

PN. AB I-888
72966

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
ISLAMABAD, PAKISTAN



IRRIGATION SYSTEMS MANAGEMENT PROJECT
PHASE II

Project Number 391-0467

OPERATION & MAINTENANCE PLANNING WORKSHOP

ISLAMABAD

DECEMBER 3-4, 1990

HARZA ENGINEERING COMPANY
DEVELOPMENT ALTERNATIVES, INC.
ASSOCIATED CONSULTING ENGINEERS-ACE (PVT) LTD

CONTRACT NUMBER 391-0467-C-00-9830-00

CONTENTS

CHAPTER	Page
ACKNOWLEDGEMENTS	1
EXECUTIVE SUMMARY	2
1. INTRODUCTION	4
1.1 Background	4
1.2 Terms of Reference	5
2. THE O&M WORKSHOP DESIGN	6
2.1 Workshop Background and Overview	6
2.2 Workshop Goals	6
2.3 Workshop Schedule	7
2.4 Session Descriptions	8
3. OUTCOMES AND AGREEMENTS	12
Specific Agreements and Recommendations	12
4. COMPUTERIZATION IN O&M PLAN PREPARATION	23
5. O&M EQUIPMENT TRIAL	25
6. PARTICIPANTS EVALUATION	29
APPENDIXES	
A. First Group Session	34
B. Second Group Session	38
C. Third Group Session	45
D. Fourth Group Session	51
E. Participants List	55

ACRONYMS

CE	Chief Engineer
DAI	Development Alternatives Inc.
ETF	Equipment Task Force
FCC	Federal Coordination Cell
ISM-I	Irrigation Systems Management Project, Phase-I
ISM-II	Irrigation Systems Management Project, Phase-II
ISRP	Irrigation Systems Rehabilitation Project.
M&E	Monitoring and Evaluation.
MIP	Manual of Irrigation Practices.
NESPAK	National Engineering Services, Pakistan.
NWFP	Northwest Frontier Province
O/ARD	Office of Agriculture and Rural Development(USAID)
O&M	Operation and Maintenance
PC	Provincial Coordinator
PID	Provincial Irrigation Department
SAR	Staff Appraisal Report.
SDO	Sub-Divisional Officer
SE	Superintending Engineer
TA	Technical Assistance (Consultants)
USAID	United States Agency for International Development
WRD	Water Resource Division (USAID)
XEN	Executive Engineer.

ACKNOWLEDGEMENTS

The Harza/DAI/ACE Technical Assistance Team would like to express its appreciation to the officials responsible for operation and maintenance of the irrigation systems in their provinces who took time from their busy schedules to contribute to this workshop. We are grateful for the thoughtful contributions made by all of the participants.

We are especially grateful to Dr. Alvin Newman, and Dr. Jan Emmert and Ms. Christine Sheckler, USAID/Islamabad; and Mr. F. H. Usmani, ISM Federal Coordinator, for their cooperation and support in organizing and implementing this O&M Planning Workshop.

EXECUTIVE SUMMARY

It is widely acknowledged that maintenance of the irrigation systems in Pakistan is deficient, leading to deterioration of the systems and a need for costly rehabilitation works. Improvement of maintenance is a major aspect of the overall ISRP/ISM Project. The World Bank has made preparation of annual O&M plans a covenant of its credit agreement. USAID has made assistance in O&M planning a major responsibility of the Technical Assistance team and has made recovery of costs for O&M a condition precedent of its grant funding.

The World Bank Staff Appraisal Report (SAR) and the USAID Project Paper both state that within 30 days of the beginning of the GOP fiscal year, an annual O&M program of work should be prepared, identifying recurring O&M requirements and special, non-recurring needs arising during the year. With the help of the Supervisory Consultants, NESPAK, and the TA Team Provincial Advisors, a first attempt to meet this requirement was made by each of the Provincial Irrigation Departments (PIDs) in 1990. It became apparent during this first attempt at O&M planning that many questions exist regarding procedures and issues.

It was concluded by the TA Team that there would be benefit to all by sharing experiences of problems faced and procedures developed by the different PIDs. For this purpose, USAID and the TA Team proposed to organize a special workshop on O&M planning. The workshop was held in Rawalpindi on 3-4 December 1990 with 17 officials of the PIDs attending.

The objectives of the workshop were to:

- . Exchange current information on the present O&M planning process and experiences within the four PIDs;
- . Identify problems and key issues related to O&M planning process and recommended solutions;
- . Discuss and propose strategy for dealing with important issues being encountered in O&M planning;
- . Propose on the role and responsibilities of PID officials at various echelons, USAID, Federal Coordination Cell, NESPAK and Harza technical assistance team in the O&M Planning process;
- . Develop concepts for implementation, monitoring, and evaluation of the O&M Equipment Trial.

Eight major topics as follow were discussed during the workshop:

1. Objectives of O&M planning,
2. Purpose to be served by O&M planning,
3. What should be in the O&M plan and how should it be prepared,
4. Concept and description of O&M Equipment Trial,
5. Implementation and monitoring of the O&M Equipment Trial,
6. Computerization in O&M Planning,
7. Specific recommendations for O&M planning in each province.

Most of the workshop was spent discussing these seven issues and reaching agreements on what steps for resolving them. Specific conclusions and recommendations are listed in Chapter 3 of this report.

Summary of Outcomes and Agreements

The outcomes and agreements of the workshop are described in detail in Chapter 3. The highlights are summarized here.

The participants agreed that inadequate maintenance of channels is a serious problem meriting high priority attention. Channel deterioration has many causes, some not under the control of the PIDs. The maintenance plan should identify routine and preventive maintenance and give an assessment of the condition of the system. The plan should originate with information from the lowest field level and should oblige field personnel to routinely inspect facilities.

The basic unit for maintenance planning should be the Division. Each division should highlight existing or developing special problems in its plan. Frequently updated yardsticks should be used for estimating budget requirements for routine maintenance activities. The sequence of planning steps should start in September of the preceding year and be finalized by the end of July of the fiscal year. The responsibilities of the various levels of Irrigation officials in preparing the plan were proposed. It was agreed that computerization would be beneficial to plan preparation.

The concept, equipment package, and monitoring and evaluation aspects of the trial program for light mechanized equipment for routine maintenance were described. Suggestions were made by the groups for implementation and monitoring of the trial. Groups representing each of the provinces summarized the recommendations as oriented to their individual PIDs.

Chapter 1

INTRODUCTION

Background

One of the major deficiencies identified in the Provincial Irrigation Departments is the inadequacy of the operation and maintenance (O&M) planning and implementation. The recognition of this deficiency has resulted in the World Bank making the proper development and utilization of an O&M Plan a covenant in their ISM-II agreement with the Government of Pakistan. In addition this is the major project issue in the USAID Project Paper for ISM-II. The World Bank identifies what it considers should be included in an O&M Plan in their Staff Appraisal Report (SAR) issued March 8, 1988. Those elements are as follow:

1. Identify O&M activities to be carried out on a regular or continuing basis;
2. Identify those activities that will require specific attention during the respective fiscal year;
3. For each activity identify location, scale of work (quantities), unit cost, total cost, manpower requirements, equipment requirements, who is responsible (position title) and provide for contingencies;
4. Prepare a comparison of O&M funding for the fiscal year with the funding of the bench mark year (FY 88);
5. Prepare an evaluation of the O&M work accomplished in the previous fiscal year and its relevance to project objectives and the O&M plan for that fiscal year.

The workshop participants support the inclusion of these elements in the O&M plans. However, they feel the O&M plan should not be limited to the revised definition of "Irrigation Systems" given in the SAR. The plan should address all operation and maintenance activities of the PID. There was also a consensus of the group that the annual work plan and the O&M plan must be a viable tool for use by the PID to guide their operation and to be a supporting document for budget request.

The USAID Project Paper on the ISM Project II states that the TA Team will provide consultation and any available assistance to the PID in the development of the annual work plan. During the process of extending this particular

to get on a clear footing, an internal meeting of the TA team was held at Islamabad on September 26 and 27, 1990. This meeting was also attended by USAID representatives and, for part of the time, by a World Bank representative. One of the recommendations made at this meeting was for holding an O&M planning workshop for involving PIDs and GOP in arriving at a consensus on O&M planning procedures and content. This national level workshop was jointly organized by USAID and the TA Team at Rawalpindi on December 3 and 4, 1990.

Terms of Reference

The responsibilities of the USAID/TA Team in organizing and conducting the workshop included:

- . Oversee the workshop planning, organization, timely and proper management of all logistic arrangements.
- . Prepare agenda/schedule and questionnaires for group discussions;
- . Prepare for/arrange briefings for the participants on O&M Equipment Trial, Monitoring and evaluation and potential for computerizing O&M planning process.
- . Manage and facilitate the workshop, emphasizing team building and problem-solving approaches.
- . Prepare a workshop report on issues identified, ensuing discussion, methodologies employed, agreements, and recommendations reached for effective O&M planning process and its implementation. The report will be distributed to all workshop participants.

Chapter 2

WORKSHOP DESIGN

Workshop Background and Overview

The overall purpose of this workshop was to get all the key players associated with O&M planning process within PIDs, donor agencies, and consultants on the same footing by sharing information about the present status and the problems/constraints being encountered.

The Water Resource Division (WRD) of USAID/Islamabad's office of Agriculture and Rural Development (O/ARD), with the concurrence of the ISM Federal Coordinator, F.H. Usmani, arranged this workshop. The workshop was held in Rawalpindi on December 3 and 4, 1990 at the Pearl Continental Hotel. The facilitator was Ms. Christine Sheckler of USAID/ARD.

Thirty three participants from the PIDs, Federal Cell, NESPAK, TA Team and USAID attended the meeting. The World Bank representative was unable to attend due to other engagements.

The workshop design provided opportunities for getting better acquainted, sharing project information, discussing and proposing solutions to O&M planning issues, defining management expectations, and drafting an outline/contents of an ideal O&M plan. The facilitators guided group assignments and encouraged full participation of all members, facilitated plenary discussions/decision making and recorded/reviewed agreements reached and recommendations made.

Workshop Goals

The workshop was designed to accomplish the following goals:

- . Exchange current information as it relates to present O&M planning process within the four PIDs.
- . Provide an opportunity to the participants to become better acquainted with the present practices of O&M Planning within the PIDs;
- . Identify problems and key issues related to O&M planning process and recommend solutions;
- . Gain agreement on the procedures and contents of O&M Planning process. Discuss and define strategy for dealing with important issues being encountered in O&M planning process;

- . Agree on the role and responsibilities of PID officials at various echelons, USAID, Federal Coordination Cell, NESPAK and TA Team in the O&M planning process;

Workshop Schedule

FIRST DAY

09:00 Opening Session

- Welcome to participants - F.H.Usmani, A.P.Newman
- Concept of workshop and working procedures - Christine Sheckler, Facilitator

09:30 Panel on Objectives of O&M Planning

- Summary of possible objectives - J.C.R.
- Reactions by representatives of PIDs, Donors, Technical

Assistance Team (C.M.Ashraf, S.K.Loni,
M.Qureshi, M.Ehsan, R.Boswell, C.Gandarillas)

10:00 Break

- #### 10:30 First Group Session - (Four mixed groups - each group to have at least one representative of each province, plus donor and TA representatives)

Subject - Purposes to be served by O&M planning

11:30 Groups report out

12:30 Lunch

13:30 Presentation on Computerization in O&M Plan Preparation

- Dr. Carlos Gandarillas

14:00 Second Group Session - (Four mixed groups)

Subject - What should be in the O&M Plan and how should it be prepared

15:30 Break

16:00 Groups report out

17:00 Close of First Day Sessions

19:00 Dinner

SECOND DAY

08:30 Presentation on O&M Equipment Trial

- Concept and description - J.P. Emmert, M. Qureshi
- Monitoring and evaluation - M. Karim
- Floor questions and discussion

09:30 Third Group Session - (Four mixed groups)

Subject - Implementation and monitoring of O&M Equipment Trial

10:30 Break

11:00 Groups report out

12:00 Lunch

13:00 Fourth Group Session - (Provincial Groups)

Subject - Specific recommendations for provincial O&M planning (Content, detail, procedure, schedule, responsibilities, etc.)

14:30 Break

15:00 Groups report out

16:00 Summary and Closure

- Summary of workshop conclusions and recommendations - Jan P. Emmert
- Evaluation discussion and questionnaires

19:00 Dinner

Session Descriptions

This section contains a brief description of each session. The results of the issues discussed and the agreements and decisions reached appear in Chapter 3.

Workshop Opening

The participants were welcomed by Mr. F.H. Usmani, Federal Coordinator, and Mr. Alvin Newman, Chief, WRD/ARD/USAID. After the welcomes, the facilitator reviewed the workshop schedule and working norms. Later on the participants introduced themselves giving name, position, where based, and assignment.

Panel on Objectives of O&M Planning

In order to share overall information and individual prospective on O&M planning, the facilitator asked selected representatives of PIDs, Donors, and TA team to be part of a panel to discuss their views on overall purpose, priorities and constraints of O&M planning. The panel comprised of:

- . Chaudhary Mohammad Ashraf, Provincial Coordinator, Punjab PID.
- . Shirin Khan Luni, Provincial Coordinator, Balochistan PID.
- . Muzzammil H. Qureshi, Chief Engineer, ISM Project, ARD/USAID
- . Mohammad Ehsan, General Manager, NESPAK
- . Rue L. Boswell, Provincial Advisor Punjab, Harza
- . Carlos Gandarillas, Provincial Advisor Balochistan

To start with the session summary of possible objectives of O&M planning was given by Mr. James C. Ringenoldus, Chief of Party, Harza Engineering. Nearly one hour was devoted for the panel discussion. Panel members gave their views and responded to questions asked by the participants.

First Group Session discussion on O&M planning issues

For this session, the participants were divided into four groups, working separately. The composition of the groups was as follows:

Group 1

A. H. Zaidi - Punjab
 F. H. Usmani - FCC
 Shafaat Ahmad Qureshi - Punjab
 Allah Bukhash Baloch - NWFP
 Haji Zainuddin Khan - Balochistan
 Rue Boswell - TA
 J. C. Ringenoldus - TA
 Kifayatulla Chaudhri - AID

Group 2

Ch. Mohammad Ashraf - Punjab
 Saleemullah Khan - NWFP
 Shirin Khan Loni - Balochistan
 Abdul Rashid Sheikh - Sindh
 Jan Emmert - AID
 Mohammad Ehsan - NESPAK
 Carlos Gandarillas - TA

Group 3

Ch. Mohammad Iqbal - Punjab
 S.A. Moghul - Sindh
 Amir Haider - NWFP
 Ghulam Usman Babai - Balochistan
 M. A. Zaidi - Punjab
 Muzammil Qureshi - AID
 Russ Stoneman - TA
 Ramiz Malik - TA
 Abdul Majeed Chaudhri - TA

Group 4

Abdul Hamid Arif - Punjab
 Yar M. Mashori - Sindh
 Asif Ali Khan - NWFP
 Khuda Dad Khajjak - Balochistan
 Gene White - TA
 M. A. Khaliq - TA
 Mehboob Karim - TA
 N.I. Dodhy - NESPAK

The groups worked from 10:30 hrs to 11:30 hrs and all the groups made their reports in plenary sessions till lunch break at 12:30 hrs. The second group session was held from 14:00 hrs to 15:30 hrs and reports were made at 16:00 hrs. The third group session was held next day at 09:30 hrs and reports were made at 11:00 hrs. The fourth and final group session was held at 13:00 hrs and reports were made at 15:00 hrs. Following each group report in each group session, the facilitator managed the plenary discussion that led to the results/agreements on the O&M planning issues. (See Chapter 3).

Computerization in O&M Planning

After lunch on the first day, Dr. Carlos Gandarillas, of the TA Team, made a presentation on computerization in O&M planning. The focus of his presentation was on the operations element of O&M. He described the availability of computer models that could be calibrated to represent the characteristics and operation of channels. By operation of the models under a range of simulated conditions, it may be possible to predict the behavior of the prototype channel as an aid to developing operational procedures. The presentation is described more fully in Chapter 4

O&M Equipment Trial

To open the second day, a presentation was made on the planned trial of light mechanized equipment for channel maintenance by sub-divisions and divisions. Mr. Jan Emmert described the concept of the trial and Mr. Muzzamil Qureshi described the equipment package. Mr. Mehboob Karim discussed the monitoring requirements for evaluating the trial and recommending modifications in the approach and equipment, if appropriate. The O&M Equipment Trial presentation is described more fully in Chapter 5. Following the presentation, the Third Group Session discussed implementation and monitoring of the equipment trial.

Workshop Close

After the last group session, a wrap-up summary was made by Mr. Jan Emmert. Individual workshop evaluation sheets were filled out by the participants.

Chapter 3

OUTCOMES AND AGREEMENTS

Specific Agreements and Recommendations

This section contains the agreements and recommendations made about the issues discussed at the workshop. Four groups discussed the major issues facing the O&M planning process within the PIDs.

PURPOSE TO BE SERVED BY O&M PLANNING

Q.1. How serious are the problems of maintenance of canals and drains?

Response

- The maintenance problems of the canals and drains are very serious and need to be addressed at a high priority and at the highest level.
- Many channels at present are unable to carry designed discharge.
- Many channels are choked.

Q.2. If there are problems, what are the causes?

Response

- * Stress on system:
 - Trespassing/encroachment are affecting the canal banks seriously.
 - Large scale theft of water.
 - Increased demand for water.
 - Changed cropping pattern.
 - Misuse and theft of water.
 - Efficiency of system.
 - Efficiency and effectiveness of staff.
 - Communication systems/transportation.
 - Feed back of information for operation & regulation, timely reporting of conditions/problems.
- * The Irrigation manuals need updating (Punjab MIP, Sind Bund). In addition canal specific manuals are needed.
- * Organizational Issues:
 - Staff is being assigned to multifarious duties at all levels.
 - Maintenance staff in the field is inadequately equipped.

- Land fragmentation is creating more difficulties in distribution.

Q.3. How can O&M planning lead to improved maintenance?

Response

- Plan should be prepared ahead of time.
- Plan should identify routine and preventive maintenance needs and also cater to special problems. Plan should be able to justify funds for O&M and should cater to targets of funding, contingency plans and efficient use of available funds. The plan should project to the decision makers the seriousness of the deterioration of the canal systems.
- The plan should provide an up-to-date assessment of the canal system and provide a basis for comparing with past conditions. It should also keep track of the backlog of deferred maintenance.
- Yardsticks should be revised/developed in such a way that they should address regular budgetary requirements for normal maintenance and weathering.
- The plan should be conceived in such a manner as to force field engineers to inspect the canals regularly, so they can think ahead to tackle the problems. The plan should also cater to periodic high level inspections.
- The plan should originate at the lowest level, this will help in ensuring proper inspections and analysis. Since the plan helps in monitoring and if there is no plan there cannot be any monitoring.
- The plan should provide a disciplined and scientific method of carrying out O&M.

Q.4. Should the O&M plan attempt to meet the following objectives?

- Monitor the condition of irrigation facilities
- Means of communication of facilities condition and maintenance/repair needs
- Basis for budgeting for specific maintenance/repairs
- Assure financial provisions for preventive maintenance
- Establish priorities for maintenance/repair activities
- Provide guidance for allocation of limited funds
- Record prior works/expenditures
- Indicate performance problems of specific facilities
- Meet donor requirements

Response

- Yes, it should meet the objectives.
- The O&M plan can be oriented to meet the listed objectives, but it is more oriented to the budgetary process.
- The cuts in the budget provisions make determination of priorities difficult.
- As far as an evaluation process is concerned, the financing agencies do not have staff for proper evaluation.

Q.5. Which objectives do you consider to be beneficial to the PIDs?

Response

- All objectives are realistic and will be beneficial.

Q.6. Are there changes unrelated to O&M planning that would help to improve the level of maintenance?

Response

- Other changes than planning that could improve maintenance:
 - Lining of canals.
 - Metaling canal roads.
 - Construction of other new roads.
 - Renovate telecommunication system.
 - Training of field staff.
 - Improved techniques and methods.
 - Periodic inspections of completed systems by experts and independent organizations.
 - Effective management and control.

WHAT SHOULD BE IN THE O&M PLAN AND HOW SHOULD IT BE PREPARED?

Q.1. What should be the basic maintenance unit considered in the plan?

Response

- Basic planning unit should be at Division level. The physical units per division should be as follow:

Canals and Drains: Unit lengths of same discharges.

Structures: Barrages, regulators and bridges etc should be taken as independent units.

Flood Bunds: Economic lengths should be adopted for rehabilitation.

Buildings: Each building should be adopted as a unit.

Q.2. How should preventive maintenance be included in the plan?

Response

- Preventive maintenance funding should be based on annually updated and realistic yardsticks. One section of the Work Plan should include required preventive works based on inspection by the field officers.
- Special maintenance should be on basis of inspections and needs.
- Preventive maintenance should be based on cyclic scheduling. A five year average cycle is suitable, but adjustments should be made where necessary.

Q.3. How can the plan communicate the condition of facilities?

Response

- Each Divisional unit should include a section in its plan highlighting serious/emergent problems to support special maintenance funds request.
- All facilities should be monitored annually and condition of facilities should be indicated in the plan.
- Works should be classified and described as routine, special, rehabilitation, and those to be carried out once in life time.

Q.4. How should Yardsticks be used in plan preparation?

Response

- Yardsticks should be used for the preventive maintenance component only. Because workplan work will cover works under preventive maintenance & special repairs etc.
- Yardsticks should be used for preparation of routine maintenance plans and can be used as a tool for projecting future budget requirements.

- Yardsticks can be directly applied to physical units. For canals, drains and flood bunds, they should be based on mileage rates; for tubewells, HP rating; and for barrages and other structures, they should be on individual bases.

Q.5. What should be the schedule of steps in plan preparation?

Response

* The suggested schedule of steps for annual O&M plan preparation should be as follows:

- A. Basic data collection should be completed by end of August or latest by beginning of September. The basic data should include:
 - Condition surveys and inspections.
 - Inventory of physical units.
 - Determination of specific non-scheduled maintenance.
 - Estimates for preventive maintenance based on yardsticks.
 - Identification of proposed works and priorities.
 - Review of past years accomplishments and short falls
- B. XEN should submit the plan to S.E ideally by 1 September.
- C. S.E. should submit the plan to C.E. by 15 October.
- D. C.E. should submit the plan to the Secretary by 25 November.
- E. The Secretary should forward the plan to the Finance Department by 1 January.
- F. The Finance Department should make the allocation by the first week of June.
- G. On the basis of the allocation, preparation of the Work Plan should be completed by end of July.

Q.6. What are the responsibilities of various institutional levels (SDOs, XENs, etc.) in plan preparation?

Response

* Following are the suggested responsibilities of various institutional levels:

SDO: He is responsible for carrying out surveys and maintaining updated inventories, and should determine the conditions/needs after carrying out inspections.

This should be the basis of budget estimates for the needed works.

XEN: He should carry out supervisory checks on condition surveys and is responsible for compiling budget estimates submitted by all SDOs. He is also responsible for prioritizing the works in his division.

S.E. He is responsible for compiling the budget estimates submitted by all divisions after rationalizing them. He should also review/revise priorities for his circle.

C.E. He is responsible for finalizing the plan for his zone.

SECRETARY: He compiles the overall maintenance and sets the final priorities.

Q.7. In what ways can Computers contribute to the plan preparation?

Response

- * Computers can help in keeping/updating inventories to schedule necessary periodical maintenance work, and for personnel and budget management.
- * In order to make effective use of computers, application formats should be first developed and after that available data can be entered for computerized processing.
- * Computers can be effectively used for the following:
 - forecasting.
 - compiling data bases.
 - review/revisions in data bases and plans.
 - continued and quick updating.
 - preparation of design drawings and graphic representation of data.
 - data base/inventory of facilities.
 - keeping track of preventive maintenance,
 - report generation.

IMPLEMENTATION AND MONITORING OF O&M EQUIPMENT TRIAL

Q.1. How do we inform and get the involvement of the personnel in the subdivisions/divisions?

Response

- A provincial level workshop, in each province, with all the concerned SEs, XENs, one or two SDOs and few selected Sub-Engineers from each division will be held at a central location in order to carry out orientation, define the plans, and adopt methodology for implementation and monitoring. Provincial Coordinator, Provincial Advisor, representatives of TA Team USAID will also participate in this workshop.
- Detailed meetings will be held at divisional level for program orientation and concept development. These meetings will be attended by all the involved staff from the division and representatives of TA Team/USAID.
- Prior training of Sub-Engineers and Mates be undertaken in order to clear their concept and ensure full involvement.

Q. 2. Who should be responsible above the division level for implementation?

- SEs should be made in charge of the program and they should look into the matters of finances, training of staff, implementation of the program, work plans, maintaining of log books, etc. Provincial Coordinator will share responsibility for implementation.

Q.3. How can we monitor the performance/effectiveness of maintenance in the trial sub-divisions?

- Representatives of USAID, TA Team and PIDs will develop a format/proforma for recording the performance and output of trial equipment.
- Monthly program of work giving planned use for each piece of equipment should be prepared and monthly performance/progress carefully observed against the established program/targets.
- The Provincial Coordinator should monitor the performance/effectiveness of the equipment through his independent nominated officer. The maintenance condition of the equipment should be reported to the Provincial Coordinator by XEN Mechanical and his staff, staff holding the equipment, and TA Team advisors.

Q.4. How can we evaluate the suitability of the specific pieces of equipment?

- The basis for evaluating the suitability of specific pieces of equipment will be the reports regularly submitted by the custodian/operating staff (XEN, SDO) of the trial equipment.
- The reports should essentially contain; quantum of work executed, hours of work machine used, cost of operation, and problems encountered in using the equipment.
- Evaluation for suitability will also be based on the careful examination of log books and observations on performance under specific conditions/limitations.
- For suitability evaluation, there is a need to find ways and methods for comparing the cost of routine works executed by machine and that done by manual labour.

Q.5. What data need to be collected and who should be responsible?

- The quantities of work done should be recorded in log books each day/occasion of use by the operator or Sub-Engineer. The entries should be checked occasionally by the SDO/XEN concerned.
- Data on work to be done as per plan, cost estimates for these works, contractor's prices for these works, actual quantities executed by a particular piece of equipment and actual hours of machine use for the executed quantities should be maintained.

Q.6. How should the evaluation be made in a way that is useful to both the PIDs and the donors? Who should review it?

- The evaluation should be done by an independent agency, designated by Provincial Coordinator and Zonal CE, in each region. The evaluation reports should be reviewed by the Zonal CE. An evaluation team comprising of Provincial Coordinator, Provincial Advisor, representatives of PID, USAID and TA Team can ideally carry out evaluation task.
- The evaluation reports should also be reviewed in Equipment Task Force meetings.

SPECIFIC RECOMMENDATIONS FOR PROVINCIAL O&M PLANNING:**A. CONTENTS AND DETAILS OF O&M PLAN:**

- 1) The plan should contain an evaluation of previous year's program, giving details of allocations and budgets, actual utilization, and critical observations on O&M performance. The current budget estimates should be compared with last three years' budgeting for reasonableness and adjustments should be made for realistic amounts. The initial preparatory work should involve defining the proformas/framework for planning. The ideal would be to hold a provincial level workshop with all the CEs and SEs participating in order to resolve key issues. The plan should be based on detailed field condition survey of facilities. It is recommended that computerized inventory of facilities be created/maintained at divisional level.
- 2) The plan for current year should contain:
 - a) Objectives of the recommended plan.
 - b) Methodology to be adapted for executing the plan.
 - c) Complete details/lists of works and financial effects giving name of work/facility, location, head discharge, current condition, O&M details, details of previous rehabilitation and scale of proposed work.
 - d) Maintenance targets and proposed allocation of equipment and manpower.
 - e) Details/break-out of routine maintenance items and non-recurring costs.
 - f) Preventive maintenance cost estimates based on the quantity of facilities and established yardstick per facility.
 - g) Established fixed costs: establishment, electricity expenses, POL other miscellaneous expenses/overheads, etc.
 - h) Evaluation of procedures and methodology based on targets in real terms, O&M estimates versus allocations, and general assessment of performance/execution of O&M works.

B. PROCEDURES AND SCHEDULE

- 1) O&M planning data based on condition surveys should be collected by concerned SDO.
- 2) The proposed works list and cost estimates should be prepared, and after review by the XEN concerned, it should to be submitted by the XEN to the concerned SE by 1st September.
- 3) SE should submit the budget and O&M plan to CE by 15 October.
- 4) The concerned Chief Engineer, after consolidating the plans pertaining to all the divisions, should submit to the Secretary by 25 Nov.
- 5) The Secretary in turn should forward the plans and budget estimates to Finance Department by 1 Jan.
- 6) Finance Department processes the provincial budget and submits to Provincial Assembly.
- 7) Assembly discusses and passes the budget in June every year.
- 8) Finance Department makes budget allocation and releases funds by early July.
- 9) Finally, based on budget allocation, the O&M plan is revised and finalized for implementation in July.

C. RESPONSIBILITIES

- SDO** : Carrying out of condition surveys and preparation of budget estimates.
- XEN** : Review of condition surveys, identification of needs and priorities, compilation and submission to the concerned SE.
- SE** : Review of budget estimates, needs and priorities, compilation, and submission to CE.
- CE** : Finalization of zonal plan and submission to Secretary.
- Secretary** : Compiles provincial program and sends to Finance Department for budget allocation.

OTHER RECOMMENDATIONS

A. Users/Public Education.

The participants were of the view that the users of the system, i.e. farmers and public, should be educated for a careful approach towards canal systems and facilities in order to avoid unnecessary tampering and damages. The education of farmers using the system and public living in the vicinity of the canals and facilities would certainly help in curtailing damages and reducing the maintenance works. The public education should cover the following:

- a. Damages caused by cattle and remedial measures.
- b. Trespassing on the canal tracks by vehicles and other type of unauthorized traffic.
- c. Tampering of outlets and its effect on the system as a whole.
- d. Encroachment of land owners and public on the canals and facilities.

The suggested media for educating the public could be:

- a. TV
- b. Mobile van with audio-video facilities and documentary films.
- c. Refresher courses of PID staff particularly lower grade employees.

B: Institutionalization of O&M Planning Process.

The O&M process should be institutionalized within the department. The formats and procedures should be defined/streamlined. The nerve center of the O&M planning should be the CE's office. Efforts should be made for computerization of the planning process down to the SDO level. Initially, a computerized program should be developed and installed at CE's office.

C. Updating of Yardsticks

It was recommended that yardsticks be updated periodically, preferably after every two years. Similarly, the 1986 Schedule of rates needs revisioning due to price escalation over the past years.

Chapter 4

Computerization in O&M Plan Preparation

At 13:30 hours on Dec 3, 1990, Dr. Carlos Gandarillas, Provincial Advisor ISM for Balochistan, gave a presentation to the participants of the workshop on "Computerization in O&M Plan Preparation." Following paragraphs contain a summary of the presentation:

The entire O&M process is aimed at achieving two major goals, i.e. equity and reliability, in water distribution. As per studies carried out by IIMI, in the Punjab, on the canal performance for water distribution, the distribution pattern in most irrigation Systems of Pakistan lacks aspect of equitability and reliability. The observation on channels revealed that the equity in the last 1/4 outlets was on the average 4 to 6 times worse off than first half outlets and variability in discharge quantities was 3 times greater in last 1/4 outlets as compared to the first half number of outlets on the channel. The rotational practices for distribution of water are not being properly followed and tail outlets stay without water 6 to 8 times as many days as head outlets do.

One of the causes for such performance is poor quality of O&M planning and practices. In order to improve canal operation performance, we have to have a solid understanding of hydraulic nature and behavior of each individual canal. We should consider that the flow condition in the canals, as per design, is only a prediction of the canal hydraulics and also that the inequity and unreliability in distribution is often enters the system at the main and distributary canal levels and not at lower levels as usually assumed. Some other important factors resulting in inequity and unreliability are:

- * Flow conditions are not always as originally designed.
- * Flow does not always behave at steady state.
- * There is instability every time we fill and empty a canal and also when we set the gates.
- * The channels do not always flow at design capacity.
- * There are time lag.

The first step in proper O&M practices is to collect reliable and accurate data. The second step calls for a realistic analysis of data. The correct analysis will lead us to to fully comprehend the hydraulic behavior of the canal.

A modern way to analyze the data is by using microcomputers. Several spreadsheet and database commercial software packages are available and can be used to calculate Yardsticks, schedule of rates and maintenance planning and many other applications.

For the operations planning, there is software available for the hydraulic simulation of conveyance and distributaries. Mathematical models allow us to analyze different operational strategies, as well as to simulate the effect of physical changes in the system. Some alternatives and strategies are neither physically nor economically possible without these models.

Computerized mathematical models can help us in understanding the hydraulic behavior of channels for conveyance and distribution of water and depicting steady and unsteady state. With the help of mathematical models, we can carry out following task most accurately and efficiently:

- * Calculate flow levels
- * Calculate flow rates.
- * Simulate seepage in the channel.
- * Determine gate opening and turn out settings.
- * Achieve reduction in delivery timings.
- * Help avoid channel overflows.
- * Help analyze the possible canal system operating conditions.
- * Simulate different operational conditions and procedures.

The software can be used by the PID's as:

- * A operational tool for managers;
- * A design analysis tool; and
- * A training tool for operators.

Good software on mathematical models is available, the only basic disadvantage with these packages is that they need calibration for particular set of environments and O&M conditions. This can be specialized and time consuming job.

CHAPTER 5

O&M EQUIPMENT TRIAL

On Dec 04, 1990 the second day's session of the Workshop started with a presentation on "O&M Equipment Trial" by Mr. Jan P. Emmert, Project Officer ISM, ARD/USAID and Mr. Muzammil H. Qureshi, Chief Engineer Water Resource Division, ARD/USAID. The presentation was followed by another presentation on "Monitoring & Evaluation Aspects of The Trial Program" by Mr. Mehboob Karim, Monitoring & Evaluation Specialist of Harza Engineering Company, Islamabad. The salient points of the presentations are summarized as follows:

PURPOSE OF THE TRIAL: The purpose of the O&M Equipment Trial is to test the concept of improving O&M performance through use of light mechanization, i.e. employment of light equipment for some O&M tasks. The trial will fully evaluate the impact of this equipment package on routine maintenance performance as well as the suitability of each specific item in the O&M package.

CONCEPT AND EQUIPMENT SELECTION CRITERIA: The idea/concept behind the whole exercise is to evaluate/test utilization of light and easy to handle mechanical equipment for the O&M tasks. The equipment is locally made, relatively inexpensive, and easy to operate and maintain. The operating expenses are much less expensive than conventional heavy equipment in use in the PIDs. The basic equipment package will be placed under control of civil sub-divisions responsible for canal maintenance, rather than mechanical units. A small additional pool of equipment will be placed at the division level for use by all of the component sub-divisions. The equipment package was selected and modified during detailed deliberations with the Provincial Irrigation Departments.

The basic O&M equipment package at the sub-division level consists of a farm tractor, several hydraulically operated attachments which are mounted on the tractor (a grader blade, a dozer blade, and a chisel plough), pieces of equipment which are pulled by the tractor (a tipping trolley, a water bowser, emergency lights) and a vibrating compactor). This equipment is supplemented by the division level pool consisting of another tractor, a tractor-mounted front-end loader, and a flat-bed truck.

This equipment is intended to make possible routine maintenance of canal banks, such as regular watering and timely minor earth work repairs. The pickup truck, the Suzuki jeep and the trolley are intended to improve the mobility of staff at the sub-division level and the jeep and flat bed truck at division level.

The equipment will be allocated and tested in 8 Divisions in the four Provinces and their component 24 sub-divisions. The trial period will be one year, hopefully starting by April.

MONITORING & EVALUATION ASPECTS OF O&M TRIAL PROGRAM: The purpose of the trial is to assess the suitability and effectiveness of the equipment package in maintaining the condition of canals and drains. To determine the results of the trial, effective monitoring and evaluation of the trial will be essential. The monitoring and evaluation will involve the SDOs and XENs directly involved in the trial, higher level PID officials, the technical assistance team, and USAID. The TA Team will help to set up the format for gathering and analyzing information on the trial. One or more Workshops will be held involving trial SDOs and XENs to make sure that the trial purposes are understood and to help assess the results.

The objective of the M&E is two fold:

- 1) To determine the impact on O&M performance.
- 2) To establish the suitability of the O&M trial equipment package.

O&M PERFORMANCE: The major issues for the evaluation of O&M performance are:

- 1) What is the state of maintenance of canals?
 - a) With and without the trial?
 - b) before and after the trial?

SUITABILITY OF THE PACKAGE: To establish the suitability of the package the issues are:

- 1) How frequently is each piece of the equipment used ?
And for what purpose?
- 2) Is the package financially viable? Do the Divisions/Sub-Divisions have finances to use and maintain the equipment?
- 3) Who are selected as operators? Can operators be made available by training the existing staff?
- 4) What standards should be used to measure usage? How frequently should it be measured; daily, weekly?
- 5) What are the problems/uses/advantages of each piece of equipment?

- 6) Are there changes needed in the equipment package to make it more effective?

OTHER AREAS OF INTEREST

A. TRAINING:

1. Are the operators adequately trained?

B. WORK & EQUIPMENT SCHEDULING:

1. How is equipment being scheduled and managed? By whom? Is daily, weekly or monthly workplan being prepared?

Are the targets being achieved?

C. EQUIPMENT MANAGEMENT:

1. Are equipment utilization and maintenance plans being prepared.
2. Is preventive maintenance being carried out on each equipment?

QUESTIONS TO BE ANSWERED AT THE END OF EVALUATION

1. What were the major problems encountered during the trial period?
2. Was the basic concept of the use of mechanized equipment for canal maintenance valid? Does it need modifications?
3. Where is the concept applicable and where is it not?
4. Was this program a financially viable proposition for both the PIDs and the donors? Should they go for an expansion?
5. Is this approach to routine maintenance sustainable? Are operators easily available? Are PIDs willing to provide repair and maintenance budget?
6. Has the performance of maintenance in the trial areas improved?

Chapter 6

PARTICIPANT EVALUATIONS

Thirty participants completed the written evaluation. The evaluation results show a high rate of achievement of the workshop goals and participants expressed a high level of satisfaction with the workshop, both in oral and written comments.

Opinions and feedback:

Participants were asked to answer the following questions. The answers as brought out by the participants are appended below:

1. What do you think has been the primary benefit of this workshop?

- Better appreciation and realization of importance of O&M planning.
- The participants have appreciated the need of the two subject points. Hopefully this will be communicated to their colleagues in the departments, when TA Team circulates summary handouts on the proceedings.
- Very beneficial.
- The primary benefit of this workshop has been the mechanics for preparation of O&M Workplan, this has been streamlined and each PID of the four provinces can prepare this plan according to the requirements of donor agencies.
- Get together, understanding each other's point of view and arriving at almost uniform line of action.
- This has helped participants belonging to different provinces of the country, not only to recognize the importance of O&M planning specific to their provinces but has also provided them the opportunity to know more about other provinces.
- This workshop has spelled out the requisites, proceedings, schedules and monitoring aspects of O&M planning. It has given start to the mechanical maintenance, which was already over due.
- Gaining acceptance and importance of preparing O&M plan on a proper format, which as per earlier practices was no more than a description of works and budget estimates, has been the primary benefit.

- Discussion of O&M trial was essential and also a secondary benefit.
- It is the first workshop on O&M planning where all the concerned agencies PIDs, USAID, TA Team, NESPAK and GOP had thorough deliberations on each and every aspect of O&M.
- This has been very educative and informative in identifying the requirements of better O&M for providing better facilities for natural uplift.
- This provided an opportunity for exchanging the ideas on O&M planning with the participants of various agencies.
- The primary benefit of this workshop has been that the different ideas of the participants from different provinces regarding the preparation of O&M plan have been heard. At the closing of the workshop, suggestions on the provinces basis were given after discussions held in provincial group sessions.
- The problems of various regions were discussed and ways and means to improve the system were suggested.
- To have comprehensive knowledge of the problems to be solved.
- It provided opportunity for sharing ideas and establishing the needs for proformas and structured approach towards O&M planning.
- The idea of such workshop is really marvellous. It definitely was of primary benefit for the participants themselves too.
- A high degree of consensus about implementation & evaluation of O&M equipment trial. It also brought out a strong sense of PID perspective on O&M planning and sense from PIDs about how it can benefit them. On both topics a number of important insights were highlighted that can be incorporated in plan.
- Better understanding and appreciation of O&M plan preparation and its implementation. Also the way it can help in projecting the point of view of PID to the government about the need for adequate provision of funds.
- A clear understanding about the concept preparation & evaluation of O&M plan emerged.

- To formulate an effective yardstick and parameter for O&M planning.
- An opportunity to exchange views on this subject. Hence onwards, through O&M plan PIDs will be better equipped to plead their case for proper funding.
- Better understanding of the issues involved in O&M planning & equipment trial.
- It made participants aware of the need for preparation of O&M plans.
- Provided a guideline for the preparation of the O&M plan.
- It provided a forum for all concerned to have a common understanding of what is needed in an O&M plan. This will go a long way to standardizing the planning process.
- Better understanding of the issues involved for preparation of O&M annual program.
- Learning and getting consensus for O&M planning.
- Familiarizing with the planning/implementation of irrigation facilities.
- It has crystalized various aspects of O&M planning into a clear perspective.
- Better understanding of O&M planning.

2. What workshop activities could have been done better?

- Preparation of O&M plan required more attention.
- I cannot think any thing better. It was very well organized.
- All activities have gone very well and according to schedule.
- I think the workshop has been conducted in a very systematic manner with perfect time schedule. All activities have been discussed.
- I think almost all the aspects were adequately covered within the time at our disposal.
- Nothing is to add.
- All the activities were done better.

- All O.K!
- All activities have been discussed upto desired possible standard.
- Every thing was O.K
- I think all aspects were discussed in length.
- None
- I feel that entire workshop was done in the proper and desired manner.

3. Do you believe there are unresolved issues that should be dealt with in follow up activities? What are they and what should be done about them?

- Workshop on provincial basis for better understanding of trial O&M equipment.
- Yes, O&M planning needs to be taken up by FID as an institution. Some follow up would be needed.
- Entire Non-Development and Development budget of the department should be taken into account for O&M planning of any year.
- Yardsticks for maintenance has not been mentioned before evaluating the cost, the question of a finally agreed yardstick should be solved first.
- There were some difference of opinions about the package of equipment which should be dealt with in follow up activities.
- The formats should be prepared for monitoring and watching the progress of mechanical equipment.
- Recovery and full funding for O&M. Unless this issue is resolved, no meaningful O&M could be achieved.
- It is a good break through and we will learn by implementing the suggestions to have the desired effect.
- This workshop should have also been attended by the high ups of departments i.e Secretaries of FIDs and Finance Department.
- Yes, O&M funding should be restricted to the requirements. Results of suggestions should be watched and discussed in next workshop.

- All the issues have been solved. No need of follow up workshop.
- In my opinion every point was dealt in details.
- There are issues that require follow up, however I feel this follow up should be done at the provincial level.
- All issues resolved.
- Yes, a joint meeting should be arranged at Secretary level with F.D in the presence of donors to ensure the proper funding for O&M.
- No.
- None.

4. What comments do you have about the workshop arrangements and accommodation?

- Arrangements were very good.
- Well done. Thanks.
- These were excellent.
- All very satisfactory.
- The workshop arrangements and accommodation were fine. The facilitator deserves special mention for her approach and the way she conducted the workshop.
- Excellent
- They were excellent and quite adequate and complete.
- The arrangements were fine.
- Well arranged and looked after. A word of thanks for USAID, HARZA and for facilitator.
- I found it excellent.
- Excellent, well done and thanks.

Appendix A

SESSION PROCEEDINGS

FIRST GROUP SESSION

Subject: PURPOSE TO BE SERVED BY O&M PLANNING

1. GROUP I

PURPOSES OF THE O&M PLAN

- To provide a disciplined and scientific method of carrying out O&M.
- A realistic method of requesting funding.
- Provide a basis for setting priorities and adjusting to allocated funding.
- To communicate to the funding decision makers the seriously deteriorating conditions of the canal system.
- Provide an up to date assesment of the canal system and a basis for comparing with past conditions.
- Provide a schedule for routine preventive maintenance.
- Track backlog of deferred maintenance.

2. GROUP II

Q.1. How serious are the problems of maintenance of canals and drains?

Response:

- Problems of maintenance of canals and drains are really very serious.
- Many channels are unable to carry designed discharge.
- Many channels are choked.

Q.2. If there are problems, what are the causes?

Response:

The major causes are:

- Stress on the system:
 - Trespassing, which has special impact on banks,
 - Increased demand of water,
 - Changed cropping pattern,
 - Misuse/theft of water,
 - Environmental impact, like discharge of sewage in canals.
- Mechanical structures(Gates & Gearing) are aged and outdated and are not maintained properly.
- Funds provided for O&M are inadequate, so even the recently rehabilitated canals are deteriorating.
- The maintenance technology and organizational setup

needs review in order to enhance the efficiency of staff, operating systems, and to overcome communication problems.

- Two basic manuals of Irrigation Practices (Punjab MIP and Sind Bund Manual) need revision and updation.
- The present approach to maintenance is based on ad-hoc arrangements, there is a need for developing canal specific manuals.
- The increase in multifarious duties of staff at all levels results in reduced time devotion to maintenance aspects.
- Land fragmentation makes distribution more difficult.

Q.3. How can O&M planning lead to improved maintenance?

- Plan should identify needs as follow:
 - Routine/preventive maintenance,
 - Needs arising out of special developments.
- Yardsticks should address regular budgetary requirements for normal wear and tear/weathering.
- O&M planning process forces field engineers to go to canal sites, familiarize with the system and think ahead to needs.
- The planning process calls for frequent frequent inspections by field officers and periodic higher level inspections.
- Existence of a plan provides basis for regular monitoring, it is very hard to carry out monitoring/performance evaluation in the absence of a plan.

Q.4. Should plan be used to meet these objectives?

- Yes, the plan should meet the objectives as earlier brought out. The existing planning procedure also calls for this, but at the moment it is orientated towards budgetary process.
- The cuts imposed at various stages result in losing basis for determining priorities.

Q.5. Which objectives do you consider to be beneficial to the PIDs?

- All objectives are beneficial to the PIDs.
- The PIDs should try to set targets in the light of objectives and try to achieve them.

Q.6 Are there changes unrelated to O&M planning that would help to improve the level of maintenance?

Yes, following will help to achieve the improved maintenance standards:

- Lining of canals,
- Metalling of canal roads,
- Other new roads,

- 34 -

- Improvement in telecommunication system,
- Training of field staff,
- Improved techniques and methods,
- Periodic inspections by independent agencies.

3. GROUP III

Q.1. How serious are the problems of maintenance of canals and drains?

Response:

- Problems of maintenance of canals and drains are very serious and need to be addressed at the highest level.

Q.2. If there are problems, what are the causes?

Response:

The major causes are:

- Inadequate finances.
- Large scale theft of water/tresspassing/encroachment.
- Limited reliability (inefficiency of operators).
- Deferred maintenance
- Lack of telecommunications and other equipment.
- Lack of transportation.
- Inadequacy of staff.
- Inadequate training/education of operators and users.

Q.3. How can O&M planning lead to improved maintenance?

- The O&M planning provides a program for:
 - Means of implementation,
 - Establishes funding aspects and targets,
 - Helps in determining contingency plans.

Q.4. Should plan be used to meet these objectives?

- Yes, to some extent.

Q.5. Which objectives do you consider to be beneficial to the PIDs?

- All objectives are beneficial to the PIDs.

Q.6 Are there changes unrelated to O&M planning that would help to improve the level of maintenance?

Not responded.

25'

1. GROUP IV

PURPOSES OF THE O&M PLAN

- Plan should identify routine and special works.
- Plan should take care of periodic review of O&M on need basis
- Plan should be able to justify funds for O&M.
- Plan should have monitoring and inspection mechanism
- Plan should identify consequences and deficiency of funding/ implementation practices.
- Plan should be prepared ahead of time.

Q.1. How serious are the problems of maintenance of canals and drains?

Response:

- Problems of maintenance of canals and drains are very serious and should be addressed immediately.

Q.2. If there are problems, what are the causes?

Response:

The major causes are:

- Canals are not being operated as per design.
- System is under pressure due to increased services requirements.
- Modern techniques and tools are lacking for managing the system.

Q.3. How can O&M planning lead to improved maintenance?

- The planning process should be more systematic.
- Evaluation/monitoring will help in early warning.
- It will ensure more efficient use of available funding.

Q.4. Should plan be used to meet these objectives?

- Yes, the plan should meet the objectives.

Q.5. Which objectives do you consider to be beneficial to the PIDs?

- All objectives are realistic and beneficial to the PIDs.

Q.6 Are there changes unrelated to O&M planning that would help to improve the level of maintenance?

Yes, effective management/control and addressing some of the human aspects will certainly help.

36

Appendix B

SESSION PROCEEDINGS

SECOND GROUP SESSION

Subject: WHAT SHOULD BE IN THE O&M PLAN AND HOW SHOULD IT BE PREPARED?

1. GROUP I

Q.1. What should be the basic maintenance unit considered in the plan?

Response:

- Basic planning unit should be at Divisional level and assessment be based on review of the last fiscal year implementation.

Q.2. How should preventive maintenance be included in the plan?

Response:

- Preventive maintenance funding will be based on annually updated and realistic yardsticks.

Q.3. How can the plan communicate the condition of facilities?

Response:

- Each Divisional unit should include a section in its plan highlighting serious/emergent problems to support special maintenance funds demand.

Q.4. How should yardsticks be used in plan preparation?

Response:

- Yardsticks will be used for preventive maintenance component only. Because workplan will cover works under preventive maintenance and special repairs etc.

Q.5. What should be the schedule of steps in plan preparation?

Response:

- No response.

Q.6 What are the responsibilities of various institutional levels (SDOs, XENs, etc) in plan preparation?

Response:

- No response.

Q.7 In what ways can computers contribute to the plan preparation?

Response:

- Computers can help in keeping/updating inventories to schedule necessary maintenance work (periodical), and for personnel/budget management.

2. GROUP II

Q.1. What should be the basic maintenance unit considered in the plan?

Response:

- The basic organizational/maintenance unit for developing a plan should be Division headed by an XEN and plan should include list of all the structures/facilities under his control giving standard lengths, discharges of canals or drains, barrages etc. including details of buildings and equipment.

Q.2. How should preventive maintenance be included in the plan?

Response:

- Preventive/routine maintenance on basis of yardsticks. It is recommended that yardsticks be frequently updated.

- Special maintenance be worked out on basis of inspection/need.

Q.3. How can the plan communicate the condition of facilities?

Response:

- In order to establish the condition of facilities, annual monitoring of all the facilities is needed.

- Depending upon the departmental decision, condition of all the facilities or of only those needing attention in the current year should be indicated in the plan.

38

Q.4. How should yardsticks be used in plan preparation?

Response:

- Yardsticks should be used for preparation of routine maintenance plans and can be used as a tool for projecting future budget requirements.

Q.5. What should be the schedule of steps in plan preparation?

Response:

The suggested schedule of steps for annual O&M plan preparation should be as follows:

- Basic data collection should be completed by end of August or latest by beginning of September.
- XEN should submit the plan to S.E. ideally by 01 September.
- S.E. should submit the plan to the C.E. by 15 October.
- C.E. should submit the plan to the Secretary by 25 November.
- The Secretary should forward the plan to the Finance Department by 01 January.
- The Finance Department should make the allocation by the first week of June.
- On the basis of the allocation, preparation of the Workplan should be completed by end of July.

Q.6 What are the responsibilities of various institutional levels (SDOs, XENs, etc) in plan preparation?

Response:

Following are the suggested responsibilities of various institutional levels:

SDO: He is responsible for carrying out surveys and maintaining updated inventories, and should determine the condition/needs after carrying out inspections. This should be the basis of budget estimates for the needed works.

XEN: He should carry out supervisory checks on condition surveys and is responsible for compiling budget estimates submitted by all SDOs. He is also

responsible for prioritizing the works in his division.

S.E. He is responsible for compiling the budget estimates submitted by all Divisions after rationalizing them. He should also review/revise priorities for his Circle.

C.E. He is responsible for finalizing the plan for his Zone.

SECRETARY: He compiles the overall maintenance plan and sets the final priorities.

Q.7 In what ways can computers contribute to the plan preparation?

Response:

- In order to make effective use of computers, application formats should be first developed and, after that, available data can be entered for computerized processing.

3. GROUP III

Q.1. What should be the basic maintenance unit considered in the plan?

Response:

- Basic planning unit should be at Divisional level. The physical units per Division should be as follows:

Canals and Drains: Unit lengths of same discharges.

Structures : Barrages, regulators and bridges etc. should be taken as independent units.

Flood Bunds : Economic lengths should be adopted for rehabilitation.

Buildings : Each building should be adopted as a unit.

Q.2. How should preventive maintenance be included in the plan?

Response:

- Preventive maintenance should be based on cyclic scheduling. A five year average cycle is suitable, but adjustments should be made where necessary.

Q.3. How can the plan communicate the condition of facilities?

Response:

- The plan should include a separate section, giving details of conditions of channels and other facilities.

Q.4. How should yardsticks be used in plan preparation?

Response:

- Yardsticks can be directly applied to physical units. For canals, drains and flood bunds, they should be based on mileage rates; for tubewells, HP rating; and for barrages and other structures, they should be on individual bases.

Q.5. What should be the schedule of steps in plan preparation?

Response:

The schedule of steps in plan preparation should be as follows:

- a. Carrying out of condition surveys and inspections.
- b. Preparation of inventories of physical units.
- c. Determination of specific non-scheduled maintenance
- d. Estimates for preventive maintenance based on yardsticks.
- e. Identification of proposed works and priorities.
- f. Review of past years accomplishments and shortfalls.

Q.6 What are the responsibilities of various institutional levels (SDOs, XENs, etc) in plan preparation?

Response:

Same as group II.

Q.7 In what ways can computers contribute to the plan preparation?

Response:

- Computers for surely help in making the planning process more efficient and convenient. It is suggested that for this purpose, computers should be used right from the Divisional level.

4. GROUP IV

Q.1. What should be the basic maintenance unit considered in the plan?

Response:

- Basic planning unit should be at Divisional level or per mile of given size channel.

Q.2. How should preventive maintenance be included in the plan?

Response:

- It is recommended that old/wornout structures should not be included in preventive maintenance plan, rather they should be planned for replacement in order to avoid major failures.
- Routine maintenance should also be included in the plan.
- Preventive maintenance costs should be based on annually updated and realistic yardsticks. The works should be prioritized for execution as per the need bases.

Q.3. How can the plan communicate the condition of facilities?

Response:

- Use classification/description of facilities, such as:
 - a. Facilities requiring routine maintenance.
 - b. Facilities requiring special maintenance.
 - c. Facilities requiring rehabilitation.
 - d. Once in life time works.
- The condition of the facilities can be communicated in the plan by giving an evaluation of the last year plan.

Q.4. How should yardsticks be used in plan preparation?

Response:

- Yardsticks be made use of in determining the budget estimates for the routine maintenance works. Yardsticks should be regularly updated keeping in view price escalation.

Q.5. What should be the schedule of steps in plan preparation?

Response:

Same as group II.

Q.6 What are the responsibilities of various institutional levels (SDOs, XENs, etc) in plan preparation?

Response:

Same as group II.

Q.7 In what ways can computers contribute to the plan preparation?

Response:

Computers can be effectively used for the following:

- Forecasting.
- Compiling data bases.
- Review/revisions in data bases and plans.
- Continued and quick updating,
- Preparation of design drawings and graphic representation of data.
- Data base/inventory of facilities,
- Keeping track of preventive maintenance,
- Report generation.

Appendix C

SESSION PROCEEDINGS

THIRD GROUP SESSION

Subject: IMPLEMENTATION AND MONITORING OF O&M EQUIPMENT TRIAL

1. GROUP I

Q.1. How do we inform and get the involvement of the personnel in the Subdivisions/Divisions?

Response:

- An initial meeting with all the concerned S.E.s, XENs, one or two SDOs from each Division and few Sub-Engineers from each Division be held at a central place to formulate and plan methodology/orientation program. Provincial Coordinator, Provincial Advisor, representatives of TA Team and USAID will also participate in this workshop.
- Detailed meetings will be held at Divisional level for program orientation and concept development. These meetings will be attended by all the involved staff from the Division and representatives of TA Team/USAID.

Q.2. Who should be responsible above the Division level for implementation?

Response:

- SEs should be made in charge of the program and they should look into the matters of finances, training of staff, implementation of the program, workplans, maintaining of log books, etc. Provincial Coordinator will share responsibility for implementation.

Q.3. How can we monitor the performance/effectiveness of maintenance in the trial Subdivisions?

Response:

- Representatives of USAID, TA Team, and PIDs will develop a format/proforma for recording the performance and output of trial equipment.
- The Provincial Coordinator should monitor the performance/effectiveness of the equipment through his independent nominated officer. The maintenance condition of the equipment should be reported to the Provincial Coordinator by XEN Mechanical and his staff, staff holding equipment, and TA Team advisors.

Q.4. How can we evaluate the suitability of the specific pieces of equipment?

Response:

- The basis for evaluating the suitability of specific pieces of equipment will be the reports regularly submitted by the custodian/operating staff (XEN, SDO) of the trial equipment.
- Evaluation for suitability will also be based on the careful examination of log books and observations on performance under specific conditions/limitations.

Q.5. What data need to be collected and who should be responsible?

Response:

- The quantities of work done should be recorded in log books each day/occasion of use by the operator or Sub-Engineer. The entries should be checked occasionally by the SDO/XEN concerned.

Q.6 How should the evaluation be made in a way that is useful to both the FIDs and the donors? Who should review it?

Response:

- The evaluation should be done by an independent agency, designated by Provincial Coordinator and Zonal CE in each region. The evaluation reports should be reviewed by the Zonal CE.

2. GROUP II

Q.1. How do we inform and get the involvement of the personnel in the Subdivisions/Divisions?

Response:

- A provincial level workshop in each province, with all the concerned SEs, XENs, one or two SDOs and few selected Sub-Engineers from each division, will be held at a central location in order to carry out orientation, define the plans, and adopt methodology for implementation and monitoring. Provincial Coordinator, Provincial Advisors, representatives of TA Team/USAID will also participate in this workshop.

- Detailed meetings will be held at Divisional level for program orientation and concept development. These meetings will be attended by all the involved staff from the Division and representatives of TA Team/USAID.

Q.2. Who should be responsible above the Division level for implementation?

Response:

Same as group I

Q.3. How can we monitor the performance/effectiveness of maintenance in the trial Sub-Divisions?

Response:

- Representatives of USAID, TA Team and PIDs will develop a format/proforma for recording the performance and output of trial equipment.
- Monthly program of work giving planned use for each piece of equipment should be prepared and monthly performance/progress carefully observed against the established program/target.

Q.4. How can we evaluate the suitability of the specific pieces of equipment?

Response:

- The basis for evaluating the suitability of specific pieces of equipment will be the reports regularly submitted by the custodian/operating staff (XEN, SDO) of the trial equipment.
- The reports should essentially contain; quantum of work executed, hours of work machine used, cost of operation, and problems encountered in using the equipment.
- For suitability evaluation, there is a need to find ways and methods for comparing the cost of routine works executed by machine and that done by manual labour.

Q.5. What data need to be collected and who should be responsible?

Response:

- Data on work to be done as per plan, cost estimates for these works, contractor's prices for these works, actual quantities executed by a particular piece of equipment and actual hours of machine use for the executed quantities should be maintained.

- SDO should collect the data and submit it to the XEN concerned. XEN concerned should compile the data for all the Sub-Divisions.

Q.6 How should the evaluation be made in a way that is useful to both the PIDs and the donors? Who should review it?

Response:

- An evaluation team comprising of Provincial Coordinator, Provincial Advisor, representatives of PID, USAID and TA Team can ideally carry out evaluation task. If needed, consultants for this specific purpose can also be hired.
- The evaluation reports should also be reviewed in Equipment Task Forces meetings.

3. GROUP III

Q.1. How do we inform and get the involvement of the personnel in the Subdivisions/Divisions?

Response:

- Same as group II

Q.2. Who should be responsible above the Division level for implementation?

Response:

- SEs should be made in charge of the program and they should look into the matters of finances, training of staff, implementation of the program, workplans, maintaining of log books, etc. Provincial Coordinator will share responsibility for implementation.

Q.3. How can we monitor the performance/effectiveness of maintenance in the trial sub-divisions?

Response:

The performance can be monitored effectively by:

- Obtaining and reviewing monthly progress reports.
- Regular inspections by SEs and XENs.
- Monitoring through appointed consultants.

Q.4. How can we evaluate the suitability of the specific pieces of equipment?

Response:

- The basis for evaluating the suitability of specific pieces of equipment will be the reports regularly submitted by the custodian/operating staff (XEN, SDO) of the trial equipment.
- XENs and SEs inspection reports.
- Consultants observations.

Q.5. What data need to be collected and who should be responsible?

Response:

- The data collected should relate to frequency of utilization, output performance, data related to financial aspects etc. The SDOs concerned are responsible for providing the data.

Q.6 How should the evaluation be made in a way that is useful to both the PIDs and the donors? Who should review it?

Response:

- The evaluation should be carried out in such a way, so as to determine the suitability and cost effectiveness of the equipment. Evaluation should also determine the ability of PID to adopt and follow the concept. Provincial Coordinator and consultants should finally review the evaluation reports.

4. GROUP IV

Q.1. How do we inform and get the involvement of the personnel in the Subdivisions/Divisions?

Response:

- This purpose can best be achieved by holding provincial level seminars and distribution of handouts in seminars.

Q.2. Who should be responsible above the Division level for implementation?

Response:

- SEs should be responsible above divisional level.

48

Q.3. How can we monitor the performance/effectiveness of maintenance in the trial Subdivisions?

Response:

- By reviewing the weekly/monthly performance reports. It is recommended that proforma be designed by M&E unit with the following key elements incorporated:
 - a. Location of work
 - b. Description of work
 - c. Quantity of work
 - d. Equipment used
 - e. Time consumed
 - f. Cost appraisal as compared to the work done
 - g. General comments on quality of work executed
 - h. Maintenance/breakdowns
 - i. Training aspects.

Q.4. How can we evaluate the suitability of the specific pieces of equipment?

Response:

- Log books on each equipment be maintained and entries reflecting the frequency of use for a particular machine be recorded.
- Records be kept for each executed work showing the type of work and time utilized.
- SDCs concerned should initiate regular evaluation reports on the performance and suitability.

Q.5. What data need to be collected and who should be responsible?

Response:

- Already answered by other groups.

Q.6 How should the evaluation be made in a way that is useful to both the PIDs and the donors? Who should review it?

Response:

- The evaluation should be done jointly by the PIDs and donors. Periodic review should be carried out in Task Force meetings.

Appendix D

SESSION PROCEEDINGS

FOURTH' GROUP SESSION (PROVINCIAL GROUPS)

Subject: Specific recommendations for provincial O&M planning (Content, detail, procedure, schedule, responsibilities, etc.)

PUNJAB PROVINCIAL IRRIGATION DEPARTMENT

1. CONTENTS AND DETAILS OF O&M PLAN

- A. The plan should contain an evaluation of previous year's program, giving following details:
 - 1) Allocations and budget.
 - 2) Actual utilization of funds.
 - 3) Critical observations on O&M performance
- B. The plan for current year should contain:
 - 1) Objectives of the recommended plan.
 - 2) Methodology to be adopted for executing the plan.
 - 3) Complete details/lists of works and financial statements
- C. Maintenance targets and proposed allocation of equipment and manpower for the same.
- D. An evaluation program for the proposed plan, based on:
 - 1) Targets in real terms.
 - 2) O&M estimates versus allocations.
 - 3) General assessment of performance/execution of O&M works.

2. PROCEDURES AND SCHEDULES

- A. O&M planning data based on condition surveys be collected by concerned SDO.
- B. The proposed works list and cost estimates be prepared, and after review by the XEN concerned, submitted to concerned SE by 1st September.
- C. S.E. to submit the budget and O&M plan to CE by October 15.
- D. The concerned Chief Engineer, after consolidating the plans pertaining to all the divisions, should submit to the Secretary Irrigation by Nov 25.

- E. The Secretary, after scrutiny, to forward the plan to Finance Department by Jan 01.
- F. Finance Department makes budget allocation and releases funds by early July.
- G. Based on the budget allocation, the O&M plan is revised and finalized for implementation in July.

3. RESPONSIBILITIES

SDO: Carrying out of condition surveys and preparation of budget estimates.

XEN: Identification of needs and priorities, compilation and submission to concerned S.E.

SE : Review of budget estimates, needs and priorities, compilation, and submission to concerned Chief Engineer.

CE : Finalization of zonal plan and submission to Secretary Irrigation.

Secretary : Compiles provincial program and sends to Finance Department for budget allocation.

SINDH PROVINCIAL IRRIGATION DEPARTMENT

1. CONTENTS AND DETAILS OF O&M PLAN

- A. Before starting the planning process there should be prior preparatory work like defining frame work for planning and outline of proformas.
- B. Provincial level workshops be organized at CE/SE level prior to the start of planning process.
- C. Computerized inventory of irrigation facilities at divisional level will certainly help in accurate planning.
- D. The plan be based on field condition survey of facilities.
- E. Breakdown of cyclic maintenance item should be listed separately.
- F. Preventive maintenance cost should be worked out on quantities of the facilities multiplied by yardstick per facility.
- G. The plan should also cater for the fixed costs like; establishment, electricity, PDL, etc.

51

H. Non recurring cost should be listed separately.

J. The planned budget be compared with the last 3 years budgets for reasonableness.

2. PROCEDURES AND SCHEDULES

Sindh PID agrees with the procedures and schedules as given by Punjab PID.

3. RESPONSIBILITIES

Same as given by Punjab PID.

4. SPECIAL RECOMMENDATIONS

The Department is of the view that public education will also help in reducing O&M costs by keeping the facilities well maintained and less tampered by the public and livestock. Public education will certainly help in controlling the following:

- A. Damages caused by cattle
- B. Trespassing, mainly by vehicles
- C. Tampering of outlets.
- D. Encroachments

The recommended media for public education is as follow:

- A. TV
- B. Mobile Van with public address systems and documentary movies
- C. Refresher courses for PID staff particularly lower grade staff.

BALUCHISTAN PROVINCIAL IRRIGATION DEPARTMENT

1. CONTENTS AND DETAILS OF O&M PLAN

The plan should separately give details of activities of regular nature (routine) and of specific nature (special). For each type of activity, following details should be given:

- a) Location.
- b) Scale of work
- c) Estimates
- d) Funding

The plan should contain following details:

- a) Name of facility/work
- b) Head discharge

- c) current condition
- d) O&M details
- e) Routine works
- f) Special works
- g) Details of previous rehabilitation works carried out
- h) Estimated costs
- i) Funds demanded
- j) Funds allocated
- k) Details of required funding based on yardsticks
- l) Repairs actually completed.

2. PROCEDURES AND SCHEDULES

Same as outlined/given by Punjab PID.

3. RESPONSIBILITIES

Same as outlined/given by Punjab PID.

4. SPECIAL RECOMMENDATIONS

- A. Yardsticks be updated periodically, preferably after every year.
- B. 1986 Schedule of Rates needs revision due to price escalation.
- C. O&M planning process be institutionalized at the level of CE's office within the Department.
- D. O&M planning process should continue to be computerized down to the lowest level.
- E. Funds under the head of E&I should be counted towards O&M funds.

NWFP PROVINCIAL IRRIGATION DEPARTMENT

The recommendations brought out by NWFP PID were in line with the recommendations as given by other three PIDs.

57