Pipeline--A watercourse area served only by a SCARP tubewell supply was chosen. A PVC pipeline has been designed to deliver water to 15 turnout points within the command. The design is such that the tubewell flow has been divided into two equal parts to create two warabandi groups, each with one half the previous supply. This design is more economical to construct. It remains to be seen whether or not the stream size is more or less efficient than before. It is, however, expected that there will be much less wasted water.

Benchmark data regarding cropping patterns, water use efficiency and transport losses have been taken. The pipeline construction has started and should be finished before the rabi season. As soon as construction is complete monitoring the new system will commence.

Effective Water Distribution--A canal supplied watercourse has been selected to install the same type of "splitting the chak" as with the pipeline study. The command area has been divided into two near equal parts and the watercourse flow will be split below the canal turnout so that there actually will be two warabandi groups operating on the one watercourse area.

Benchmark data have been taken, in fact some detailed data have been collected on the farmer practices during the night and the day time hours. The division structure and sections of lined watercourse have been designed and are under construction. The new warabandi should start sometime during the current kharif season.

Mechanical Construction of Watercourses--A watercourse was constructed by means of a tractor drawn ditcher that is available in Pakistan. The farmers assisted by removing trees and other vegetation from the watercourse area and by destroying the banks of the old watercourse. A pad was constructed with tractor and soil scraper. Soil compaction of the pad was accomplished with the movement of the tractor and scraper while preparing the pad.

The watercourse is functioning well and has been cleaned once with the same ditcher used to construct it. The farmers are pleased with the results.

The economics of the operation is yet to be determined. Also the necessary structures to permit ready access to the watercourse with the tractor equipment have not been installed. There was short-term technical help with preparation of the watercourse. The advisors prepared a manual describing the steps necessary to mechanically build a watercourse. More watercourses will be constructed in order to delineate benefits and economics.

Matching Cropping Patterns--The project has not gotten much beyond discussions and planning because there are several ways to approach the subject and a satisfactory one has not yet been chosen. A preliminary simulation model is being tested with the actual cropping patterns on two watercourse areas.

Obviously, computer simulation will be an excellent tool to develop a reliable method to determine the best crop mix for a given situation. However, given the economic, social, land and water constraints the process is highly complex and will take considerable time and effort to arrive at workable solutions. In this regard, it appears that at least two other groups, IIMI Pakistan and the Command Water Management Project, are interested in pursuing work along these same lines. ISMR will work closely with them and together an appropriate solution should be found.

This study will be combined with the tubewell study described below because in order to optimize the benefit from tubewell augmented supplies it is necessary to determine the best mix of crops and tubewell operation schedules.

Water Supply Augmentation with Fractional Tubewells--This project is in the design stage. The plan is to select a watercourse area, without SCARP tubewell, where the water table is reasonably high but there is, at least, a thin layer of usable sweet water. The watercourse area will be designed to have one fractional tubewell for approximately each 25 acres, strategically placed and operated to augment the canal supplies for that same area. Tubewell and canal water will not be mixed, rather the tubewell will be operated by the farmers as a separate irrigation system. Economic, operational and implementation constraints will be measured.

Monitoring Irrigation Water--Water flows are being measured throughout one distributary. Records have been kept for about 7 months. Discharges throughout the distributary, at the watercourse heads and the amount of land irrigated every 12 hours are recorded. The method is showing the sensitivity of the system to water demand. It has been noted that during periods of high water demand the irrigation efficiency is higher than during periods of lower demand. Of course, this is to be expected and it demonstrates a definite constraint with the weekly warabandi system.

#### 4.2 Farm water management

This study is implemented by several institutions including Mona, LIM the Universities of Agriculture at Faisalabad and Tandojam, the University of Karachi, the Land Reclamation Directorate, and the National Agricultural Research Centre. All institutions other than Mona and LIM are coordinated and financed through PARC.

Biotic Reclamation--Cooperators are the University of Agriculture, Faisalabad, the Land Reclamation Directorate, the University of Karachi (all through PARC) and Mona.

Kallar grass has been planted at all sites and it is being tested in conjunction with gypsum. A hybrid plant (sorghum-sudan grass cross) seed has been procured and is being planted at all sites.

This project requires establishment of the grasses before any practical results can be obtained. The University of Karachi is doing exploratory work on the tolerance of various crops and plants to salt. A variety of highly tolerant species from over the world are being tested in lysimeters and in highly saline areas.

Nitrogen Management--Cooperators are the Agricultural Universities at Faisalabad and Tandojam, the National Agricultural Research Center, NARC (all through PARC) and Mona.

All sites are testing nitrogen rates, sources and timing of applications on various crops depending on site. During kharif the crops are maize in Punjab and sunflower in Sind while in rabi the crop is wheat at all sites.

Brackish Groundwater Use--Cooperators are Mona and LIM. Research on cotton was carried out at Mona during the 1986 kharif season. Both sites carried out experiments on wheat during the rabi season. The treatments include irrigation at various intervals using furrows of varying widths. The water at Mona has a salinity of 2000 parts per million while that at LIM has 2400 ppm. Although results are not fully analyzed, it is obvious that good yields can be obtained by irrigation at frequent intervals through furrows.

Strategies for Poor Drainage Sites--Cooperators are Mona and LIM. All sites (three at LIM and two at Mona) were planted to wheat. LIM also introduced irrigation methods at all sites. The treatments are conventional flooding and broad beds of varying widths. The best results have been with light irrigation with widely spaced furrows.

Salt Balance--This study is at Mona. It was decided to attempt this difficult study on a field basis first as opposed to the designed plan of using a large area since the methodology is not readily apparent. Six fields have been selected on one watercourse area and data collection has started to trace the soil salinity conditions throughout the year and attempt to relate it to the irrigation and precipitation conditions.

#### 4.3 Irrigation systems outside the Indus Basin

Field work was initiated in January 1987. A field team was placed in Quetta. A survey of various concerned agencies and personnel in Baluchistan was made. From these discussions and with the assistance of a short-term advisor, a list of possible research topics was developed and from this list the karez was selected as the first method to be studied.

A survey of several karezes and discussions with operators led to the conclusion that karez maintenance and enhancement of karez discharge are two factors of extreme importance to karez owners. Some possible techniques are: lining the karez, strategically placed detention dams, and capping the access holes to the karez.

The decision has been made to test one or more improvement techniques on a pilot basis. Three karez areas have been selected and base data have been collected, including geological, topographical, agricultural, historical and social aspects. Special capping devices have been designed and installed on one karez system.

Project funding is inadequate for pilot testing on a major scale. For this reason, a PC-J is being prepared to access more funds.

#### 4.4 Beyond watercourse improvement

With the arrival of computers, training of staff in statistical analysis with computers was undertaken. An expatriate advisor conducted a one-month course for nine Monitoring and Evaluation Directorate scientists. During the course of study several groups of watercourse data were analyzed as examples.

The special studies were planned in detail. The study entitled "Trading of Canal and Tubewell for Irrigation" has been reviewed and finalized for initiation early in the next project year. The study "Extent of Over and Under Irrigation of Wheat and Cotton" is being reviewed for initiation next year. Two additional studies entitled "Comparison of Design and Actual Watercourse Discharges under Various Conditions" and "The Physical Parameters of a Watercourse" are suggested for the future.

Regarding the Special Studies portion of the project, the Directorate has requested the ISMR Principal Investigators to suggest new studies for implementation. This is a rare opportunity and one in which the spirit of cooperation of ISMR is demonstrated. Several suggestions are expected.

#### 4.5 Ground and surface water models

Computers and software have been delivered to the project. The computers are located in the Analog Model Laboratory until other facilities at SCARP Monitoring are available.

Two training courses were held, Groundwater Concepts and Computer Orientation and Programming Skills in FORTRAN 77.

Collection of climatological and hydrologic data for the simulation model of the Mona Scheme in SCARP-II and the Khanaqah Dogran Scheme SCARP I remain in progress. The Mona Scheme has been selected for the first simulation model. Fortnightly meetings are held by the model simulation group to assess data collection needs.

Visits were made to Islamabad, Hyderabad and Karachi to determine the status of other groundwater simulation work at universities, government and other agencies. The only simulation work found was that of SCARP Monitoring and a two dimensional finite difference model at the Centre of Excellence at the Engineering University in Lahore. Courses in groundwater simulation are offered at the Centre.

The plans for the building addition to house the project have been approved by WAPDA. Tenders for construction have been received and evaluated.

#### 4.6 Public and private tubewells

Work Plans to carry the project for the next two years have been outlined. The first phase, that of designing a data base system for analyses of tubewell performance, has been completed. Some tubewell data have been entered into the data base.

A short-term consultant assisted with the Work Plan and helped design a tubewell data collection, verification, and analyses system that will eventually allow all SCARP tubewells to be monitored and analyzed in an orderly fashion. The system should be applicable to other water related data banks, i.e. that of the Watercourse Monitoring and Evaluation Directorate.

Progress on field evaluations of tubewell deterioration is dependent on the procurement of special equipment. This should be available during the next report period, however the tubewell data analysis might require more than 6 months so the equipment constraint may not be critical.

#### 4.7 Drainage and water table control

The first phase of the project is data collection and that has started. Some sites have been selected for the small scale drainage scheme to be pilot tested.

The Drainage Research Institute of Pakistan, DRIP, is the Principal Investigator. A skeleton staff of one agricultural engineer, one civil engineer, one surveyor and some support staff have been posted to the project.

Virtually no field work could be completed during the report period because funds were not made available to DRIP until May 1987. This funding constraint must be removed during the next report period or some other means must be sought to implement the project.

#### 4.8 Farmer involvement in water management

PCRWR has appointed a Project Director. Six universities have been identified as potential collaborators. The PCRWR agreement and the guidelines for proposal preparation have been given each potential collaborator. The collaborators have met in a training session regarding proposal preparation and at the date of this report most proposals are ready for review, in fact some have already been reviewed once.

The collaborators are the University of Agriculture-Faisalabad, the University of Peshawar, the University of Baluchistan, the Sind Agricultural University, Quaid-e-Azam University and the Applied Economics Research Centre, University of Karachi.

Eleven study topics have been identified and several others will be added before the proposals are finalized. The topics cover the institutional and social aspects practically all types of irrigation systems found in Pakistan. In this regard, this sub-project will be beneficial and add to the research output and understanding of some of the other ISMR sub-projects. Some are directly related in that the laboratory for the social study is the laboratory for another ISMR project.

In addition to the above, five MS level students at Quaid-e-Azam University are conducting social research on irrigation related topics. ISMR has not provided financial assistance but advisory service and field access to other ISMR projects have been given.

## 5 INSTITUTION BUILDING

Institution building is an integral part of the Project and it is handled in much the same manner as research, through specific activities.

### 5.1 Documentation center

The Center's name has been changed to the National Documentation Centre, Library and Information Network (NADLIN). The Centre plans initially to specifically serve the ISMR Project with water resource material, but in the future, if successful, it may include other disciplines in it's clientele.

All potential collaborators have been identified, notified and visited. Some agreements with them have been signed. A building has been rented to provide space for the Centre, however it is the second such rental during the past year. Hopefully this will be the final choice of a home for the Centre.

Ten positions have been filled out of the 34 sanctioned posts. Recruitment is in progress.

The organization of library materials such as formats of requisition cards, acquisition registers, book slips, book jackets, etc. have been prepared. The list of journals to be subscribed has been finalized and subscriptions are to start from July 1, 1987. The format for the monthly newsletter has been finalized.

## 5.2 Competitive grants

The Project Director visited potential collaborators at Universities and explained the program. Eleven universities were visited and all are interested in contesting for grants.

A brochure with a brief description of the project was prepared and sent to all potential collaborators. A draft agreement for potential recipients has been reviewed and approved by the Council.

In summary, the grants program is about ready to start receiving proposals. The methodology will be reviewed and approved by the Project Implementation Committee and the program initiated soon after July 1, 1987.

Progress during the past 6 months has been slow because the Project Director was operating under several constraints including vehicle, telephone and office space inadequacies.

## 5.3 Training

For practical purposes training started after January 1, 1987. The Annual Training Plan was amended twice to take advantage of short term training programs not known during preparation of the Plan.

Not many participants have been processed for formal training. The numbers have fallen short of expectation. The ISM Research project does not have a large number of possible candidates because research units are small compared to other government departments and large numbers of participants cannot be absent on a continuous basis.

Some training was missed because Project personnel did not understand the inordinate amount of time required to process applications through the GOP and USAID bureaucracies. One problem is that short course timings are not usually known far enough in advance to gain clearance. In two cases it was found that four months is not enough time to process from first nomination to final clearance. Future short term training will be programmed only if the dates are known at least 8 months in advance. It is very disappointing to a candidate to have been selected by his department only to find that he cannot take advantage of the training simply because the clearance process is cumbersome. He would be better off never to have been selected.

### 5.3.1 In-country

English language: Considerable effort was spent assisting candidates meet the English language requirement. Sixty- one

scientists and technicians have taken the TOEFL test with discouraging results. Eleven scored above 500 but only 6 high enough to qualify for MS or Phd training. As a result emphasis is being placed on English language training. Thirteen candidates from ISMR started the June course of study. Prior classes had several ISM candidates.

Groundwater concepts: A one-month course taught by Gary Johnson in Feb/March to 20 participants. The course covered basic theory of groundwater flow and related it to conditions of the Indus Plain and to basic ground water modeling procedures. Participants were from SCARP Monitoring and the Analog Model Laboratory, WAPDA.

FORTRAN programming: A 7-week course taught by the firm, Pakistan Computer Consultants. Eleven participants learned the basics of computer language necessary for development of ground water models.

Geophysical survey methods: A seminar held by Dr. Dale Ralston, a short-term advisor, regarding methods of determining underground geology and water conditions using modern equipment. Most of the methods discussed will be possible under ISMR as soon as the equipment arrives. Approximately 30 scientists attended.

Water measurement: A one-month course held in May on water measurement at the farm level. The course was taught by James Bondurant, a short-term advisor, to 10 trainees. The course was conducted mostly in the field and involved testing many methods. As a result of the training a simpler method of measurement of watercourse discharge will probably be adopted. The trainees were from the Mona Reclamation Project and from the Watercourse Monitoring and Evaluation Directorate.

Statistical analysis with computers: A 5-week course taught by Dr. Joel Hamilton, a short-term consultant, in June 1987. The course was practical in that trainees analyzed their own data that had been collected and previously analyzed by other means. The training involved an introduction to the statistical software purchased for all ISMR sub-projects. There were 12 participants from WAPDA Directorates.

Sociological aspects of Irrigation: A 3-day workshop held in June to familiarize 20 social scientists from throughout Pakistan with the ISMR project and to develop research methodologies for the farmer involvement research to be initiated early in the next project year.

There has been considerable informal training during the period, including design of pipe flow systems, design of drainage systems and methods of watercourse construction with a tractor and ditcher.

### 5.3.2 Abroad

Degree: Two long-term degree participants are:

Munir Bhatti; PCRWR; PhD; Water Resources Planning; Colorado State University; started September 1986.

Mohammad Azim; PCRWR; MS; Irrigation Engineering; Asian Institute of Technology; started January 1987.

Six candidates are in process in WAPDA. They have unofficially passed the TOEFL test and two have been admitted to universities pending scholarships. WAPDA has a lengthy process of nomination but these should be processed and proceed on training in the next six months.

Short course: Two participants were processed for a five-week short course entitled "Sociological Aspects of Irrigation" at Colorado State University. The course started June 15, 1987.

Study tours: The Chairman of PCRWR proceeded on a two week study tour in February. He visited several research stations and universities throughout the United States.

A 5-week study tour for Project Directors has been programmed for August. Six candidates have been nominated by their agencies. This tour will be of research stations in the USA with the objective of giving Project Directors the opportunity to evaluate these stations as possible training sites for some of their research scientists.

## 6 COORDINATION

The informal Project Implementation Committee consisting of one member from each participating agency, WAPDA, PARC and PCRWR, has met several times. This Committee has been invaluable for overall Project coordination.

Quarterly meetings of the ten Principal Investigators continue to be held. These provide an opportunity to identify implementation problems early. A special project officer has also been assigned to the Federal Coordinator's office. His entire function is to serve the interests of the ISM Research Project at the Federal level. This has resulted in much speedier processing of documents.

The Project Advisory Committee has been officially formed, although it has not met as yet.

## 7 CONTRACTOR ACTIVITIES NEXT 6-MONTHS

The next 6-month period should include the initiation of several additional dimensions for the Project. It will be a busy period with all research sub-projects fully active and new tasks immersing.

Participant training will increase significantly. The process is well known to all agencies, the next Annual Training Plan will be much more specific, training needs are readily identifiable and several applications for long-term training are in process. In fact, some participants have already received university admission pending clearance through GOP and USAID.

A seminar series will be initiated in September. It is intended to be continuing on a bi-monthly basis. It's objective is to bring researchers and users of research together to discuss relevant and important irrigation issues in a forum where actions can be taken to encourage both parties to make changes for improvement.

A contract amendment has been requested to provide flexibility to enable the Project to include the Irrigation Research Institutes of Punjab and Sind in the Project. Other aspects of the amendment include Special Studies to permit engaging sub-contractors to make relevant studies that might have influence on the research direction of the Project.

The Project has an element referred to as Unspecified Research. This is approved funding that requires design of Projects before it can be allocated. At least four additional sub-projects can be developed. It is expected that some will be initiated during the next report period.

The planned activities for each advisor are as follows:

Chief of Party

1. Plan and participate in a quarterly meeting of Principal Investigators in September and December.
2. Supervise delivery of all equipment to concerned agencies.
3. Review the field office staffing and make needed additions.
4. Visit all research sites.
5. Assist with the preparation of the PC-Is for the Irrigation Research Institutes and with those to be included in the Unspecified Research category..
6. Supervise the preparation of the next Semi-Annual Progress Report.
7. Provide technical help to the Integrated Watercourse, Beyond Watercourse Improvement and the Outside Indus sub-projects.
8. Finalize all required Technical Directives needed during the period.

### Social Scientist

1. Review and finalize the computer training Plan.
2. Finalize next year's Training Plan.
3. Provide technical help to the Farmer Involvement sub-project. Finalize agreements with all collaborators and initiate research.
4. Provide assistance to PCRWR with implementation of the Competitive Grants and Documentation/Library programs.
5. Assist with Newsletter preparation.
6. Provide technical assistance to the Beyond Watercourse Improvement sub-project.
7. Assist counterparts with preparation of Scopes of Works for needed short-term technical assistance.

### Irrigation Agronomist

1. Review the Farm Water Management sub-project and prepare recommendations based on findings.
2. Provide technical help and training in the completion and operation of the closed pipeline delivery system.
3. Provide technical assistance on the design and construction of the drainage systems being built under the Drainage sub-project.
4. Assist with organizing the Farm Water Management investigators into a cooperating technical team.
5. Assume responsibility for and plan two seminar sessions, one in September and one in November.
6. Assist counterparts with preparation of Scopes of Work for needed short-term technical assistance.

### Hydrologist

1. Supervise the work of the sub-contractor providing computer training to the Project.
2. Continue the tubewell data base testing.
3. Conduct a training course in Groundwater Simulation.
4. Assist with planning of field study for tubewells and for a monitoring method for new tubewells.
5. Assist with data estimation and validation of simulation procedures for the Mona modeling scheme.

6. Assist counterparts with preparation of Scopes of Work for needed short-term technical assistance.

#### Short-term Technical Advisors

Technical Directives been approved for the following activities:

1. Assistance with the Biotic Reclamation study of the Farm Water Management program. The advisor is Dr. Denny Naylor Soil Chemist, University of Idaho. His assistance will be accomplished during July/August.
2. Library and documentation planning and training. This was to be accomplished during the last 6-month period, however the Documentation Center was not ready and the assistance was postponed until August. The advisor is Donna Hanson, Science Librarian at the University of Idaho.
3. Hydrology assistance with the groundwater conditions prevailing at an active karez. This is to provide assistance with selection of a pilot study to enhance karez discharge for the Irrigation Systems Outside the Indus Project. The advisor is Dr. Larry King, Hydrologist from Washington State University. He is to be in Pakistan during July/August.
4. Irrigation Engineering assistance for the Irrigation Systems Outside the Indus sub-project to decide on a program for the inclusion of the Sailaba irrigation method into the study. Data collection and pilot studies will be designed. The advisor is James Bondurant who has been advising the project since its inception. He will be in Pakistan during August/September.
5. Hydraulic Engineering assistance to advise on equipment and prepare specifications for special laboratory and field measurement devices for water and sediment measurements. The specialist is Dr. Fred Watts, Hydraulic and Civil Engineer, University of Idaho. His visit will be in August.
6. Assistance and review of the reclamation, drainage and water table control work of the entire program. The advisor is Dr. Eugene Doering, an expert with broad experience in salinity and reclamation research for the USDA. He is a possible candidate to fill the vacant position on the field team. He will visit in August/September.
7. Farm Management Economist to provide advisory assistance to the participants in the Farmer Involvement sub-project. Assistance is desired during October.
8. Finalizing and advertising Competitive Grants program. The proposed advisor is Dr. Maurice Wiese. He is expected to visit in September/October.

Following are the anticipated needs for assistance during the next few months. Technical Directives have not yet received clearance.

1. Tubewell deterioration and rehabilitation. Advisor to be selected, timing in November/December.
2. Drainage construction and data collection. Advisor to be selected. Timing in November/December.
3. Surface irrigation technology/methods. Advisor to be selected, timing in October/November.
4. Data management and statistical procedures for the watercourse monitoring analysis. Advisor to be selected. Timing in October-December.

## 8 CONCLUSIONS

The project is progressing well. It, of course, will remain behind schedule by at least 6 months because of the lack of funds for research during the first 9 month period. The delayed PC-I approval was most certainly due to there being three ministries involved. There are still constraining issues, some of which could be eased and many of which are the natural process of creating new concepts and programs.

### 8.1 Observations

The contract does not provide for an adequate level of effort for the home office at the University of Idaho. That office has done an excellent job to date, but has needed non-USAID funding support and the Project Director's contracted time will be used up in less than one more year. A contract requirement is for the Project Director to travel to Pakistan once or twice annually to assist with project planning and coordination. The contract however does not provide the level of effort for this. Without someone spending considerable time on assistance at the campus level the Project will not be able to function as it has in the past and production will suffer. A request has been made to USAID for a contract amendment to take care of this problem.

The past constraint of getting Task Orders cleared and approved has been streamlined and is no longer a constraint. This has greatly facilitated the process of obtaining expert advisory service on a timely basis. Assistance needs are also much easier to predict now that research is underway.

The Project Advisory Committee has been formalized and although it has not met it will become important as the ISMR Project begins to interface with other programs such as IIMI and the Command Water Project. The Project Implementation Committee (the Principal Investigators of each sub-project) though not formally instituted meets quarterly. These meetings have been invaluable in solving implementation problems and keeping lines of communication open. The project is diverse with respect to institutions and research agenda

and these meetings are essential for coordination.

The work load has increased immensely at the local office of the contractor. This is the result of the project finally getting underway. The procurement process requires much more time than was anticipated. Equipment needs specified by the Project designers have been altered many times. Much of the equipment is highly specialized and the latest models are not usually known to the local researchers.

The expatriate field team is one member short and this adds greatly to the load of the current staff. The authorized level of effort for the field team is minimal at best and when it is one person short some items must be neglected. The obvious one is the technical assistance help to the research projects. This can be satisfied somewhat by short-term help but not entirely. Short term technical assistance is successful when it is purely technical while the long term advisor becomes a part of the effort and he is much more aware of the local environment and its limitations.

Training has been initiated in a major way, especially the in-country training. The previous problem of getting Task Orders cleared has caused a serious delay in computer training however. The Task Order to procure local trainers required 4 months for clearance with the result that when the computers arrived the training program was not ready. This training will get underway during the next 6-month period.

The approval process for overseas training has been learned and the next year's training plan has been designed to facilitate clearances. The fact that approvals require an inordinate amount of time must be factored into the plans. Next year's training plan should be much more successfully implemented than last years.

EXHIBIT A

ANNUAL REPORT OF GOVERNMENT PROPERTY IN CONTRACTOR'S CUSTODY  
ISM RESEARCH THE UNIVERSITY OF IDAHO

JULY 1, 1987

CONTRACT NO. 391-0467-C-00-5044	Motor Vehicles	Furnishings & Equipment Office Homes	Other Property	Total Value	
=====					
A. Value of property-last report	\$38,965	\$31,250	\$30,837	\$0	\$101,052
B. Transactions during period					
1. Aquisitions					
a. Purchased by contractor					
30-Computer PC/AT		\$172,440			\$172,440
30-Color Monitor		\$21,660			\$21,660
30-Voltage Regulator, Elgar		\$23,970			\$23,970
30-Printer, Epson 286-E		\$19,560			\$19,560
4-Computer, Portable Compaq		\$16,316			\$16,316
4-Graphics Plotter		\$6,184			\$6,184
4-Printer, Epson 86-E		\$1,792			\$1,792
3-Letter Quality Printer		\$3,669			\$3,669
1-Laser Jet Printer		\$3,200			\$3,200
b. Transferred from USAID	\$0	\$0	\$0	\$0	\$0
c. Transferred from others	\$0	\$0	\$0	\$0	\$0
2. Disposals					
a. Returned to USAID	\$0	\$0	\$0	\$0	\$0
b. Transferred to USAID	\$0	\$0	\$0	\$0	\$0
c. Transferred to GOP agency	\$0	\$0	\$0	\$0	\$0
C. Value as of reporting date	\$38,965	\$300,041	\$30,837	\$0	\$369,843
D. Estimated average age (years)	1	1	3		

I attest that (1) physical inventories of Government property are taken not less frequently than annually; (2) the accountability records maintained for Government property in our possession are in agreement with such inventories; and (3) the total of the detailed accountability records maintained agrees with the property value shown opposite line C above, and the estimated average age of each category of property is as cited opposite line D above. The values of some USAID transferred equipment are estimates.

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Authorized Signature