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THE MADHYA PRADESH MINOR IRRIGATION PROJECT: AN EVALUATION

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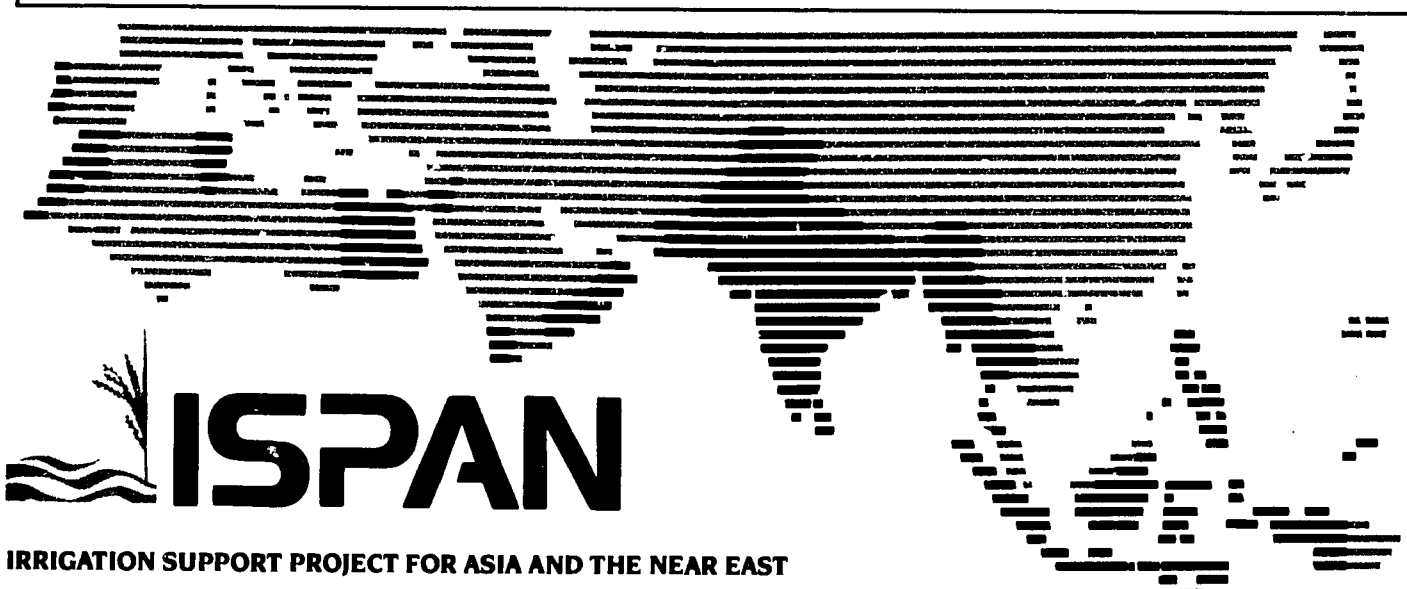

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AN EVALUATION

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PREFACE AND ACKNOWLEDGEMENTS

The Madhya Pradesh Minor Irrigation Project (MPMIP) evaluation was carried out under the auspices of the Agency for International Development's centrally-funded Irrigation Support Project for Asia and the Near East (ISPAN). The evaluation team members were:

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Shri A.S. Kapoor was provided to the evaluation team under a contract with USAID/India. Other team members were provided through ISPAN.

The evaluation team would like to thank the Government of Madhya Pradesh (GOMP) Irrigation and Agriculture Departments, the MPMIP Local Coordination Unit, and USAID/India for their assistance and support during the course of the evaluation.

During the evaluation team's time in the field, officials in several ministries of the GOMP, professors and staff of JNKVV University, and private citizens shared their time and insights with team members. Although they are too numerous to list here by name, the evaluation team wishes to sincerely acknowledge their collective and individual contributions to the content of this report.

Finally, USAID/India provided professional and logistical support for evaluation team operations, both in New Delhi and in Madhya Pradesh. The team is particularly grateful for the assistance rendered by the USAID Project Officer, Shri J.R. Khanna and by the staff of the American Express Travel Office in the American Embassy.

Any errors in fact contained in this report remain the responsibility of ISPAN and the evaluation team members.

ACRONYMS AND TERMS USED IN THE REPORT

AID	Agency for International Development [Headquarters in Washington, D.C.]
AIP	Annual Implementation Plan
APM	Adjustable Proportionate Module
BODHI	Bureau of Designs and Hydrological Investigations
CE	Chief Engineer
DISNET	Distribution Network
FIOP	Farmer Irrigator Organizer Program
FSS	First Set of Systems
GOI	Government of India
GOMP	Government of Madhya Pradesh
GOMP/AD	Government of Madhya Pradesh Agriculture Department
GOMP/ID	Government of Madhya Pradesh Irrigation Department
GOMP/TWD	Government of Madhya Pradesh Tribal Welfar Department
IFY	Indian Fiscal Year
IIT	Indian Institute of Technology
JNKVV	Jawaharlal Nehru Krishak Vishwa Vidhyalaye
LCU	Local Coordination Unit
MIC	Minor Irrigation Committee
MIS	Minor Irrigation Scheme
MP	Madhya Pradesh
MPMIP	Madhya Pradesh Minor Irrigation Project
NCA	Net Command Area
NIA	National Irrigation Agency
PACD	Project Activities Completion Date
PBD	Performance Based Disbursement
PIL	Project Implementation Letter
PP	Project Paper
ProAg	Project Agreement
PVC	Poly Vinyl Chloride
REAO	Regional Agricultural Extension Officer
SE	Superintending Engineer
SE (SASC)	Superintending Engineer (Special Appraisal and Supervision Cell)
SE (SCC)	Superintending Engineer (Special Coordination Cell)
SSS	Second Set of Systems
USAID	United States Agency for International Development [Field Missions Outside the United States]
WALMI	Water and Land Management Institute
WRM & T	Water Resources Management and Training Project

EXECUTIVE SUMMARY

A. Introduction

The Madhya Pradesh Minor Irrigation Project (MPMIP) was undertaken in 1983 by the Government of India (GOI), the Government of Madhya Pradesh (GOMP), and the United States Agency for International Development (USAID). Project activities were directed at increasing irrigation coverage and improving system efficiency and performance through improved planning, technology and management in Madhya Pradesh. Performance was to be improved primarily through improvement in the timeliness and reliability of water delivery to client-oriented irrigation systems.

The MPMIP was to achieve its objectives by supporting construction of approximately fifty (50) minor irrigation sub-projects with a net command area (NCA) of about 25,000 hectares. USAID support was in the form of a $ 41 million loan, primarily to support construction, and a $ 5 million grant to support research, pilot sub-projects, field demonstration activities, and external and in-country participant training.

The project had implementation difficulties and a low disbursement rate during the first three years of life. Project expenditures were exclusively directed to construction activities on minor irrigation sub-projects in Madhya Pradesh. As a result of the perceived deficiencies in the original project, an internal review of the project led to USAID submission and AID/Washington approval of a Project Paper Amendment in June 1987. The Amendment was intended to accelerate project activities, to tie project disbursements more closely to project objectives, and to incorporate modifications and clarifications in technical criteria. A Performance-Based Disbursement (PBD) system was also adopted as a management tool for all of the loan and many of the grant disbursements of the MPMIP.

The purpose of the present evaluation is to assess progress in the MPMIP to date, with particular emphasis on progress since June 1988 -- the date of acceptance of the new PBD system by the Government of India. The evaluation has focused on the nature and extent of progress in terms of achieving the goal and objectives stated in the Project Paper, as amended, with particular reference to the relevance of the 1987 project redesign effort and the effectiveness of the PBD system in fostering achievement of project objectives.

The evaluation is intended to provide guidance to the GOI, GOMP and USAID on changes in approach and activities needed to achieve MPMIP objectives -- and, particularly, the objective of ensuring systematic and reliable irrigation water delivery at the farm level.

The methodology adopted by the evaluation team included a review of background reference materials, USAID and GOMP Irrigation Department (ID) documents, plans and specifications at sub-project sites in Madhya Pradesh, and other literature provided by relevant institutions and agencies.

The team spent three weeks in Madhya Pradesh visiting sub-project sites and interviewing farmers, GOMP/ID and GOMP/Agriculture Department (AD) staff, GOMP/Tribal Welfare

Department (TWD) officials, and faculty and administrators of the Water and Land Management Institute (WALMI) in Bhopal and JNKVV University in Jabalpur. The team interviewed scientists working for the USAID Water Resources Management and Training (WRM&T) Project and at the Ford Foundation in New Delhi. And, finally, a review of Ford Foundation documents relevant to certain aspects of the MPMIP was conducted.

B. Findings

1. The Quality of Irrigation Systems Design and Construction

The evaluators were impressed with the results of efforts to improved the design and construction processes for minor irrigation sub-projects under the MPMIP. Improvements have been achieved through better appraisal, monitoring, and quality control for sub-projects by GOMP/ID. The project appraisal units produced detailed reports which led to better engineering designs of system components. Preparation of the reports and implementation of their findings has provided useful training for GOMP/ID personnel.

Other GOMP/ID units monitor and correct design and engineering deficiencies in sub-projects. Their efforts have resulted in physical components of systems of high quality. These systems include canals, field ditches and micro-distribution networks which are lined to reduce seepage losses. Construction of micro-distribution networks has not previously been done on minor irrigation systems in Madhya Pradesh. Turnouts at each chak are through an Adjustable Proportionate Module" (ATM). The ATM is set to apportion equal quantities of irrigation water per unit of land throughout each chak. In sum, then, systems are being constructed which have improved technical capacity to provide water to farmers' fields on a timely and reliable basis.

2. Rate of Irrigation Systems Construction

The rate of construction on the USAID-assisted sub-projects is not significantly faster than that on other Madhya Pradesh minor irrigation schemes despite assured availability of funding and the incentives built into the MPMIP management system. Construction of headworks on sub-projects take between four and eight years and construction of canals is undertaken only after the headworks are nearly complete. Canal construction has generally taken additional four years or more and construction of micro-distribution networks has only just begun on some sub-projects. **Seven years into the project, therefore, not one MPMIP sub-project has been completed.**

USAID-assisted sub-projects have not progressed at a more rapid rate than non-USAID-assisted schemes because of the "linear" nature of the construction process used by the GOMP/ID. There is no logical justification for this sequencing of system components and it should be quite possible to undertake construction of system components concurrently in situations where assured funding is available.

As of 31 March 1990, headworks had been completed on 29 MPMIP sub-projects. Canals up to the outlet had been completed on only four schemes. And, no micro-distribution network

had not been completed. The GOMP/ID estimates that by the currect Project Activities Completion Date (PACD) of 30 June 1991, headworks will be complete on 43 sub-projects; canals will be complete on 34; and micro-distribution networks will be complete on 18 schemes. The GOMP/ID has indicated that it would complete all sub-projects by June 1993.

3. Client-Oriented Irrigation Systems

A basic assumption of the GOMP/ID, which has not been altered by USAID project assistance, is that provision of irrigation water to the boundaries of farms is a **necessary and sufficient** condition for the development of efficient and equitable irrigated farming systems -- i.e., for farmers to obtain timely and equitable shares of water to meet their crop needs, to organize themselves for fair distribution and maintenance of ditches, etc.. The record of development of irrigation systems throughout the world has shown this to be an erroneous assumption. While no one would deny that timely and equitable distribution of water is a **necessary** condition for any irrigated farming system, its availability per se is not a **sufficient** condition to obtain the socio-economic objectives USAID seeks to realize through project assistance.

The primary element in the "client-orientation" approach introduced by the MPMIP is the imposition of the warabundi system of water rotation in each chak. In cases where chaks have been completed within a sub-project, signs have been erected indicating the water schedule for each farmer. There is little reason to believe, however, the warabundi system will be accepted by farmers. Educational and organizational efforts are needed if sustainability is to be expected in the USAID-assisted sub-projects.

The MPMIP provides little in the way of guidance and/or support for such efforts and this is reflected by the fact that not a single benchmark in the MPMIP PBD management system is directed at organizing functioning sub-project water users associations. The only effort in this regard was associated with the Gadigaltar pilot project, which is not typical of the rest of the irrigation systems in the project.

One of the major "discoveries" of the evaluation team is that thirty-six (36) of the forty-six (46) sub-projects in the project are in tribal areas and irrigation client groups are composed of tribal people. This fact was apparently unknown by the project designers. And, therefore, no special provisions been made in project design or implementation to accomodate the differences in social structures as a result of tribal and caste variations. This is a significant deficiency and has serious implications for attainment of the MPMIP's stated goal, purpose and objectives.

4. Institutional Relationships and Collaboration

One of the principal objectives of the project was to foster active coordination and collaboration between the GOMP/ID and GOMP/AD on USAID-assisted sub-projects. This objective has not been attained because to date the assumption of the GOMP/ID has been that the GOMP/AD would assume its assigned functions in working with farmers only after the GOMP/ID has water flowing to farms.

Since this has not accomplished on more than one or two chaks in the MPMIP, the GOMP/AD has to play a significant role in the project. The evaluation team found no instance where close consultation and collaboration had taken place from initiation of a sub-project. GOMP/AD's role in the project is furthered constrained because it does not control any project funds or have direct responsibilities for any specific project activities.

Moreover, some important local institutions have been entirely overlooked or disregarded in project design and implementation. Active involvement of the GOMP Tribal Welfare Department in project planning and implementation, for example, could have been beneficial in working on sub-projects in designated tribal areas. The GOMP/TWD, however, has not been consulted -- or even informed -- about the project, even though they have active irrigation project activities in tribal areas.

5. Special Studies

The original Project Agreement indicated that special field studies would be undertaken to "collect socio-economic data to improve the understanding and quality of public support services to farmers". The special studies were to have been used to develop improved design and construction techniques leading to improved quality of systems. The team found the contents of the few special studies completed to date to be variable but, with few exceptions, they appear to be of little value to attainment of the objectives of the project. Some studies yet to be completed may have some value to future projects of the GOMP/ID.

6. Pilot Projects

Four pilot sub-projects are at various stages of development. The Raipura and the Khor sub-projects are near completion. The Raipura pilot sub-project seeks to demonstrate land leveling for improved irrigation efficiency. The Khor scheme uses sub-surface PVC pipe for water distribution and holds considerable interest for GOMP/ID engineers. The PVC pipe system represents one of the technical innovations which is likely to be extended to non-USAID funded minor irrigation schemes.

However, enthusiasm for this system may be premature. It is based on the operation of only a small part of the sub-project which has only been operational for one cropping system. Moreover, capital, operational and maintenance costs, system benefits and/or farmer acceptance of the PCV pipe system have yet to be seriously evaluated.

Another pilot sub-project features a level-top canal with limited "on-demand" water delivery to farmers' field through a sub-surface concrete pipe distribution system. The sub-project has a number of problems, including the fact that a similar system in Sri Lanka, proved to be a failure.

The fourth pilot sub-project utilizes specialists from JNKVV University to evaluate different land leveling techniques with the cooperation of local farmers. The field activities in this sub-project are just beginning and the evaluation team had no basis on which to judge the prospects for sub-

project success.

7. The Performance-Based Disbursement System

At the time of the evaluation, the MPMIP PBD system had been operational for only 21 months. Evaluation team comments relate, therefore, to a management system which was grafted onto an existing project late in its life and will not have adequate time to affect major changes in project performance before the PACD of 30 June 1991. In that sense and because this PBD system is so atypical, our comments should not be generalized to all USAID PBD project systems in India.

The MPMIP PBD system has suffered from a number of design deficiencies. First, it was introduced into the project at such a late stage that it in all probability did not have a reasonable chance to reorient implementation patterns set down previously. Second, the PBD system as designed in 1987 was excessively complex with a total of 44 benchmarks to be met -- i.e. 25 to disburse $ 41 million in loan funds and 19 to disburse $ 2.1 million in grant funds.

As of 31 March 1990, only ten benchmarks under the loan component and eight under the grant component had been met. **None of the benchmarks attained to date can be considered major ones.** The most critical constraint on the PBD system at present, therefore, is that all **major** benchmarks remain outstanding and there are only 15 months remaining until the PACD. This means that there are now significant risks that the GOI and GOMP will not be able to achieve many of the major MPMIP benchmarks and that USAID will not be able to disburse a major portion of the loan and grant funds remaining in the project pipeline.

The MPMIP PBD deficiencies have led directly to greater USAID micro-management of the technical and financial aspects of the project; while critical socio-economic, organizational and instititutional aspects are virtually ignored. Moreover, contrary to initial expectations, project disbursements have not been speeded up by installation of the MPMIP PBD system. In fact, the opposite has been true.

Experience with this particular PBD system has shown that, while the PBD benchmarks have been used to "persuade" the GOI and the GOMP to move in certain directions and adopt institutional changes in the narrow confines of the project, they have not been sufficient in themselves to assure the transfer and replicability of such changes <u>outside</u> the project. Nor have the benchmarks assured that the actions undertaken would always be of high quality or would be irreversible.

8. The Status of Economic Inputs in the Project

No significant USAID resources have been provided to the GOMP/ID to enhance its capacity to do even routine financial and economic benefit/cost analyses for project activities. Upon review of completed benefit/cost calculations required by MPMIP benchmarks, the evaluation team determined that the "economic internal rates of return" did not fulfill stated project requirements and provided no basis for selection of sub-projects.

The financial "cost estimates" used in the calculations have been shown by subsequent construction records to seriously underestimate the actual costs of sub-project construction -- i.e., by, at least, 150 percent. Moreover, projected benefit streams have been significantly diminished due to the protracted construction delays encountered in all sub-projects.

Finally, no financial calculations have been done to estimate the capital and recurrent cost implications for the GOMP budget of trying replicate project "innovations" in the GOMP's minor irrigation schemes outside of the project -- despite the fact that the stated goal of the MPMIP is to "institutionalize the project's innovations" within the GOMP irrigation sector.

C. Recommendations

Based upon the findings described in the preceeding summary and more detailed analyses in the main report, the evaluation team presents the following recommendations aimed at achieving the greatest possible movement toward project objectives by the PACD of 30 June 1991. Additional suggestions, which will be primarily of interest in other GOMP/ID and USAID projects, are contained in body of the main report.

1. Principal Recommendations

a. USAID should inform unequivocally that the present MPMIP PACD of 30 June 1991 will be adhered to and that all project implementation activities must oriented accordingly.

b. USAID and the GOI should revise current PBD benchmarks to provide for greater "proportionality" in USAID reimbursements. This should be accomplished in three steps by:

* Rewriting major benchmarks to delink them from physical completion of discrete sub-projects;

* Dropping from the list of rewritten benchmarks all of those already attained and those found to be inappropriate and/or not directly linked to achievement of major project objectives; and

* Revaluing the payoffs associated with the final PBD benchmarks, up to the full value of the remaining loan and grant funds, to reflect their relative importance in attaining project objectives.

c. USAID and the GOMP should design and cause to be implemented a financial analysis of projected GOMP budgetary and personnel resources in the 1990s and their implications for potential replication of USAID-sponsored project "innovations" in all other minor irrigation projects in Madhya Pradesh. This analysis should then be followed by a thorough discussion of the results with senior decision-makers in the GOI, GOMP and USAID.

d. USAID should increase USAID staff and professional contractor assistance to the GOMP/ID to ensure that adequate attention is given to the substance and content of all non-engineering project activities. As necessary, USAID should use project grant funding to secure the services of contractors who are professionally competent to design and supervise such activities.

e. Establish and implement a training program, implemented by the WALMI, for 18 teams -- each consisting of a water user association organizer and a process documenter -- to be involved in communities ready for irrigation.

f. In collaboration with the WALMI at Bhopal and the WRM & T Project, develop two courses for GOMP/AD and GOMP/ID personnel. One course should introduce both groups to the socio-cultural aspects of irrigated farming systems and the second course should introduce engineers to the agronomic requirements of irrigation management.

g. Design a pilot project, funded and supervised by USAID, to organize water user associations in one or two communities ready for irrigation and staffed by engineers amenable to experimentation.

h. The Gadigaltar pilot project should be reviewed before construction proceeds. Information should be obtained, insofar as possible, about the reasons for the failure of the similar system in Sri Lanka. The scheme should be analyzed again for its benefits and costs to determine if the significant added expenditures are justified or are too great to preclude any reasonable expectation of replication. If, after review, it is decided to retain the limited on-demand and level-top canal concepts, operational plans should be revised to provide water in the same proportion as provided on other schemes. In this way, benefits of the innovative technology can be assessed independently of additional water supplies.

i. Design a special study to assess farmer acceptance, operation and maintenance characteristics, economics and overall applicability of the PVC pipe distribution system at Khor. This study should be designed to obtain information required to make a well-informed decision about the social, economic and technical feasibility of replicating this type of distribution network on a broad scale in the state. The study should be designed by a competent engineer, social scientist, and economist and be carried out under the supervision of a competent scientist from one of those fields.

2. **Suggested Additional Areas For Action**

a. USAID should provide competent economic expertise to the GOMP/ID to design and implement ex-post financial and economic analyses of all USAID-approved sub-projects. This assistance should be directed at providing a training opportunity for GOMP/ID personnel in understanding and implementing proper financial and economic analyses and in demonstrating the deficiences of the ex-ante calculations prepared previously under the project.

b. For ease and speeding up construction, canal and distribution networks should be grouped in suitable packages for bidding and allotment of work to contractors.

c. To shorten the construction time, canal and field ditch construction should be carried out concurrently with dam and headworks.

d. The input and communications study, along with that of irrigation management, does contain data which, if reorganized and analyzed in greater depth, may provide useful, if limited, baseline information to measure the impact of water availability upon organized irrigators, as well as on a broad spectrum of their practices. It will be necessary that a competent socio-economic analyst, well-versed in farm management analysis, actively collaborate with the unidentified author(s) of the two studies.

e. From studies and reports on Indian irrigation, it may be possible and desirable to commission a single volume, written presumably for intermediate level irrigation and agricultural technicians, which would lay out an interdisciplinary approach to system design, as well as an approach to establishing "warabundi" type rotations and the farmer organizations required to make it work.

f. USAID/India should review the status of all special studies prepared to date, ascertain their worthwhileness for careful editing, reproduction and distribution.

MAIN REPORT

I. INTRODUCTION

A. Evaluation Purpose and Methodology

The Madhya Pradesh Minor Irrigation Project (MPMIP) was undertaken in 1983 by the Government of India (GOI), the Government of Madhya Pradesh (GOMP), and the United States Agency for International Development (USAID). Project activities were directed at increasing irrigation coverage and improving system efficiency and performance through improved planning, technology and water management in Madhya Pradesh. Performance was to be strengthened by improvement of the timeliness and reliability of water delivery in client-oriented irrigation systems.

The MPMIP was to achieve its objectives by supporting construction of approximately fifty (50) minor irrigation schemes (MIS) with a net command area (NCA) of about 25,000 hectares. USAID support was in the form of a $ 41 million loan, primarily to support construction, and a $ 5 million grant to support research, pilot sub-projects, field demonstration activities, and external and in-country participant training.

The project had implementation difficulties and a low disbursement rate during the first three years of its life. During this period, project expenditures were almost exclusively directed to construction activities on minor irrigation sub-projects in Madhya Pradesh. Because of perceived deficiencies in the original project, an internal review led to submission by USAID/India and AID/Washington approval of a Project Paper Amendment in June 1987. The Amendment was intended to accelerate project activities, to tie project disbursements more closely to project objectives, and to incorporate modifications and clarifications in technical criteria. A Performance-Based Disbursement (PBD) system was adopted as a management tool for all of the loan and many of the grant disbursements of the MPMIP.

The purpose of the present evaluation is to assess progress in the project to date, with particular emphasis on progress since June 1988 -- the date of acceptance of the new PBD system by the Government of India. The evaluation has focused on the nature and extent of progress in terms of achieving the goal and objectives stated in the Project Paper, as amended, with particular reference to the relevance of the 1987 project redesign effort and the effectiveness of the PBD system in fostering achievement of MPMIP objectives.

The evaluation is intended to provide guidance to the GOMP and USAID on changes in approach and activities needed to achieve MPMIP objectives -- and particularly the objective of ensuring systematic and reliable irrigation water delivery at the farm level.

The methodology followed by the evaluation team included a review of background reference materials, USAID and GOMP Irrigation Department (GOMP/ID) documents, plans and specifications at sub-project sites in Madhya Pradesh, and other literature provided by relevant institutions and agencies.

The team spent nearly three weeks in Madhya Pradesh visiting sub-project sites and interviewing farmers, GOMP/ID and GOMP/Agriculture Department (GOMP/AD) staff, GOMP/Tribal Welfare Department (GOMP/TWD) officials, and faculty and administrators of the Water and Land Management Institute (WALMI) in Bhopal and JNKVV University in Jabalpur. The team also interviewed personnel working for the USAID Water Resources Management and Training (WRM&T) Project and at the Ford Foundation in New Delhi. Finally, a review of Ford Foundation documents relevant to certain aspects of the MPMIP was also conducted.

B. Project Goal, Purpose and Objectives

The stated goal of the original and current MPMIP is to **"raise rural production and incomes by providing on-farm employment opportunities"**.

The original project purpose was to "increase irrigation coverage and efficiency through improved technologies and management systems". The purpose was altered in 1987 to read to "**increase irrigation coverage and performance through improved technologies and management systems**". It was held that "a system can be efficient without necessarily optimizing productivity. Furthermore, one farmer's efficiency may be another farmer's loss. Nor does efficiency necessarily mean distributional equity and overall productivity. Performance is a more all-inclusive indicator of returns on investment."

The original MPMIP objectives were to:

1. Provide alternative design criteria and upgrade managerial capacity to operate a more reponsive (flexible) system vis-a-vis farmer demand;

2. Establish better coordinated "services" provided by the GOMP Irrigation and Agriculture Departments to farmers; and

3. Organize special professional development and training as needed.

Under the revised project, the first objective "remains generally valid, although planning and engineering design as well as managerial capacity must be upgraded". Greater emphasis was to be placed on improving operations for reliable and timely water delivery. The second objective was changed to read "strengthen the service delivery orientation and capacity of the GOMP/ID". In this regard, the first step envisaged was "to get the GOMP/ID to accept and adopt a service approach". Under the third objective, the intent was to "institutionalize in-service professional development in the GOMP/ID", with "stress on sensitizing GOMP/ID staff to Agriculture Department and farmer inputs".

Finally, the Project Amendment states that "it is USAID's premise that the timely and reliable delivery of an adequate ration of water to the public outlet by the GOMP/ID is a prerequisite to local farmer organization and water rotation below the outlet. This project is directed squarely at that prerequisite, although some grant funding will be used to explore and work with existing

farmer organizations on a pilot basis". Pilot projects using alternative technologies and management modes were to be installed and demonstration chaks were to be used to disseminate tested technologies and management systems. These innovations were to be based upon socio-economic studies conducted under the project.

C. Project Background and Organization

Madhya Pradesh is the largest state in India. It has a total area of 44 million hectares, of which 19 million hectares are currently under cultivation. Water resources are limited and only about one-quarter of the land under cultivation has irrigation. Even after harnessing the state's full irrigation water potential, the land area with irrigation will be less than one-half of the land under cultivation.

The National Water Policy of India (1987) accords the following priorities in water allocation in the planning and operation of systems:

1. Drinking water;
2. Irrigation;
3. Hydro-electric Power;
4. Navigation; and
5. Industrial and other uses.

The policy states that irrigation intensity should be such as to exend the benefits of irrigation to as large a number of farm families as possible, keeping in view the need to maximize production (ibid., para. 10.1). Water allocation in an irrigation system should be made with due regard to equity and social justice (ibid., para. 10.3).

The GOMP distinguishes irrigation projects under the categories of multiple purpose, major (more than 10,000 hectares), medium (2,000 to 10,000 hectares), and minor (up to 2,000 hectares). Whereas the multiple purpose and major irrigation projects face some public opposition, the utility of minor irrigation schemes is universally accepted.

A significant portion of Madhya Pradesh's population of 53 million is made up of tribal groups (23 percent) and harijans (14 percent) who are economically most disadvantaged. Nearly 60 percent of the state's annual budget for minor irrigation schemes is earmarked for regions having major populations of tribal groups and/or Harijans.

Planning, surveying and design of minor irrigation schemes in Madhya Pradesh are carried out by the GOMP/ID but public representatives have an important say in the selection of the schemes. The beneficiaries of the schemes are farmers. The construction work on the schemes is carried out by engaging contractors on the basis of open competitive bidding. Irrigation schemes generate employment opportunities, help in rural development, and promote agricultural production -- all of which are the highest objectives of the national planning policy.

To place the USAID assistance in perspective, it should be noted that the GOMP/ID currently employs 11,724 technically-training engineering staff members. The Seventh Plan provided for $ 196 million for minor irrigation system construction over the period 1985 to 1990. And, the GOMP/ID had an annual budget during Indian Fiscal Year (IFY) 1989/1990 of $ 191 million -- of which 29 percent -- or $ 56 million -- was allocated to minor irrigation projects. There are currently 1,669 minor irrigation under construction in the state, in addition to 4,471 schemes already completed.

The USAID-sponsored MPMIP contributes $ 46 million for approximately 50 minor irrigation sub-projects, with the GOMP providing an additional $ 25 million in project funding.

D. Implementation History

The Project Paper for the MPMIP was written by a design team composed of staff members from USAID/India. Following submission to AID/Washington, the MPMIP was originally authorized on 26 July 1983. The Project Agreement was signed by representatives of the GOI and USAID/India on 30 July 1984. Under the MPMIP, AID/Washington allocated $ 41 million in loan funding and $ 5 million in grant funding to be disbursed over a six-year period ending 30 September 1989.

Following a period of implementation problems and slow disbursements, USAID/India conducted an internal review of the MPMIP in 1987. The major findings of this review were that:

1. The rates of disbursement for loan and grant funds during the first half of the project were slow;

2. The loan overly concentrated resources and staff attention on the construction aspects of the project;

3. There was a real risk that the irrigation sub-projects could be successfully constructed and still fail to deliver irrigation water satisfactorily;

4. Land and water management below the public outlets did not receive adequate attention in project design or implementation;

5. Grant funding failed to address the needs and opportunities to develop the planning, design and operations capacity within the GOMP/ID;

6. There were difficulties in modifying the relationship between the GOMP/ID and the GOMP/AD;

7. Neither the GOMP/ID nor the GOMP/AD could by themselves handle the tasks of water distribution and maintenance below the outlets without

appropriate farmer organizations and the original project design had not made adequate provisions for this fact;

8. The USAID objectives concerning the above matters were not matched with funding levels or mechanisms commensurate with the needs; and

9. The construction-tied disbursement process absorbed all of USAID/India's management attention.

The internal review led directly to submission of a Project Amendment request to AID/-Washington. The Project Amendment was approved on 12 June 1987.

The Performance-Based Disbursement (PBD) system, which was the major managerial innovation in the revised MPMIP, was actually operationalized within the project by issuance of Project Implementation Letters (PILs) Numbers 14 and 15, both dated 9 March 1988. The first of these PILs dealt with 25 PBD benchmarks pertaining to disbursement of loan funds under the project; the second dealt with 19 benchmarks for disbursement of grant funds. The performance benchmarks in PIL No. 15 were subsequently modified by letter on 20 May 1988. (Annex D for complete statements of the 44 project benchmarks).

Concurrent with the installation of the PBD benchmarks, the original PACD for the MPMIP was extended until 30 June 1991. This action was formalized in PIL No. 14. In effect, then, at the time of the evaluation the revised project and its new PBD system had been operational for only 21 months.

The major objectives in amending the Project Paper in 1987 were stated to be:

a. To link funding directly to improved systems design, planning and operational processes (and consequent institutional performance) while remaining in close relation with the proxy of that performance -- i.e. the system construction;

b. To redirect grant funding to activities which more directly support the objectives of the loan funding -- i.e. system planning, design and operations;

c. To concentrate dialogue and technical and management staff time on the fundamental issues of institutional performance as opposed to the widespread and large number of individual construction and on-farm activities which are at best partial indicators of that performance; and

d. To simplify the claims and disbursement procedures to free the USAID/GOI/GOMP relationships from onerous and cumbersome

budgeting, accounting, monitoring and claims processes at the expense of dialogue and attention to technical and institutional improvements.

II. PROJECT PERFORMANCE: IRRIGATION SYSTEM CONSTRUCTION AND TECHNICAL ASPECTS

A. Introduction

The MPMIP project was intended to improve the efficiency of surface irrigation by proper design and construction of approximately fifty minor irrigation sub-projects. These sub-projects cover a net command area of 25,000 hectares. They were to be used to test and demonstrate innovations in design, construction and operation of irrigation systems involving active participation of farmers. The Minor Irrigation Committee (MIC) selects the sub-projects to be included in the MPMIP. Prior to the revision of the project in 1987, the MIC had approved a total of 35 sub-projects. This list of approved sub-projects was revised in March 1990 to include 27 of the original 35 sub-projects as the first set of schemes (FSS) and 19 additional sub-projects which were designated as the second set of schemes (SSS). As of March 1990, therefore, a total of 46 sub-projects have been approved by the MIC for inclusion in the project.

In addition to examining project-related documents and interviewing project personnel, the evaluation team visited eight of the USAID-assisted minor irrigation sub-projects, five other minor irrigation schemes, and several medium and major irrigation projects. The team evaluated the status of construction on MPMIP sub-projects, the progress and appropriateness of special studies and pilot projects, the quality of construction and the appropriateness of system operational plans.

B. Major Findings

1. Current Status and Rate of Construction

Construction of headworks has been completed on 29 of the 46 MPMIP sub-projects. Headwork construction is in progress on 14 additional sub-projects and has yet to be started on 3 other sites. It is expected that the headworks of the 14 schemes now in progress will be completed by the current MPMIP PACD of 30 June 1991. However, the estimated completion date for two of the remaining headworks is June 1992 and for the last sub-project is June 1993. These completion estimates were provided by the GOMP/ID.

The canal system up to the outlet has only been completed on one sub-project. Work on canals is in progress on 39 other sub-projects and has yet to be started at 6 sites. The GOMP/ID estimates that work on canal systems of 34 schemes will be completed by the current PACD. An additional 9 canal systems are estimated to be completed by June 1992 and the remaining 3 schemes will not be completed until June 1993.

Micro-distribution networks have not been completed on any of the sub-projects. GOMP/ID engineers estimate that these networks will be completed on 18 sub-projects by the current PACD. Networks on an additional 18 sub-projects will be completed by June 1992 and the balance of networks are projected to be completed by June 1993.

Text Table 1 summarizes the present state of construction on the major components of the MPMIP minor irrigation sub-projects -- i.e. USAID-approved and others. Text Table 2 summarizes the breakdown of financial outlays for the various components of the project.

Text Table 1
Current Status of Sub-project Construction and the Projected Status by Project PACD

Project Component	Completed by 31 March 1990	To Be Completed by PACD (30 June 1991)
Headworks	29	43
Main Canals to Outlets	1	34
Distribution Networks	0	18

Source: GOMP/ID

Text Table 2
Current Status of GOMP and Project Expenditures on Irrigation Sub-system Components

Project Component	Estimated Total Revised Costs	Expenditures Through to February 1990
Headworks	30	21
Main Canals	15	7
Distribution Networks	12	1
Other Items	8	4
Total	65	33

Source: GOMP/ID, March 1990

The construction process has not been accelerated despite the assured availability of funds. The period of completion of head works has generally ranged between 4 to 8 years -- and up to 11 years in one case. The time lag between start of head works and start of construction of the canal system has generally been 4 years or more -- again, 11 years in one case. Text Table 3 summarizes these time lags.

Text Table 3
Summary of Time Lags Between Start of Head Works and Start of Canal Systems

Time Lag	Number of Sub-Projects
Four years or more	28
Three years	7
Two years	4
Yet to be started	6
Total	46

Sources : Project Documents and GOMP/ID

The rate of construction on canal systems is slow. The work has been fully completed on only one USAID-assisted sub-project on which the canal construction work began six years ago. On many other sub-projects, construction work has been underway on the canals for four years or more and is still incomplete.

The construction work on the micro-distribution networks in the sub-projects has only been undertaken during the past year. It is difficult, therefore, to judge how rapidly construction of these components will proceed. However, given that some of the sub-project systems will be completed by June 1990, one can assume that micro-distribution network construction will proceed at a more rapid rate than has been the case with other elements of the systems. However, there have been reports of contractors abandoning construction of micro-distribution networks and problems of finding reliable contractors for these components of the sub-project systems. These problems could lead to further delays in construction of USAID-assisted sub-projects.

2. Special Studies

The original Project Agreement (ProAg) indicated that special field studies would be undertaken "to collect socio-economic data to improve the understanding and quality of public sector support services to farmers." This is considerably different than the description of field studies in the Project Paper (PP) itself, which listed ten possible studies, only two of which related to socio-economic aspects of the MPMIP. The studies listed in the PP are:

a. Watershed yield methodologies
b. Sedimentation rates determination
c. Development of irrigation guides
d. Determination of estimated seepage losses along channel alignments
e. Recommended rotational water supply system and improved basis for water charges to be used on MISs.
f. Farmer organizations
g. Evaluation of effectiveness of seeds, fertilizer and pesticides distribution network
h. Credit availability and acceptability
i. Socio-economic baseline studies
j. Effects of water stress on crop yields.

The PP further noted that this list was not necessarily all-inclusive. The intention was that other studies might be identified or some of the above modified as the MPMIP developed. It is interesting to note, therefore, that at least one of the above studies -- i.e., on sedimentation rates -- appears to contradict statements made in the environmental assessement chapter of the PP, where it was stated "Madhya Pradesh has a program of measuring time changes of volumes of sediment in reservoirs which will lead to better quantification of this impact. Available data concerning this aspect of design of dams suggest that currently used criteria are acceptable." One might logically ask, therefore, "Why a sedimentation study was included in the PP?".

It has been difficult for the evaluation team to assess the status of the MPMIP Special Studies Activities as there appears to be no systematic method of keeping track of what is being done. Nine studies have actually been commissioned and of these four are ostensibly complete and await final editing. Text Table 4 summarizes these studies and the status of each.

A more detailed discussion of some of the studies is given in Annex B.

Text Table 4
Special Studies Commissioned to Date and Their Current Status

Study Topic	Contractor	Current Status
Rotation of water supply	CE NT sin	In progress
Watershed hydrology	BODHI (Hydrology)	In progress
Sedimentation I	BODHI (Director of Research)	Completed
Sedimentation II	BODHI (Director of Research)	In progress
Irrigation Guide	JNKVV (Agricultural Engineering)	In progress
Land Development Techniques	JNKVV (Agricultural Engineering)	In progress
Irrigation Management and Farmer Organization	R.S. Pachori of WALMI	Completed
Socio-Economic Study	GOMP Director of Economics and Statistics	Completed
Inputs Studies	JNKVV	Completed

Sources : MPMIP documents, USAID Project Officer, and GOMP/ID
Note : Completed denotes only that the final draft report has been submitted for USAID approval. Final draft reports may require additional editing.

Based on our review of the studies undertaken to date and the degree of completion of a number of the sub-projects in the MPMIP, we feel that several additional special studies should be undertaken prior to the PACD in fulfillment of the project's goals and objectives. These additional three studies include: a detailed analysis of the Khor Pilot project utilizing PVC pipes; a study on the Megehwan scheme to develop and test approaches to formation of farmers organizations; and an economic study of the capital and recurrent costs of the innovations in the MPMIP and the potential for replicating them in all minor irrigation schemes in Madhya Pradesh.

Detailed recommendations for these additional special studies are given in Section VI in this report. Additional discussion of them may be found in Section IV and in Annexes B and C.

3. Pilot Projects

The original PP called for two "pilot control minor irrigation schemes". These sub-projects were to demonstrate new technologies or approaches. The 1987 PP Amendment

indicated the expected MPMIP outputs were to include three pilot projects. Apparently, a fourth pilot was added at some time after the PP Amendment was finalized. The four pilot projects in the MPMIP as of March 1990 are:

a. **The Khor Sub-project**

This sub-project introduces a buried PVC pipe distribution system to irrigate a net command area of 370 hectares. The system is being tried as an alternative to conventional surface water course/field channel networks. It appears to offer some advantages both in terms of ease and rate of construction and in terms of costs.

b. **The Gadigaltar Level-top Canal Sub-project**

This system envisages a farmer-managed, flexible irrigation delivery system using a low pressure buried concrete pipe system to irrigate a NCA of 1157 hectares. A major feature of this system is a limited "on-demand" water supply to each farmer. An additional feature is that farmers will be allowed more water than is standard in other sub-projects. This sub-project is unlikely to be completed by the PACD and presents some additional problems which raise questions about it's appropriateness.

c. **The Raipura Sub-project**

This sub-project is being developed to demonstrate improved gravity flow (surface) irrigation systems with land smoothing over a NCA of 153 hectares. The sub-project is largely complete.

d. **The Ghorapachhar Sub-project**

This sub-project was selected to demonstrate gravity flow irrigation and to serve as an adaptive research site for visiting GOMP/ID and GOMP/AD personnel. The WALMI at Bhopal was expected to initiate this adaptive research. However, little guidance has been given to date with no such research underway or planned.

Detailed observations regarding pilot projects are given in Annex C.

4. Construction Quality

Construction work has been of generally high quality with no serious problems reported in any of the elements finished to date. In comparison with non-USAID-assisted schemes, it is readily noticeable that inclusion of canal and distribution network lining in the USAID-assisted schemes is resulting in field delivery systems which are of considerably better quality.

A Quality Control Manual has been developed and issued to GOMP/ID field engineers. During construction of dams and canals, a quality control record is maintained which documents quality control tests. Quality control personnel take samples of construction materials and send them to a laboratory for testing. Unfortunately, results of such tests are often delayed for such a long time that they are of little actual use for quality control. Some construction aspects such as fill compaction and moisture content are monitored on-site.

The LCU has prepared guidelines detailing tests which can be performed in field laboratories at construction sites for monitoring much of the construction associated with the micro-distribution networks. These guidelines also indicate which tests should be performed at the BODHI.

The procedures outlined in these guidelines have yet to be formalized into routine practice.

5. System Operation Plans

Operational plans have been prepared for a "75 percent dependable yield" storage in the sub-project reservoirs for both the kharif -- i.e. summer -- and rabi -- i.e. winter -- cropping seasons. In consultation with the GOMP/AD, the running period of canals has provisionally been set at three weeks in the kharif season and ten weeks in the rabi season. The actual dates of opening and closing of canals each season are to be decided in consultation with the GOMP/AD and farmers. These dates are expected to vary from one sub-project to another and from year to year.

The operational plans are prepared to ensure equitable distribution of available water proportionate to farm size and in accordance with a pre-determined sequence and timing. Successful implementation of the operational plans, however, depends on farmer participation in the process through "water user associations". To date, there has been little or no progress in establishing such organizations.

6. Planning and Design

Planning and design of canal and micro-distribution networks on the USAID-assisted sub-projects is a significant improvement over the detail and quality found in non-USAID-

funded schemes. The planning and design of headworks was well developed by the GOMP/ID and major improvement or revision of those processes were not required. Although canal design had been a part of the GOMP/ID's planning and design process previously, the process was significantly improved under the MPMIP. The design and planning of micro-distribution networks was not done prior to the project and represents a new element in irrigation planning processes for the GOMP/ID.

C. Additional Findings

1. Reservoir Storage Capacity

Most of the minor irrigation schemes in Madhya Pradesh are water-constrained in the sense that available water is the limiting technical factor in crop production. In general, land areas which can benefit from irrigation water are large relative to the available water supply. In such a situation, the storage capacity of the head reservoir should be large enough to store as much of the water from the effective catchment area as is economically viable.

In minor irrigation schemes in Madhya Pradesh, the criteria of "75 percent dependable yield" has been used to determine the live capacity of the reservoir. The reservoirs are expected to fill completely 75 percent of the time and "excess" water is expected to spill during good rainfall years. The actual quantities of water that spill and flow downstream vary from year to year. During 25 percent of the time, the reservoir would not fill to its capacity.

The criterion of keeping live capacity of the reservoir equal to "75 percent dependable yield" has been established by "long experience" but the criterion has no clear economic or technical basis. The criterion, therefore, needs to be verified to determine if better results could be achieved by adopting a higher storage capacity. If, for example, a "50 percent dependable yield" criterion is used, the cost of the dam would be higher to enable greater storage. Presumably, the benefits would also be higher during, at least, 75 percent of the time.

2. Canal Capacity, Command Area, Water Availability and Allowance

It was observed that the main canals in MPMIP sub-projects are being designed with a capacity to match a water allowance of five liters per second per hectare of net command area. The proposed operational planning for such sub-projects envisages running the canal for three weeks during the kharif season and ten weeks during the rabi season.

Under such planning, canal capacities at the head ought to be large enough to draw the entire "live capacities" of the reservoirs in question within a period of thirteen weeks. In most sub-projects observed, this draw done capacity is much smaller than required.

The extent of net command area should also be determined by dividing the canal capacity with water allowance factor. In most sub-projects, the net command area could be extended if this criterion is used.

The evaluation team observed some outlets that were planned and installed with very low discharges -- i.e. as low as 1.9 liters per second. Water streams of such small size cannot be used to irrigate fields in an efficient manner since, for many soils, the stream size would only enough to match the intake rate of the soil and water advance across the entire field could not be obtained. Some minimum stream size should be established compatible with actual field conditions and, thereafter, adhered to in GOMP/ID system designs.

At several locations, the team encountered farmers who possessed no land in the sub-project's net command area but who did have land on the high side of a sub-project canal -- i.e. the field was too high to be served by sub-project's gravity irrigation system. These farmers naturally were unhappy that they were not receiving any benefits of the installed system and raised the question as to why they could not use available water from the sub-project canal by resort to pumping.

In some of these cases, the sub-project canal had actually been dug through these farmers' fields. In other cases, farmers had pumped water to their fields by installing or hiring a pump set. In these situation, the evaluation team believes that there are some unresolved equity issues, which are currently being overlooked by MPMIP officials in development of the minor sub-project

The evaluation team was observed that no provision has been made in sub-project chaks for making water available for community uses, other than irrigation. Under these conditions, owners of water buffalo may have little choice but to allow their animals to wallow in the sub-project canals, with subsequent damage to the facilities. Given this problem, reinforced "buffalo baths" could be built into the sub-project canals at selected locations.

3. Data Collection and Utilization

The measurement and assessment programs have resulted in better and more complete designs, which have been translated into systems which have been improved in terms of the technical aspects of the system. It remains to be seen if these improvements translate into better systems operations.

The special studies have been discussed in considerable detail above. Those completed to date have not been used in any way in design or operation of sub-project systems. Of the technically-oriented studies, it is doubtful that they will contribute to improved designs in any way.

The meteorological data collection stations mandated by the project at each sub-project are in operation and data are being collected. However, the data are minimally processed

on-site -- i.e., temperature, rainfall and other data are being plotted over time -- but they are not being used in any way. At best,data may be forwarded to Bhopal for storage, but not for compilation and further analysis. Thus, the utility of the sub-project meteorological stations is very questionable and they seem to be an added expense of no significant value to the present or future projects. GOMP separately maintains stations based on agro-climatic zones! This approach is more rational, let alone economical.

III. PROJECT PERFORMANCE: INSTITUTIONAL ASPECTS

A. Introduction

Modern irrigation works began to be developed in India's Northwest in the 1890s and it is only in relatively recent times that these were extended elsewhere in the country. Nevertheless, irrigation itself is not a technological innovation in Madhya Pradesh.

With the possible exception of forest-dwelling and forest-exploring populations with little or no contact with farming -- i.e., the so-called pre-agricultural peoples of Madhya Pradesh -- even slash-and-burn farmers have seen, if not utilized, irrigation facilities. Old indigenous small systems reportedly are still operative in the eastern part of the state and, in Khargone, a rudimentary water-lifting system known as bhat is a funded item in 1990/1991 budget of the GOMP Directorate of Tribal Area Development Planning. The irrigation tank itself has been a centuries-old element in Indian agricultural technology.

The operational plan for irrigation systems developed and administered today by the GOMP has concentrated on the building of large retaining or diversional structures and turning water into a canal at the beginning of the season and regulating canal flow. Water to chaks is delivered through unregulated and unmanaged pipe outlets. The GOMP/ID traditionally has played no role whatever in system operation below the farm turnouts.

In the MPMIP sub-projects, water to each chak will be delivered through APM outlets which provide a controlled "apportioned" rate. A rotational scheduling system will be put in place for each chak which will determine the time and amount of water each farmer will receive in any given period. The method proposed by the GOMP/ID is the warabundi system, involving a weekly schedule of water delivery for each chak and designating the time and duration of water delivery to each farmer in that chak. The system is viewed by GOMP/ID technicians as an improvement over the "unregulated " system. However, for this system to be successful, it will be necessary to involve the farmers directly in decision-making processes regarding apportioning and delivery of water. To date, little has been done in the MPMIP to involve the actual water users in a meaningful way. The GOMP/ID will not be able to operate the system adequately to the satisfaction of farmers without their active participation. However, forming of water users associations is a new concept and poorly defined task for GOMP/ID officials, most of whom have yet to welcome and accept responsibility for such actions.

B. Major Findings

1. Farmer Organizations

Effective community organizations of water users can facilitate government-farmer communication, providing the latter with a group mechanism to voice needs, suggestions

and observations about water management and delivery let alone about the planning of physical structures. At the same time, they can provide a basis for developing local responsibliity and participation in decisions about water management and allocations, maintenance of physical structures and resolution of interpersonal differences among irrigators when these arise. If effective, an organization will play a major role in assuring equitable water distribution, using criteria which the groups consider to be important. Such criteria, it should be added, may be considerably different from those employed by irrigation engineers. This lively difference should not be surprising. After all, farmers are intimately involved with the water needs of their farming systems, unlike those planners and engineers, who at best are concerned with macro-policies and who may be distant from the pragmatic issues of on-farm procedures.

Irrigation systems are agricultural systems, the success of which ultimately depends on the effective use of water, soils, plants and humans, all interacting dynamically. Planning for sustainability in this context will require the involvement of skilled, competent and committed technicians and researchers from a broader array of disciplines than engineering alone, or agronomy alone or, for that matter, practitioners of social organization. Ultimate responsibility cannot rest in any governmental agency dominated by the perspectives of a single discipline. Similarly, working with farmers to build effective water user groups is not likely to be fruitful if responsibility is given to a single traditional line agency, no matter what its field of specialization.

Farming communities in Madhya Pradesh are much too varied in their ecological situations, much too heterogeneous in their social organization -- with ethnicity, tenure status, distribution of irrigable holdings by size, caste and other socio-economic factors which must be understood -- to apply a single, universal blueprint for farmer organization. The existence of traditional forms of household organization and interhousehold cooperation, the existence of modern entities such as cooperatives and agricultural marketing amenities, the history of contacts with government itself -- these and similar factors will have to be understood. These and other issues potentially involved in farmer organization have not been raised in the PP -- yet one stated objective of the MPMIP is to serve "client-oriented" systems.

The evaluation team encountered no functioning irrigation panchayat, as promulgated by state legislation in 1974, let alone enthusiasm for them. Officers from administrative and technical services uniformly were negative in their assessment of the panchayats as viable vehicles for irrigator organization. The quest for a single model is best not made. Instead, some lessons may be drawn from indigenous minor irrigation systems which reportedly have successful long histories within Madhya Pradesh, from current experiences with systems elswhere in India, or from experiences in other countries. Even with such lessons learned and new directions suggested, no single model should be expected. On the other hand, the evaluation team does not mean to suggest that 46 different organizations will be required. What is necessary is flexibility and sensitivity to local differences and similarities in approaching farm communities.

Given the variations in tribal and caste affiliations in the 46 sub-projects, understanding of traditional social structures may provide the bases for organization within outlet command areas. The special studies thus far have shed no light on local patterns of social organization or informal leadership, an undertanding of which might enhance this process.

Experiences in the Philippines, Sri Lanka and most recently, Nepal, suggest one approach which should be considered. Irrigation organization workers were recruited and trained to organize irrigators to take on the management of water on the local level. In the case of the National Irrigation Agency (NIA) in the Philippines, potential community workers were identified and trained, along with a second group, called "process documenters," who record in detail the efforts of the organizers, their interactions with farmers, and the reactions of thhe farmers themselves to these efforts. There is also some experience with this alternative approach to be found in the private sector in India and that, in itself, is suggestive for an experimental effort in Madhya Pradesh, both for training and work in selected communities. Such a resource of trained personnel -- living and working full-time in the new irrigation communities -- could perform an invaluable service both for concerned government departments as well as for the farm families.

The caveats here are several. Initial efforts should be seen as experimental. No effort should be made to superimpose a single, formal structure for organization. And, recruitment of personnel for training and field assignment should be based, insofar as possible, on previous experience in rural community work as well as willingness to take up residence in a rural area within the MPMIP.

To expedite the foregoing, it would be extremely useful if a pilot program designed to organize farmers into water user associations were to be initiated with USAID funding and supervision. At one or at best two communities ready for irrigation, where the responsible engineers would be amenable to such experimentation, such as Mehgawan, a senior consultant with organizational experience, working with a team of one water user association organizer and one process documenter for each site, would deal with problems of farmer reactions, issues of farmer participation, rights and responsibilities in local water management, and approach questions of alternative organizational structures.

The major criteria for selection of such persons would be professional competence and experience to enhance rapid establishment of the project. Team findings and experience would contribute directly to the training curriculum for irrigation organizers.

The effort to introduce at the Gadigaltar sub-project one experimental approach used by the NIA in the Philippines requires some comment here. In the best of circumstances, efforts at institutional transfer from one country to another meet with little success. The history of technical assistance in developing countries is replete with instances of failure. USAID/Philippines has been assisting, through its Accelerated Agriculture Program, a pilot study on the use of selected farmers to replace the established and successful practice of using community organizers of water user associations. It is an experiment, not yet

ended. Evaluation studies supported by ISPAN have only recently been installed. This situation in itself would be reason not to attempt replication in Madhya Pradesh of an untried mechanism about which there are a number of serious, unresolved questions.

Even if the Farmer Irrigator Organizer Program (FIOP) in the Philippines had been concluded to be a successful social mechanism, there would still be questions raised by this evaluation team. Was there sufficient knowledge of the social organization of Gadigaltar villages prior to the initiation of the selection and training of the farmers? Were caste, tribal affiliation, tenure status and other factors taken into consideration?

The prescriptive nature of the relevant reports suggest otherwise. Introducing a Hindi name for the proposed water user organization may have merit, but like the intensive efforts of the consultant and the GOMP/ID personnel who worked with him, these will have little or no effect until water flows in the sub-project. The recommendation to introduce this approach was premature at best. If a NIA device were to be borrowed, that of "process documentation" would have been immediately constructive. Indeed, it has been useful, with modification, in other Indian state systems.

2. Rotation in Water Delivery

It is generally assumed by GOMP/ID, USAID and LCU personnel that the warabundi system of rotation will be utilized after the micro-distribution ditches are established and are operational. Its employment as a mechanism to permit the equitable distribution of irrigation water should be transferrable to Madhya Pradesh, provided that the successful modifications developed in other Indian states are considered here. Institutional "technology transfer" is seldom possible if dealt with mechanistically, without regard for the particular socio-economic and cultural environments in which it is attempted. It will be useful to learn, for example, why warabundi has not been well-accepted in Eastern Rajasthan.

Enthusiasm by its proponents notwithstanding, there is little reason to expect that the warabundi system will be accepted by farmers in existing minor irrigation schemes, especially by those farmers at the head reaches, who in effect have been receiving the lion's share of irrigation water in these schemes. An educational and organizational process will be necessary if sustainability is to be expected after the first season of innovation. Water user organizations especially will be required to internalize disciplined behavior by members of a chak. Farmers have to be helped to understand and carry out their roles and responsibilities; exhortation will not be sufficient. Given the variations in tribal and caste affiliations in the various sub-projects, understanding of traditional social structures may provide the bases for organization within an outlet command area. The special studies thus far shed no light on local patterns of informal leadership, which might enhance this process.

The mode of introduction of the system of rotation, whatever its form, is critical. Farmer

participation in decisions on water allocation is more likely to bring cooperation rather than dissention. The prevailing tendency appears to be one of superimposition.

The several implications and possibilities of participation by farmers are not fully understood, e.g., merely assembling irrigators to tell them what has been decided for them. Here the USAID-funded sub-projects, where institutional mechanisms for water distribution, maintenance, etc. are developed, can play a significant role in setting possible directions for and facilitating constructive participatory processes involving the collaboration of GOMP/ID, GOMP/AD. GOMP/IRD and, where appropriate, GOMP/TWD.

At this juncture, rotational systems like warabundi, exist largely on the hypothetical level, so the usual complaints about inequity and iniquity in water distribution between head and tail, untimely delivery, etc. still arise.

It should be noted that on one USAID-funded sub-project, criticism was made by farmers that the policy of equal amounts for each of three waterings of wheat -- a new crop -- was inappropriate. They argue that the first watering necessitates a greater amount of water to moisten soil, permit easier working of the soil, to help germinate seed, etc.. The engineer-in-charge, a successful farmer himself, was in strong agreement. Determination of amounts of water by non-agriculturally trained personnel can affect cropping success and alienate farmers.

3. Appraisal, Monitoring and Quality Control

The GOMP/ID did not previously have a system of preparing systematic, detailed Appraisal Reports for minor irrigation schemes and little planning was done for works below the canal outlet. The Project Appraisal Reports are a significant improvement over the earlier reports and preparation of Outlet Reports is an altogether new element of the planning process. Both the Appraisal and Outlet reports are of technically high quality. The Appraisal and Supervision Cell, as well as the LCU, have been primarily responsible for development of these reports.

A special Appraisal and Supervision Cell headed by a Superintending Engineer has been constituted for the USAID-assisted sub-projects. The LCU is actively associated in developing standards and procedures for appraisal, design and monitoring. The evaluation team had the opportunity to see some appraisal and design reports which were prepared as per the standardized procedures. The reports are detailed and of high quality and represent a positive input to the design and construction process.

Appraisals of forty-six (46) minor irrigation sub-projects, covering a NCA of 25,070 hectares, have been completed. The appraisal reports have been reviewed by the MPMIP Local Coordination Unit (LCU) and approved by the GOMP Appraisal Committee.

With respect to project monitoring activities, the Superintending Engineer (Special Appraisal and Supervision Cell (SE/SASC) and the Superintending Engineer (Special Coordination Cell) (SE/SCC) are in place, properly staffed and functioning. Two project monitoring parties have been constituted. One party, headed by an Executive Engineer, assisted by an Assistant Engineer and Assistant Director of Agriculture, visits each MPMIP minor irrigation sub-project annually. The other party, headed by the Superintending Engineer, with the Executive Engineer, Deputy Director of Agriculture, and an Assistant Engineer, also visits each sub-project annually. The monitoring parties submit their reports to USAID, GOMP/ID Superintending Engineer (SE) and Chief Engineer (CE), and the GOMP/Agriculture Department (AD). These reports point out any deficiencies in project implementation. Follow-up actions are monitored by the concerned GOMP/SE and CE and reviewed by the monitoring team during in its next visit to the sub-project.

4. Technical Assistance and Training

a. Technical Assistance

Technical assistance has been provided to several aspects of the MPMIP by external consultants. The role of the FIOP from the Philippines was discussed earlier. Technical assistance was also provided by an American consultant through the ISPAN project for the design of the Gadigaltar Pilot Project. While the technical assistance in the form of engineering design appears to be of high quality, the evaluation team has questioned the appropriateness of such a system in the Madhya Pradesh context and these questions have been discussed in more detail in Section II and in Annex C on pilot projects.

Technical assistance has been provided on several occasions to the BODHI through ISPAN. The first consultant team assisted BODHI in the selection of a micro-computer system and development of a management information system. At the time of the visit of the evaluation team, some of the recommended hardware had been put in place and additional hardware and software was on order. This technical assistance appears to have helped the process of strengthening the BODHI in its ability to provide technical assistance to the GOMP/ID.

A second consultant team undertook an organizational review of BODHI and provided some useful recommendations which should lead to improvement in BODHI's ability to support GOMP/ID. However, it was difficult to determine which of those recommendations had been acted on to date and what effect(s) they have had. In addition to the organizational recommendations, the consultant team recommended a wide range of equipment to improve the testing capabilities of the BODHI. Some of this equipment has been obtained and some of the remainder is on order. Procurement of the equipment will strengthen BODHI's capabilities.

The final consultant team providing technical assistance to BODHI prior to this evaluation

visit was in February of 1990. The purpose was to evaluate the capabilities of the hydraulic research station. The consultant team found the station to be an important resource for the GOMP/ID but in need of strengthening in terms of training, personnel and equipment. These recommendations, if acted on, should further strengthen the BODHI as a resource for the GOMP/ID.

b. Training

Training under the project has taken two primary forms. The first involves short-term training in the United States and third countries, such as the Philippines. Several GOMP/ID engineers have participated in this type of training and interviews with some of them indicate that the training has been useful. In at least one case, the training in the United States appears to have "sensitized" the engineer to the socio-economic aspects of irrigation systems.

The second form of training has been in-country induction training for new engineers in the GOMP/ID. This training is of more questionable value as it appears that the subject matter has been primarily basic engineering subjects which should have already been covered in post-secondary education. These courses covered a broad range of technical subject matter. What may be much more appropriate, if an objective is institutional change, would be to develop one or two training courses of a much more limited scope which would be unique to the project and would provide technical people with the training outside of their fields and would sensitize them to the broad aspects of irrigated farming systems.

As part of its evaluation, the team visited with the staff of the Madhya Pradesh Water and Land Management Institute (WALMI) in Bhopal. This institute is supported under the USAID Water Resources Management and Training (WRM&T) project. Based on this visit and additional discussions with WRM&T project personnel in New Delhi, the evaluation team believes that the WRM&T project has potential to be of great benefit not only to the MPMIP but to other irrigation sector and natural resource projects in the USAID/India portfolio.

The evaluation team found needs for additional training in the GOMP/ID in several areas. One of the greatest of these is to provide training to engineers at all levels to "sensitize" them to the needs for and benefits of greater farmer participation in operations and management of irrigation systems. The WRM&T project can develop such training programs and provide these as an important element of the other projects. Development and encouragement of greater farmer participation is an important step towards "open markets/open societies". If farmers play greater roles in operation and management of the irrigation systems that serve them, they are likely to assume a much greater active role in deciding their own destiny. They become "unburdened" by the constraints imposed by a rigid government bureacracy and can begin to exercise greater flexibility not only in how "their" irrigation system is managed but also in the ability to manage it in a way

that gives them enahnced opportunities for new crops and new markets. Thus moving towards the assumption of a greater role by farmers in irrigation systems is a first and fundamental step on the road to "opening" opportunities for them. The WRM&T project can and should have an active and important role in achieving this first step.

5. Demonstration Chaks

The basic goal of irrigation is to increase the productivity of agricultural enterprises so that farmers will be able to be market-responsive and thus enhance the level of living of their families. More is involved than access to water. The proposed establishment of "demonstration chaks" in each of the MPMIP sub-projects, in conjunction with the so-called construction of micro-distribution networks, requires some comment from the evaluation team.

It is recognized that farmers unaccustomed to irrigation and the farming practices that it requires and enables will need some guidance and advice during the transition from dryland farming to irrigated farming. There is some question about the demonstration plot as the most effective technique for accomplishing this transition. The history of agricultural extension is replete with the lack of success -- or at best limited success -- of this approach to farmer training, if indeed the target clientale is to be more than the most "progressive" or affluent farmers.

Generally speaking, on-farm demonstration carried out by the farmers, collaborating with subject-matter specialists, employing existing farm practices or modifying them in a manner consistent with the local farming systems, tends to be the more effective method of getting farmers to adopt new recommended practices. The history of the package programs in India attests to this observation.

Doubts about the use of demonstration chaks notwithstanding, the fact remains that these are planned as a major extension device. It seems appropriate, then, to ask several questions. Who will prepare the plans for individual chaks? Who will implement the plans? Will planning content of the demonstration chaks be based on local agro-climatic conditions as well as local cropping patterns and farm practices? Or, will a basic overall plan be used for each agro-climatic zone without taking into account local cropping patterns and farmer experiences and preferences?

Can it really be claimed that the necessary comprehensive knowledge of farming conditions and practices in the 46 irrigation sub-projects is now available? It is expected that GOMP/ID and GOMP/AD personnel will work closely on developing the demonstration plots, but is such optimism warranted, given the relative lack of interaction between the two ministries on the ground level? Where will ultimate responsibility lie? At this point, such proposed linkages are at best poorly defined.

The active utilization of demonstration chaks will require a concentration of efforts. Is it expected that the current extension approach will suffice? Training and Visit extension methods already have proven to have limited effectiveness. They place a heavy workload on extension personnel and clearly the periodic visits of a Regional Agricultural Extension Officer are much too infrequent and irregular. Will there be a balance between food crops and cash crops in the demonstration lay-outs? Will there be an emphasis on the preferred crops of agricultural technicians, such as wheat or soybeans, at the expense of the pulses and grams, so basic to poorer rural household diets?

Decisions along the lines raised by these questions require careful planning and the involvement of farm families, including women, who emerged in our discussions with farmers as active participants in decision-making about farming as well as household matters.

A final note: the success of demonstration chaks as an extension device depends upon more than planning. Those assigned to implement the plots will require careful supervision by senior officers who, it is presumed, will also maintain contacts with the farmer-irrigators in the course of developing the demonstration chaks.

It is premature to generalize about differential attitudes by GOMP/ID staff to be found on USAID and non-USAID funded minor irrigation schemes. Completion of fully operational micro-distribution networks is yet to come; the full results of such systems will only be ascertainable if the demonstration chaks will have positive effects on farmer adoption. Moreover, for many engineers, their responsibilities encompass both types of irrigation schemes. There is some evidence that the possibility that the greater equity and efficiency in water use and irrigator satisfaction attained by the new technologies finds interest and approval among several of the engineers interviewed at different levels of responsibility.

Evidence from interviews and reports indicates that farmers receiving water for dry season crops were pleased with this possibility whether on partly-functioning USAID or non-USAID funded schemes. Previously, farmers planted only one crop annually and limited themselves largely to traditional cereals, grams and pulses. The new availability of water has encouraged them, with the support and advice of GOMP/AD personnel and the provision of mini-kits, to introduce new improved seeds and practices for subsistence and sale.

Anecdotal evidence and a limited number of interviews suggest both increases in area and in productivity. It would be useful if, after the micro-distribution networks are operational, GOMP/AD would establish a record-keeping system of a selected number of households, using a stratified random sample to obtain such data measuring impact and farmer satisfaction. USAID personnel can play a significant role in helping establish such procedures -- not only for Madhya Pradesh but for other state systems as well.

6. Institutional Linkages

There are activities of the GOMP/AD hypothetically available for villages on all minor irrigation schemes -- both USAID and non-USAID funded ones. These would range from the availability of a Regional Agricultural Extension Officer, who is scheduled to come to a village on a regular basis through the World Bank-supported Training and Visit system, adopted by the GOMP/AD to credit cooperatives. Subject matter specialists are supposed to be available when needed and training sessions are held for farmers on a variety of subjects.

The agriculturalist on the LCU staff -- a former joint director of the GOMP/AD Jabalpur Office -- acts as liasion between the two departments, offering advice on land levelling and future development of demonstration chaks, etc.. The LCU has only one such specialist and, with the completion of physical structures on a large number of sub-projects, it is predictable that he will be overburdened. Currently, there is no organization specialist on the LCU staff, let alone on that of the GOMP/ID.

A basic problem exists in the extant linear approach to the development of irrigation schemes. It is assumed that the GOMP/ID will work on physical structures to enable water flow and distribution up to the farm gate, as it were, after which the GOMP/AD will assume its function of working with farmers. There appears to be token consultation with the LCU staff member as intermediary, but there have been no instances known to the evaluation team where close collaboration have taken place from the onset of the sub-projects. Major decisions on the nature of the sub-projects, which in fact are intended to be irrigation agricultural systems, are made by the GOMP/ID. The GOMP/AD may provide a listing of crops grown in a village or cluster of villages within a net command area -- but no attention is given to existing farming systems or even more limited cropping systems, as a basis for planning and design. A high official in the GOMP/ID, referring to the USAID-supported program and the role of the GOMP/AD within it, spoke of the latter as "marginal". That marginality is more than budgetary; it is functional.

Availability of some water on a few sub-projects during the dry season has already resulted in the use of improved seeds -- both for familar and new crops -- fertilizers and, for some crops, insecticides. Double-cropping in itself, then, is the major factor affecting input increases. Availability of purchasable inputs through the Cooperatives and private sector agents on a timely basis appears not to be a major problem. Modest production loans were already available through local banks and the fact of irrigation facilities has apparently simplified obtaining them. Current data from the special studies indicate the use of credit sources, but no records of repayment since the introduction of irrigation are available. The evaluation team is unaware of any attention being given to the needs for rapid turnover in land preparation when double-cropping is in force, nor to problems of post-harvest technology or the assurance of marketing outlets for the sale of cash crops and/or surplus produce.

In Jabalpur, it was evident that professional relationships are maintained between senior officers of the GOMP/AD and extension education personnel at the university. The former are kept abreast of agricultural research activities conducted at the university and its strategically-located branches in other agro-ecological parts of the state, such as Indore. Contacts with the social science disciplines like sociology and agricultural economics are minimal, but this may be due to what appears to be a lack of applied interests on the part of senior professors in those departments. This lack of liaison may, in fact, be short-sighted. One professor, at least, participated in the USAID-supported study of the role of women in development at the Dohud irrigation scheme and today supervises a number of post-graduate students conducting research in tribal as well as non-tribal communities. The evaluation team cannot over-stress the importance of development work with rural women, the majority of whom are demonstrably involved in different aspects of agricultural work.

Despite the fact that 23 percent of the state's population has tribal affiliations, minimal communication was found between the GOMP/ID and the several state offices dealing with tribal affairs and tribal research. Again, this is a short-sighted position on the part of the former. The Tribal Planning Office in Bhopal has minor irrigation works within its purview and, while these are small-scale in nature, funds and expertise can be trapped. It is the latter know-how in dealing with tribal entities and cultural factors where a contribution to the GOMP/ID's minor irrigation projects in the Narvada Valley can be made.

The evaluation team would be remiss if the report of E.H. Sims, Irrigation Institutions and Strategy in Madhya Pradesh was not mentioned. The detailed observations on institutional linkages, different elements of agricultural services, and selected aspects of the original PP, are relevant today as they were in 1984.

So long as the role of the GOMP/AD is regarded by the GOMP/ID as "marginal" -- and this characterization is buttressed by differential allocation of funds -- the realization of actual collegial collaboration is problematic, "achievement" of relevant benchmarks notwithstanding. The financial inducements offered by the project will be insufficient to influence relinquishing a position of institutional power. As for changing of bureaucratic attitudes about farmers and their potential role in irrigation planning, it may be said that of all those who are resistant to change, professional change agents lead all others.

IV. PROJECT PERFORMANCE: MANAGERIAL, ADMINISTRATIVE AND ECONOMIC ASPECTS

A. Introduction

The Performance-Based Disbursement (PBD) system, which is the major managerial innovation in the MPMIP, was authorized by the Bureau for Asia and the Near East in AID/W on 12 June 1987 following submission of a Project Paper Amendment by USAID/Delhi. The PBD system was actually operationalized within the project by issuance of Project Implementation Letters (PILs) Numbers 14 and 15, both dated 9 March 1988. The first of these PILs dealt with the 25 PBD benchmarks pertaining to disbursement of loan funds under the project; the second dealt with the 19 benchmarks for disbursement of grant funds. The performance benchmarks in PIL No. 15 were subsequently modified by letter on 20 May 1988. (Annex D presents complete benchmark statements).

The present PBD system was grafted into the pre-existing project 56 months after it had been originally authorized (26 July 1983), 44 months after the Project Agreement was signed (30 July 1984), and only 18 months prior to its initial PACD of 30 September 1989. Concurrent with the installation of the 44 loan and grant PBD benchmarks, the original PACD was extended until 30 June 1991. This action was formalized in PIL No. 14. In effect, then, at the time of this evaluation, the new PBD system had been operational for only 21 months.

As stated in the Project Paper Amendment, the PBD system was installed in the project to reverse the situation in the original project where total loan disbursements were tied principally to expenditures on irrigation system construction. A collateral objective appears to have been to speed up the rates of disbursement for both loan and grant funds under the project. These rates of disbursement had been judged by USAID to be very slow over the first four years of the project.

The major objectives in amending the Project Paper in 1987 to install the PBD system were stated to be:

a. To link funding directly to improved systems design, planning and operational processes (and consequent institutional performance) while remaining in close relation with the proxy of that performance -- i.e., the system construction;

b. To redirect grant funding to activities which more directly support the objectives of the loan funding -- i.e., system planning, design and operations;

c. To concentrate dialogue and technical and management staff time on the fundamental issues of institutional performance as opposed to the widespread and large number of individual construction and on-farm activities which are at best partial indicators of that performance; and

d. To simplify the claims and disbursement procedures to free the USAID/GOI/GOMP relationships from onerous and cumbersome budgeting, accounting, monitoring and claims processes at the expense of dialogue and attention to technical and institutional improvements.

Under the PBD system, 25 individual performance benchmarks were established to govern disbursement of the project's loan funding ($ 41 million). An additional 19 performance benchmarks were established to govern disbursement of part of the grant funding ($ 2.12 million). The balance of the grant funding ($ 2.88 million) was reserved by USAID for direct payment of certain technical assistance, evaluation, participant training and other activities.

B. Major Findings

1. Achievements

As of March 1990, ten benchmarks under the loan component and eight benchmarks under the grant component of the project had been fully or partially attained. Specifically, under the loan component, benchmarks I.A.1, I.A.2, I.B.1, I.B.2, I.B.3, I.C.1, I.D.1, I.D.3, I.D.5 and I.D.7 were attained. Under the grant component, benchmarks II.A.1, II.B.1.a, II.B.2.a, II.B.3.a, II.C.1.a, II.E.1 and II.E.2 were fully attained and II.B.1.b was partially attained.

In addition to the progress reflected in actual achievement of PBD benchmarks to date, the evaluation team found significant evidence -- as detailed in previous sections of the report -- that the GOMP/ID was attempting to adopt institutional changes, as required, in the planning and implementation of minor irrigation sub-projects <u>within the context of the MPMIP</u>.

2. Areas of Concern

a. Late Grafting of the PBD System as a Project Management Tool

The MPMIP differs from other USAID-sponsored projects in India in that the PBD system was grafted into the project late in its effective life. In all other USAID irrigation and water management projects, PBD systems were installed as part of the original project design or shortly thereafter.

his factor -- perhaps as much as any other -- explains the relatively modest contribution e PBD system has had to date as a management tool for affecting institutional change n the Madhya Pradesh irrigation sector. It also makes the MPMIP PBD system atypical nd, thereby, a poor representative by which to judge the totality of USAID project PBD ystems in India.

With approximately fourteen months until the MPMIP PACD, the evaluation team believes it is doubtful that the MPMIP PBD system can reach its full potential or have the same degree of impact on this particular project as those which have apparently been observed in other USAID projects.

b. The Large Number of PBD Benchmarks Relative to MPMIP Funding

The MPMIP PBD system is encumbered with an extraordinary number of benchmarks relative to the amounts of loan and grant funds available for disbursement. On average, GOMP achievement of each loan and grant benchmark presently would allow USAID to disburse $ 1.64 million and $ 111,579, respectively. All other USAID projects with PBD systems have far fewer benchmarks in total -- i.e. usually five or less -- and provide much larger payoffs for achievement of each benchmark.

By constructing such a complicated and extensive benchmark system for the MPMIP, the Project Amendment design team created a project administrative package which virtually guaranteed that the MPMIP would have to be "micro-managed" by USAID staff and that GOMP implementation efforts would be dissipated -- rather than concentrated -- in trying to attain a very large number of benchmarks.

While the intent of the designers may have been meritious, the practical effects of such a cumbersome series of benchmarks are clearly being felt at present in project implementation. Even if these benchmarks had been introduced at the start of the MPMIP, the requirements would have been difficult to meet for reasons stated below. Their introduction so late in the project, however, clearly created an untenable situation.

c. The Major PBD Benchmarks Have Not Been Attained

As can be seen from the detailed statements of the benchmark requirements in Annex D, virtually all benchmarks attained thus far involve preliminary actions in the project. These include items such as the GOMP's providing assurances to USAID that adequate state budgetary resources will be made available for project activities; establishment of the project's appraisal unit; identification of the sub-projects to be included in the project; erecting information boards at sub-project sites; doing approach papers and scopes of work for various special studies; curricula preparations for in-country training courses; and identification of training candidates.

While these benchmark items are of some importance to project operations, they are all preliminary actions -- most of which were or should have been accomplished in the project long before the PBD system was put in place. **In the opinion of the evaluators, then, none of the benchmarks attained to date can be considered major benchmarks.** All major benchmarks remain outstanding and must be attained in the 15 months before the PACD of 30 June 1990.

d. Continued Slow Disbursements Under the PBD System

For attainment of the component benchmarks to date, the USAID project officer stated that USAID has disbursed or is about to disburse to the GOI a total of $ 17,000,000 in loan funds and $ 174,500 in grant funds. Supplementary records from the USAID Controller's office show that -- as of 4 January 1990 -- total actual disbursements against the project loan component totalled $ 18,953,511 -- plus an additional $ 4,400,000 in accruals. As of the same date, disbursements against the grant component totaled $ 901,553 -- with $ 272,274 in accruals. It should be noted, however, that cumulative disbursements against the grant component include both payments against PBD benchmarks and direct payments by USAID. Against these total disbursements, the GOMP/ID officials claimed that they had been notified as of 31 March 1990 about only $ 13,000,000.

Using the Controller's records, project disbursements have amounted to 46.2 percent of the loan component and 18 percent of the grant component over the approximately six years of project life since the signing of the project agreement and after 21 months of PBD system operations. On an annualized average rate basis, this amounts to a dispersement rate of 7.7 percent for the loan component and 3 percent for the total grant component -- i.e. benchmark attainments plus direct payments. Moreover, according to personnel interviewed in the Controller's office, the rates of project dispersement have actually slowed down in the 21 months since installation of the PBD system.

e. Program Problems With Incomplete Delinkage of Benchmark Attainment from Sub-Project Completion

The slow attainment of project benchmarks since 1988 and the prospect for completion of those remaining before 30 June 1991 are linked to several problems.

First, there is the programmatic dilemma posed by the fact that benchmark attainment is only partially delinked from physical completion of minor irrigation sub-projects in Madhya Pradesh. While it was the intent of the 1987 Project Paper Amendment design team to completely delink the attainment of project objectives through PBD benchmarks from the physical completion of individual sub-projects, many of the PBD benchmarks were written so as to be effectively linked to physical completion of two groups of sub-projects -- i.e. a first set of 25 sub-projects and a second set of about 25 sub-projects.

The MPMIP, as originally designed, provided that the Minor Irrigation Committee (MIC), comprised of representatives of the GOMP/ID and GOMP/AD and the GOI/Ministry of Finance, would be responsible for approving the sub-projects to be included in the project. The basis for such approvals was a set of agreed-upon criteria listed in Attachment B of PIL 3.

Pre-1988, USAID/India's responsibility in connection with the MIC-approved sub-projects was to approve the total amount to be reimbursed by USAID under a Fixed Amount Reimbursement (FAR) arrangement for each sub-project and the rates of reimbursement for each unit -- i.e., kilometer, cubic meter, or other agreed unit -- completed for separate components of the sub-projects -- i.e., main canals, drainage channels, watercourses, masonry/concrete spillway. These USAID approvals were contained in PILs 4 through 11.

PIL 14 dated 9 March 1988 changed the MPMIP reimbursement arrangement from a FAR to a PBD system. As a result of this change, USAID intended to move the focus of project activities away from individual sub-projects to implementation of a minor irrigation program and likewise to shift USAID reimbursements away from reimbursing strictly for construction costs for individual sub-projects to inducing key planning, design, budgeting and construction actions necessary to implementation of the program.

With the changes in PIL 14, it was comtemplated that USAID would review a list of 50 proposed sub-projects and annual implementation plans. The number of approved sub-projects included in the MPMIP could be less than the 50 schemes initially proposed if, based on progress reviews in the AIPs prepared by USAID and the GOMP/ID, it was decided that less than 50 sub-projects could be accomplished by the PACD. PIL 14 provided that to the extent sub-projects on the original list ran into significant implementation delays such that 75 percent of their irrigation potential could not be reached by the PACD, then, not later than 31 October 1988, the GOMP was required to replace such schemes in the MPMIP with other schemes approved by the MIC.

The Project Loan and Grant Agreements and the various PILs specifically state that approximately 50 minor irrigation schemes will be financed under the MPMIP. Although as the PBD benchmarks are structured so that some PBD benchmark payments can be made even if all of the 50 sub-projects identified are not completed by the PACD, not all reimbursements can be secured by the GOI and the GOMP unless approximately 25 schemes in the second set of sub-projects are essentially completed by the PACD.

As of 31 March 1990, the MPMIP MIC had approved 46 sub-projects for inclusion under the project benchmarks. As per PIL instructions, these sub-projects were grouped in two sets of 27 and 19 schemes. Currently, attainment of 9 of 25 benchmarks under the loan component and 1 of 19 benchmarks under the grant component appear to be tied to completion of the second set of 19 sub-projects. All of these are major benchmarks for the project.

Since it now appears to both the GOMP/ID and the evaluation team that a significant number of MIC-approved sub-projects will not completed by the PACD, the situation raises two programmatic questions. The first is "How far is USAID/India willing to stretch its definition of approximately 25 second set sub-projects?". The second is "Given the possible significant shortfall, should be existing PBD benchmarks be rewritten so as to complete the intended separation between attainment of program objectives and physical completion of any specific number of MPMIP sub-projects?".

f. Benchmarks as Close Proxies for Actual Construction Costs

The second series of implementation problems has been related to the fact that many of the major project benchmarks are close proxies for construction costs on new minor irrigation sub-systems. This means in effect that many of the PBD benchmarks cannot be achieved until these new sub-systems are physically complete and that the GOMP/ID can get no credit for introducing the same desired institutional changes on pre-existing minor irrigation projects in the state.

Related to this problem is the attitude prevalent to date within the GOMP/ID that all sub-project construction must proceed in a sequential manner. That is, sub-system planning and construction must proceed from the dam to the headworks and main canal(s) to the secondary canals and, finally, to the micro-distribution networks.

This sequential approach has had serious implications for the speed at which many of the benchmarks can be attained. The first is that land acquisitions and approvals from other state agencies -- i.e, forestry -- before construction can start seem to take inordinate amounts of time. The second is that the GOMP/ID is plagued with relatively short annual construction seasons during which sub-project contractors can actually work on the main system components -- i.e., only three to five months. The third is that there have been many delays in construction work attributable to problems of finding and retaining quality and reliable construction contractors. And, lastly, the fact that sub-system construction has to be in a relatively advanced stage before many of the major benchmarks can be attained.

g. The Time Constraint on Attainment of PBD Benchmarks

Another major problem facing the MPMIP is directly related to the present PACD. Essentially all of the "easy" benchmarks have already been attained. Many of them had been attained in effect before they were written. The GOMP/ID is now faced with the daunting risk of using state funds in the attempt to finish the sub-projects and, thereby, attain the benchmarks with little hope that this can actually be done before the PACD. All senior officials are beginning to realize the risk they are taking and they are clearly worried about it.

h. USAID Micro-Management of Benchmark Attainment and Other Aspects of the Project

With respect to the current project review process, there was a pervasive feeling expressed in our interviews that the USAID project officer has been forced to manage the minute details of all aspects of the project to a much greater extent than was being done before 1988. While many GOMP/ID officials expressed gratitude for the project officer's technical contributions to project operations, they often complained to evaluators in private interviews that they thought the PBD review process was less objective by its nature and subsequent execution than the FAR reimbursement system in place prior to 1988. Several said that they were not clear as to what USAID thought it was purchasing under the PBD system and/or what precise targets they had to meet before the project officer could release reimbursements.

Under the old system, these officials believed objective judgements could be made more easily as to what existed and what did not exist. Costs incurred could be objectively determined against vouchered receipts. Under the PBD system, many complained of having to redo reports and other work three, four and five times before they were finally accepted. One official even made the statement that "there are now so many people monitoring and evaluating the project that I don't have any time left to do my real work".

Finally, many officials expressed their feeling that the project's "real" attainments -- i.e. the physical construction of the sub-systems and the provision of irrigation water to the command areas -- are being denigrated and delinked from the payments being made by USAID for benchmark attainment. And that, at least, some of the institutional changes being required were either redundant or unlikely to be sustainable after the project PACD.

i. The Limited Effect of Benchmarks on GOMP Irrigation Sector Planning Outside of the MPMIP

It was noted by the evaluation team that the MPMIP benchmarks exert no real pressures on the GOMP to **institutionalize** the specific project-induced changes on a long-term basis for the <u>entire</u> GOMP irrigation sector.

For the 46 MIC-approved sub-projects in the MPMIP, the GOMP/ID is required to take certain actions which might not otherwise have been taken in the planning, design and installation of minor irrigation schemes. However, none of these actions directly affect minor irrigation schemes <u>outside</u> the project. At best, one could say that USAID through the PBD system is "persuading" the GOMP/ID to do certain things <u>within the specific context of the MPMIP</u>. But, there is only the concommitant hope -- with no leverage attached -- that there will be demonstration effect spillovers to the rest of the state irrigation program.

The evaluation team believes that there may in fact be some demonstration effect spillovers for other minor irrigation schemes in the state. But, at this stage, it is clear that, whatever these may be, they will be only be partial in nature and will be limited to those institutional changes which the GOMP/ID -- not USAID -- officials judge to be "innovative" and feasible -- i.e. actual adoption of a sub-set of project "innovations" will be limited to those which are not only desirable but can be paid for from the GOMP's own budget after the project per se is over.

j. Utility of the Annual Implementation Plan (AIP) Approach as an "Innovation"

As of March 1990, only one MPMIP Annual Implementation Plan (AIP) had been submitted by the GOMP/ID and approved by the USAID project officer. This AIP was for the Indian Fiscal Year (IFY) 1988/1989. The document consists of five and one-third typewritten pages. It includes a financial budget estimating loan and grant expenditures by quarter in local currency and lists of the projected "physical targets" -- i.e., benchmarks -- to be attained during the year under loan and grant activities.

The AIPs for 1989/1990 and 1990/1991, according to the USAID project manager, have not been prepared. He stated that the AIP which was due to be submitted to USAID in February 1990 -- i.e., for IFY 1990/1991 -- had been delayed due to the "recent elections".

The one available AIP is deficient in many aspects. It contains no summary of the project status to date. There is no discussion of implementation successes and problems. No statement as to the basis for the projections presented is included. In short, there is very little of a substantative nature in the "plan".

Moreover, when questioned about the AIP and its role in the project, senior officials of the GOMP/ID were unsure as to what Annual Implementation Plan the evaluation team members were referring to. When this confusion was clarified, the officials freely acknowledged that one AIP had been prepared but that it had played no real role in formulation or execution of their actual work program. Officials said that the project AIP requirement duplicated their normal -- i.e., pre-existing -- system for annual work plans in all respects and that they did not consider the USAID AIP to be an "innovation".

We feel that the deficiencies in the AIPs are significant because joint USAID/GOI/GOMP review of these documents on an annual basis was foreseen as a major management tool for use in determining whether project adjustments would be necessary over time.

k. Blurred Linkages and the PBD System's Lack of Effective Leverage on GOMP's Irrigation Sector Planning

Changes induced by the MPMIP PBD system benchmarks apply only to the 46 MIC-

approved minor irrigation sub-projects. The benchmarks have no direct applications to or effects upon the total GOMP inventory of 1,669 minor irrigation schemes presently under planning and/or construction; or to the 4,471 minor irrigation projects which have already been completed; or to the unknown number of medium and major irrigation projects in the state.

Total USAID funding for the project, when available to the GOMP/ID via the project's convoluted resource transfer mechanism, generates essentially no leverage on overall GOMP irrigation sector policies and planning or on those irrigation projects in total GOMP irrigation sector program but outside the project per se. In this sense, the entire array of project activities runs a risk of being "additive" only in theory.

This is so partially because the GOMP has resources at its command which far exceed any provided under the MPMIP. In this regard, the GOMP/ID Supervising Engineer said that planned expeditures for all irrigation activities in Madhya Pradesh this year totaled R 3,250,000,000 ($ 191,176,470 at R 17 = $ 1.00). The total minor irrigation systems component expeditures totaled R 936,000,000 ($ 55,058,824) and, that total GOMP expenditures on USAID project minor irrigation system was projected at R 180,000,000 ($ 10,588,235).

However, since actual reimbursements from USAID are based on the attainment of the benchmarks -- and not on GOMP expenditures -- actual USAID disbursements for irrigation activities in the state on an annualized basis presently constitute considerably less than five percent of the total GOMP irrigation budget. This being the case, we cannot disagree with the assertion often made by GOMP/ID senior staff that the specific USAID-approved minor irrigation schemes were already part of the GOMP irrigation program before the project started and would eventually have been completed by the GOMP/ID even without USAID funding.

The problem of lack of broader, sector-wide leverage related to the relatively minor amount of USAID resources being transferred is further compounded by the fact that the GOMP/ID does not receive the USAID funding directly as a discrete line item in its budget allocation. Funding comes as an integral part of the GOMP/ID normal state budget vote, after being transferred through an administrative and political filtering mechanism at the federal and state levels. There is, therefore, no clear and unambiguous linkage for most GOMP/ID officials between the attainment of project benchmarks and the receipt of USAID resources.

Only a very few senior officials in the GOMP/ID -- probably less than 20 out of 11,724 technical and administrative employees in the GOMP/ID -- are close enough to the project management and dispersal mechanism to realize that any linkages exist between the PBD benchmarks, project objectives, USAID resource transfers, and the GOMP irrigation program.

In the case of these very senior officials, the major pressures for attainment of the benchmarks come through the periodic interventions of finance officials at the state and federal levels. And, at this level, there appears to be diminished concern for the attainment of benchmarks as desirable "innovations" in and of themselves. The overwhelming practical concern lies in ensuring that the federal and state governments do enough to recover the government funds advanced to the project for construction of the sub-projects and other activities.

In this situation, the attainment of the project benchmarks becomes simply the means toward an end which is much more important in their eyes -- i.e., cost recovery. In this sense, the merit and "innovation" of any particular benchmark becomes a secondary -- and possibly -- irrelevant consideration.

1. The Socio-Political Climate in Which the MPMIP Must Operate

The basic problem of the blurred linkages between benchmarks, project objectives and resource transfers is further compounded by the more fundamental problem of the socio-political climate in which the project is operating. By the unsolicited admission of virtually every senior GOMP/ID official, the state irrigation program is driven almost exclusively by local political concerns and the exigencies of the GOI's national development strategy. This confluence of local politics and national strategy objectives means that the selection and construction of all irrigation projects -- i.e. major, medium and minor -- is driven primarily by socio-political considerations. Economic and/or technical factors are distinctly secondary issues.

Heavy emphasis is placed on providing irrigation water in some form to the greatest number of rural families within the state. This orients the irrigation sector agenda toward spreading the limited budgetary resources thinly over the greatest number of irrigation projects. The GOMP/ID in its normal operations is constantly forced to place greatest stress on initiation of new projects for new client groups. The annual completion of some degree of work on a very large inventory of projects is seen to take precedence over completion of any particular project.

This policy of spreading of the available resources over the largest possible number of client groups has two major consequences. First, the gestation and construction periods for any particular project are likely to be very long. For the average minor irrigation project, eight to ten years from concept to completion of the dam, primary canal and secondary outlets is seen to be "normal". In these projects, no provisions, moreover, are made for works beyond the outlets -- i.e., in provision of a terminal water distribution network or for any other work at the level of the chaks or farmers' fields. Such additional work, should it be required, would normally add another one to three years to the total length of the project. Moreover, since the vast majority of GOMP irrigation sector projects are seen to be operating within the accepted GOI/GOMP irrigation sector

strategy, there are few -- if any -- internal, bureaucratic penalties attached to the GOMP/ID's operating in this manner.

This situation poses a fundamental challenge to the types of "innovations" being introduced in the USAID/GOMP project. Boiled down to its essential components, the project is attempting to promote an alternative development strategy for minor irrigation projects which places the emphasis on higher quality design and construction of irrigation systems. This necessarily means that fewer projects can be completed in any given time period with the available resources. It also means that, while some groups of farmers may be better served when their particular irrigation schemes are finally completed, many other equally-deserving client groups will not receive any irrigation water for their land.

Under these new ground rules, the project is attempting to reorient basic Indian socio-political priorities in a fundamentally new direction. In the narrow context of the MIC-approved sub-projects, the project -- and specifically the PBD system -- has "persuaded" the GOMP/ID to begin to adopt certain "innovations".

These "innovations" are conservatively estimated by GOMP/ID officials to increase the cost of any particular minor irrigation sub-project by at least 150 percent -- and often by much more. This is so, first, because the system design process under the project requires much more staff time and expense. Second, there are a greater number of more costly construction components involved in provision of the basic irrigation system. Third, there is a completely new component in provision of micro-distribution networks at the chak level. And, finally, there are the other staff-intensive activities at the sub-project level -- i.e., hydro-meterological observations, system monitoring, chak-level demonstrations, and organization of water user groups.

m. Poor Financial and Economic Analyses and the Prospects for Replication of MPMIP "Innovations"

In addition to the fundamental dilemma of trying to reverse the pre-existing socio-political development strategy orientation of the GOI and the GOMP, project "innovations" pose another equally elemental problem. It is, "Who is going to pay for the replication of all the project "innovations"? It is evident that the potential for replicability of project "innovations" is ultimately constrained not be their desirability but by the resources available to the state to pay for them -- i.e, funding, staff time, personnel expertise -- after USAID assistance ends.

This problem is particularly troubling in the context of present project implementation for, while many officials freely admit that many of the USAID-sponsored "innovations" are desirable in theory and should be components in all minor irrigation projects, none of those interviewed expressed confidence that the GOMP/ID would actually be able to extend the "innovations" to all minor projects -- even in the long-term. Political pressures

and the lack of available internal resources were seen as the primary factors mitigating against this possibility.

Given these evident deterrents to project success, it was particularly discouraging to the evaluation team to find that no significant USAID project resources have been devoted to providing the GOMP/ID with a capacity to do even routine financial and economic analyses for project activities. The sum total of such resources to date is twelve days of consulting time by one USAID staff economist to instruct GOMP/ID engineers on how to do routine "economic internal rate of return" calculations.

We were unable on the basis of available information to determine what were the contents of this "instruction". However, on the basis of our review of the completed IRR calculations, we can say that the "economic rate of return" calculations performed by GOMP/ID engineers are nothing of the kind. They are simply crude estimates of projected financial costs and benefits cranked through a mechanistic formula to meet a benchmark requirement.

Moreover, we found that the financial "cost estimates" have uniformly been shown by subsequent construction records to underestimate the real costs of constructing the irrigation sub-systems by, at least, 50 percent -- and sometimes by much more. Similarly, the financial "benefits" are calculated using abstract technical coefficients and financial "prices" applied across all sub-projects. They show no sophistication and/or sensitivity to either the objectives of doing a benefit/cost analysis or to the circumstances of any particular sub-project situation. Finally, no economic costs and benefits are calculated and used in any of the "economic rate of return" estimates -- chiefly because the engineers doing the calculations have no training in what they are being asked to do and apparently are unaware of the differences between financial and economic internal rate of return methodologies.

This is a serious problem because, on the basis of the available information, the evaluation team believes that ex post calculations of accurate financial and economic rates of return for the 46 MIC-approved sub-projects -- given the poor cost estimations and the delayed benefit streams -- would almost certainly show that very few of them should have qualified for inclusion in the project -- even under the GOMP/ID's elementary 12 and 10 percent IRR cutoff rule.

The lack of competent financial and economic analyses in the project has another consequence, which is probably even more serious for the potential replicability of project "innovations". No attempts have been made from the original Project Paper onward to analyze the potential capital and recurrent cost implications for the GOMP budget of trying to replicate the "innovations" being promoted under the project. We found no evidence that anyone associated with the project had made any attempts to analyze the current structure of the GOMP irrigation sector budget, to extrapolate from that analysis the potential additional costs of implementing the USAID-induced "innovations" across

a broad spectrum of GOMP minor irrigation projects, or to seriously discuss the implications for the state program of such replication after the project ends. In short, then, the project personnel hope that the USAID "innovations" will be adopted by the GOMP, but that hope is in no sense buttressed -- or tempered -- by any serious assessment of the fiscal and other realities facing the GOMP.

n. Local Acceptance of the MPMIP PBD System

Finally, with respect to whether or not the PBD system and its financial incentives are accepted by key project officials, we found that senior GOMP/ID officials accepted the PBD system as a given for cost recovery under the project. They generally responded to such questions by saying that, since the agreement was signed between USAID and the GOI, they would do their best to live up to the conditions presented to them.

This, however, is a far different matter than saying that they appreciate that the PBD system is superior to the FAR system that was in place before 1988. Virtually every senior official interviewed stated that the GOMP/ID would prefer to have a system of direct reimbursement against periodic vouchers for actual costs incurred in implementing the project -- largely the construction costs of the systems. And, if that was not possible, they said they would like to see introduction of a much greater degree of proportionality in reimbursements for attainment of benchmarks -- i.e. that benchmark reimbursements should become an even stronger proxy for actual GOMP expenditures.

This stance is taken to be an accurate reflection of their increasing dismay over the widening gap between the actual costs they are incurring in trying to implement project activities and the reimbursements the GOI is receiving from USAID. It is also indicative of the prevailing attitude within the GOMP/ID that the real job of the project is to build minor irrigation systems and that most other elements of USAID's agenda are desirable but secondary to the task at hand.

V. SUMMARY OF EVALUATION CONCLUSIONS

A. Project Performance: Technical Aspects

The major technically-related goals of the MPMIP were to improve system efficiency and performance through improved planning and technology. Improvements in planning and technology were intended to contribute to improved timeliness and reliability of water delivery at the farm level. The particular technical emphasis has focused on three aspects; improved planning by more detailed appraisals of potential sub-projects, including more detailed surveys and development of site specific data bases; improvement in quality of design and construction by formal incorporation of monitoring and quality control into the planning, design and construction processes of each sub-project; and improved technologies for water conveyance and delivery such as lined canals, micro-distribution networks, controlled outlets to farms, and innovative technologies such as buried PVC pipe delivery systems.

Completion of the micro-distribution networks is the final construction-related aspect necessary for delivery of water to farmers fields. At current construction rates, it is projected that these networks will be completed on 18 of the 46 sub-projects by the PACD. Main canals will be completed on an additional 16 sub-projects by that date and headworks will have been completed on 43 of the 46 sub-projects by the PACD. Thus it appears that by the PACD construction will be essentially completed on slightly fewer than one-half of the MPMIP 46 sub-projects. It will be possible to deliver water in a manner similar to current GOMP/ID practice on 16 projects.

Quality of planning, design and construction appears to be considerably better on the USAID-assisted sub-projects than that found on non-USAID-assisted sub-projects. This is attributable, in part, to the greater effort put into obtaining and processing reliable site-specific data prior to and during the design phase and in part to the greater emphasis accorded quality control and monitoring throughout the design and construction process.

Although the design and construction process introduced on the USAID-assisted projects appears to be producing more technically reliable systems, the rate of construction has not improved despite the ready availability of funds. The average length of construction of approximately eight years has posed a serious problem in attaining the project objectives of reliable water delivery within the life of the project. It has also made it difficult to involve farmers in a meaningful way early in the project life. This, in turn, has led to the very serious shortcoming of the project of not adequately addressing the "client-oriented" aspect of the project.

The evaluation team has recommended that the construction process could be speeded-up by combining construction contracts for canal and distribution networks. Whether or not it will be possible to do this within the time frame of the MPMIP is problematical. The principal reason for the long duration of the construction process, however, is the

"linear" manner in which GOMP/ID undertakes construction. Thus work on the canal system is not begun until the headworks are complete, field channel construction is undertaken only after canals are finished and micro-distribution networks are constructed as the last element of the system. It certainly should be possible to speed up the construction process by undertaking construction of all system components simultaneously. It is too late in the MPMIP to initiate such a schedule. However, this should serve as a "lesson learned" for GOMP/ID and USAID for consideration in future projects.

The special studies were intended to contribute to the project objectives by developing socio-economic data necessary to produce client-oriented systems and to develop improved technologies and improved design and construction techniques. With few exceptions, the special studies underway or completed to date appear to be of little value to the goals of the project. The evaluation team is specifically recommending three additional special studies which will directly address the needs of the project.

Four pilot projects are at various stages of development with three nearing completion. These are the Khor Pilot Project which utilizes buried PVC pipe for the distribution system, the Raipura Pilot Project which features land-smoothing and the Ghorapachhar Pilot Project which is to serve as an adaptive research site for gravity sytems. The fourth project, which is unlikely to be completed by the PACD, is the Gadigaltar Pilot Project. This project introduces a limited "on-demand" system utilizing a level-top canal and buried PVC pipes.

The Khor sub-project has created considerable interest among GOMP/ID engineers because the PVC pipe systems are easier to design and construct than the more traditional systems, with the result that projects can be completed in a much shorter time frame. In addition, it is claimed that these systems will also be less expensive than the surface systems being constructed. The Evaluation Team recommends that a special study be undertaken as quickly as possible to thoroughly analyze the technical, economic and social aspects of this project with a view toward the feasibility of replication.

The Gadigaltar sub-project is problematic from several standpoints. First, it is virtually certain that it cannot be completed by the PACD and given the considerable greater investment required as compared to even the other USAID-assisted sub-projects, it is questionable whether the GOMP/ID will complete the project as designed. Secondly, a similar project in Sri Lanka failed for a variety of reasons and has been abandoned. Thirdly, in addition to the technical innovations introduced, the project is designed to provide the farmers with more water than those on other projects. This complicates the possiblility of determining whether any increased benefit is due to the technical aspects of the project or the increased water. In summary, this Pilot Project seems to have been illy conceived and should be reviewed before construction on any aspects of the project beyond the headworks is begun. At the time of the evaluation visit, there was still considerable work to be done on the dam.

The criterion of using a live capacity of reservoirs at "75 percent dependable yield" is questioned by the Evaluation Team. While it makes sense to size a net command area based on this criterion, it seems that project benefits would be greater if the dam (and reservoir) were sized, based on a higher capacity such as a 50 percent dependable yield criterion. This problem cannot be addressed during the remaining life of the project, but can be viewed as a lesson learned for future projects.

B. Project Performance: Institutional Aspects

One of the main objectives of the MPMIP was to improve irrigation system performance by improved timeliness and reliability of water delivery to client-oriented systems. The client-orientation implies a number of institutional relationships which were discussed in Section III. In addition, an objective of the project was to establish better coordination of services between the Irrigation and Agriculture Departments of GOMP. A third institutional aspect of the project was aimed at improving the institutional capability of the GOMP/ID with regard to the appraisal, quality control and monitoring of projects.

The evaluation team found that the project has paid little attention to the socio-economic settings of the client groups for whom the benefits are intended. The basic assumption has been that provision of water to the boundaries of the farm is sufficient in itself for farmers to obtain equitable shares of water to meet their crop needs and to organize themselves for fair distribution and maintenance of the system. Effective community organizations of water users can facilitate and, in fact, are necessary for the success of irrigation projects. However, no single model is likely to be successful given the variations in tribal and caste affiliations found in the 46 sub-projects. It will be necessary to develop an understanding of traditional social structures in order to provide a basis for organization within outlet command areas of each sub-project.

The evaluation team recommends that a pilot program to organize farmers be undertaken on one or two communities where the system is ready for irrigation. It is important to realize that farmer participation in decisions on water allocation is more likely to bring cooperation rather than dissension. However, the prevailing tendency seems to be one of super-imposition.

The Appraisal, Monitoring and Quality Control Units developed by GOMP/ID for the USAID-assisted sub-projects appears to be functioning as intended. It remains to be seen if these units will continue to function on other projects beyond the PACD.

The evaluation team found the technical assistance provided to the project to be of mixed utility to the project. The assistance provided to the BODHI appears to have been of high quality and should contribute to an improvement in the capabilities of that organization to serve the GOMP/ID.

The assistance provided to the Gadigaltar Pilot Project, while technically competent,

raises a question of appropriateness. Given previous experiences with similar projects, some questions should have been raised about the appropriateness of the project itself. Similarly, the technical assistance provided for farmer organization on this project will prove to be of marginal value since the mechanism of organization tried is one that is still experimental in the Philippines.

The effectiveness of training efforts within the project has also been mixed. The long-term (3 to 6 months) overseas training appears to have been useful and will contribute to the project goals. However, much of the in-country induction training and the short-term (10 days) overseas training is of questionable value, although for different reasons. The evaluation team recommends that one or two training courses be developed for in-country training which would be aimed at training technical people in areas outside their fields of expertise and sensitizing them to the broader aspects of irrigated farming systems.

The evaluation team found that while the GOMP/AD has been involved in the sub-projects, this involvement has not been nearly to the extent desired, given that irrigation systems are, after all, farming systems. So long as the role of the GOMP/AD is regarded as "marginal" by the GOMP/ID it will be difficult to achieve effective collaboration. This is buttressed by the fact that the funding available to the GOMP/AD is only through the GOMP/ID and is limited.

C. Project Performance: Managerial, Administrative and Economic Aspects

The PBD system is the major managerial innovation in the MPMIP. It was grafted onto the project in 1988. The PBD system has had only a modest impact on project implementation. All of the PBD benchmarks attained through March 1990 were related to preliminary project actions. All of the major PBD benchmarks remain outstanding and must be met by 30 June 1991 if the GOI and GOMP are to receive the full benefits of the project.

The evaluation team believes that there is still an opportunity for the PBD system to at least assist in introducing significant institutional changes into the planning and operations of the GOMP/ID. However, there are major impediments to greater system impacts. At present, these impediments include:

1. The time constraint imposed by the PACD;

2. The complexity of the existing PBD benchmarks;

3. The incomplete delinkage of project objectives and physical completion of discrete minor irrigation sub-projects; and

4. The lack of adequate GOMP/ID capacity to do requisite economic analyses.

With respect to the major benchmarks still outstanding, we have reason to believe that the GOMP/ID is making a "good faith" effort to achieve as many of them as possible during the life of the project. However, time is now the biggest constraint in the equation with the PACD set at 30 June 1991. We therefore must temper our assessment by saying that, we believe that the point is fast approaching when GOMP/ID officials will realize that many of the major benchmarks -- as presently written -- are simply unattainable within the life of the project.

In the present situation, the evaluation team feels that there are several actions which should be taken by USAID management in the near-term. They include:

1. Informing the GOI and the GOMP that USAID will maintain the current PACD and that project implementation activities should be oriented accordingly;

2. Rewriting the existing PBD benchmarks to delink attainment of project objectives from physical completion of any particular number of minor irrigation sub-projects; and

3. Reducing the number of effective PBD benchmarks to be attained significantly and introducing a greater degree of proportionality into the reimbursement equation.

Such actions would constitute tacit admission by USAID that the initial target of finishing approximately 50 minor irrigation sub-projects over the life of the MPMIP and with the available resources was both unnecessary and overly ambitious in light of the revised project focus. They should not, however, constitute a retreat from the project's basic objectives or an abandonment of the PBD system as a useful implementing mechanism.

The evaluation team believes that these actions would greatly improve prospects for affecting institutional changes within the project over the last 15 months of its life. Morever, we would argue that the absolute number of sub-projects included in the project has no direct correlation with the demonstration effects to be derived. We believe that the demonstration effects from a lesser number of completed sub-projects would be infinitely greater than those from 50 sub-projects in various stages of completion at the PACD.

The existing PBD benchmarks are both too numerous and too complex for effective project implementation in the time remaining. We feel that USAID must pay attention to dropping many of the existing PBD benchmarks as irrevelant to achieving the objectives of the project. Coupled with the reduction in benchmarks, USAID should also

increase the payoffs associated with those benchmarks retained as truly important.

Unfortunately, due to the poor state of financial and economic analyses within the project, the evaluation team had no factual information on the important question of "Whether the anticipated increases in technical reliability and performance of the approved sub-project systems has been purchased at acceptable and sustainable levels of financial and economic costs?".

As to redirecting the priorities of the GOMP/ID officials in the specific context of the project, it appears that the PBD benchmarks most closely related to engineering work and the installation of technical system's "innovations" have received priority consideration. They appear to have had the most impact on the manner in which the GOMP/ID has conducted the appraisal, design and construction of the approved minor irrigation sub-projects to date.

This result is no surprise since such "innovations" are most easily understood by the GOMP/ID engineers implementing project activities. They also represent in a sense the least distant departures from the GOMP/ID's "standard operating procedures" and its institutional structure and mandate. All the engineers interviewed appreciated the importance of and potential benefits to be derived from better pre-project site appraisals; more adequate technical planning and design of irrigation structures and networks; more intensive quality controls and sub-project monitoring; and the calculation of more precise water retention capacities, siltration rates, and water release and rotation schedules.

The GOMP/ID has shown itself to be less adept at dealing with the whole complex of client needs at the post-outlet level. These include organization of water user groups; design of micro-distribution networks in conformance with farmers' needs; assisting client groups to manage their transition from dryland to irrigated agriculture in the communities affected by the sub-projects; and promoting desirable technical and socio-economic changes in local farming systems under irrigated conditions.

We believe that the central reason why the anticipated impacts at the post-outlet level have not materialized is that there is a deep and abiding faith among the GOMP/ID engineers that simple provision of irrigation water to the micro-distribution network on a reliable and timely basis is the necessary and sufficient condition for development of efficient and equitable minor irrigation schemes.

While the evaluation team agrees that the reliable and timely provision of irrigation water is a necessary condition for proper functioning of any minor irrigation scheme, we strongly disagree with the premise that it is the only condition that needs to be satisfied. Reliable and timely provision of water releases one of the major constraints on irrigated crop agriculture. Without a reliable source of irrigation water, it is self-evident that irrigated crop agriculture cannot exist. But, it seems equally evident to us that the provision of water, in and of itself, is not sufficient to guarantee the efficient and

equitable operation of an irrigation system for all client groups .

There has been less than the desired level of active collaboration between the GOMP/ID and the GOMP/AD on the critical post-outlet aspects of the project. In this regard, the retiring Secretary of the GOMP/ID described the GOMP/AD's role in the project as "very marginal".

At the USAID level, the expectations with respect to speeding up the rates of disbursement for this project have clearly not materialized. Persons interviewed in the Controller's office stated that, contrary to expectations raised by installation of the PBD system, actual rates of disbursement under both the loan and grant components of the project have decreased since 1988. We see the late installation and the complexity of the present PBD system as the major factors contributing to this failure.

In principle, one would expect that the process of validating and certifying attainment of benchmarks under the PBD system would be simpler and faster than that for approving vouchers under the project before 1988. All of the information at our disposal, however, appears to refute this notion.

Although the time period between receipt by USAID of a GOMP/ID request for a benchmark reimbursement and actual payment from USAID to the GOI -- one or three months -- do not seem excessively long, virtually every USAID officer interviewed said that considerably more staff time was required to certify payments and monitor activities under a PBD system.

At the level of the GOMP/ID, it is clear that "efficiency" in the PBD system is equated primarily with how closely benchmark reimbursements track the actual GOMP expenditures on project activities. In effect this means sub-system construction and other related costs. And, unfortunately, the gap between actual expenditures incurred and reimbursements received has increased considerably since 1988.

The evidence gathered by the evaluation team indicates that there have been programmatic benefits but also significant risks involved in use of the PBD system in this particular project. They include:

* The managerial risk of relying too heavily on the PBD system as a tool to replace intensive day-to-day USAID staff supervision and management of the substance and content of project activities;

* The operational risk of having to refuse reimbursement to the GOI as of 30 June 1991 after actively pressing the GOMP/ID and other agencies to incur the financial costs in pursuit of project benchmarks and activities; and

* The strategic risk of using a PBD system in a project when that project is not specifically oriented toward affecting a limited number of major but relatively simple economic and/or institutional policy reforms.

In the opinion of the evaluation team, the USAID Mission has tended to rely too heavily on the PBD system for effective management of all project activities -- i.e. substantative as well as administrative and financial. One problem with this management style is that it has tended to induce detailed "micro-management" of selective aspects of the project, while virtually ignoring others. The central problem with this approach is that the PBD system can effectively force changes in the context of a specific project **without concommitant guarantees that those changes are appropriate, substantative in nature or well executed in fact.** In other words, PBD system in the MPMIP has improved administrative and financial tracking of project activities but at its base it has proven to date to be a mechanistic system oriented wholly to quantitative achievement of "target" objectives -- i.e., benchmarks -- with only limited capacity to ensure project outcomes that are substantitive, irreversible and of high quality.

In our report, several examples have been cited where the GOMP either has met or will meet the technical requirements of the stated benchmarks without producing high quality work. These include but are not limited to the following: the special reports, socio-economic studies, "economic internal rate of return" calculations, establishment of chak demonstrations with less than active collaboration with the GOMP/AD, and other support activities.

The point is simply that USAID should have broadened its management approach for this project. While the PBD system appears to have been beneficial to reorienting certain activities within the MPMIP, it has not been sufficient in and of itself to fully replace other types of project supervision.

We believe, therefore, that a more balanced management approach is needed in the future to increase supervision and collaboration between USAID staff, GOMP staff and professionally-competent contractors on the substantative aspects of all project activities -- not just those related to irrigation systems engineering.

The present operational risk in the MPMIP is that USAID non-reimbursement for unattained benchmarks has now become an almost certain outcome, unless the present benchmarks are rewritten to better conform with the realities of project implementation. While the GOMP/ID appears to be making a "good faith" effort and is spending GOI/GOMP funds in pursuit of the PBD benchmarks, it appears clear that many of the major benchmarks, as written, will not be attained by 30 June 1991.

We recognize that this situation presents USAID with a serious dilemma. On the one hand, if there is premature certification of benchmark attainments to, in effect, reimburse the GOI for project costs incurred up to the PACD, the integrity of every other existing

USAID PBD systems in India will be jeopardized. If, on the other hand, PBD system deficiences in this project lead directly to non-reimbursement of expeditures from the federal and state budgets, USAID will probably forego any prospects for using PBD systems as management mechanisms in new -- and, perhaps, more appropriate -- program activities in the future.

Finally, the strategic risk evident in this project is that there is an inappropriate match between the number and character of the institutional changes to be undertaken and the exigencies of an effective PBD system. USAID experience with PBD systems in other countries appears to indicate that PBD systems work best where they are used in country programs -- not projects -- and where USAID Missions are collaborating with the host government and/or other donors to affect major but relatively simple economic policy and institutional reforms (Herman, 1985).

The contention is that PBD benchmarks are most suitable in cases where USAID is trying to induce a limited number of discrete economic policy or institutional reforms, the attainment of which can be easily verified and the effects of which are irreversible. In these situations, payments to the host government should not be aimed primarily at compensating the host government for financial costs incurred in executing the particular reform(s). They should be more appropriately be directed at compensating groups disadvantaged by the reform(s) undertaken and/or providing the government with foreign exchange resources to be used for development purposes; many of which may be unrelated to the initial reforms.

In the opinion of the evaluation team, the MPMIP by its nature does not conform very well to these criteria. This is so because:

1. There are too many institutional "reforms" stipulated for the project and they are by nature too complex and costly too replicate;

2. The reforms are largely administrative and technical in nature and do not entail, as constituted, economic or institutional changes in the GOMP/ID that are simple or applicable to the entire GOMP irrigation sector -- i.e. their scope is limited to a discrete and narrow set of irrigation sub-projects, which have effectively been deliberately selected to be atypical of the "normal" state minor irrigation schemes;

3. The majority of USAID reimbursements, through the proxy of benchmark attainments, are still seen by the GOI/GOMP to be direct compensation for system construction expenditures that most GOMP/ID officers admit would have been incurred even without project assistance;

4. The institutional "innovations" in the project are easily reversible -- or may not even be replicable for other reasons -- in the state irrigation sector program; and

5. Finally, there is only a muffled second "bang for the buck" from the transfer of resources because the foreign exchange provided under the project is used primarily to reimburse the government for construction costs incurred and therefore cannot be jointly programmed by USAID and the GOI for other development purposes.

VI. EVALUATION RECOMMENDATIONS AND LESSONS TO BE LEARNED

A. Principal Recommendations

1. USAID should inform unequivocally that the present MPMIP PACD of 30 June 1991 will be adhered to and that all project implementation activities must oriented accordingly.

2. USAID and the GOI should revise current PBD benchmarks to provide for greater "proportionality" in USAID reimbursements. This should be accomplished in three steps by:

   a. Rewriting major benchmarks to delink them from physical completion of discrete sub-projects;

   b. Dropping from the list of rewritten benchmarks all of those already attained and those found to be inappropriate and/or not directly linked to achievement of major project objectives; and

   c. Revaluing the payoffs associated with the final PBD benchmarks, up to the full value of the remaining loan and grant funds, to reflect their relative importance in attaining project objectives.

3. USAID and the GOMP should design and cause to be implemented a financial analysis of projected GOMP budgetary and personnel resources in the 1990s and their implications for potential replication of USAID-sponsored project "innovations" in all other minor irrigation projects in Madhya Pradesh. This analysis should then be followed by a thorough discussion of the results with senior decision-makers in the GOI, GOMP and USAID.

4. USAID should increase USAID staff and professional contractor assistance to the GOMP/ID to ensure that adequate attention is given to the <u>substance and content</u> of all non-engineering project activities. As necessary, USAID should use project grant funding to secure the services of contractors who are professionally competent to design and supervise such activities.

5. Establish and implement a training program, implemented by the WALMI, for 18 teams -- each consisting of a water user association organizer and a process documenter -- to be involved in communities ready for irrigation.

6. In collaboration with the WALMI at Bhopal and the WRM & T Project, develop two courses for GOMP/AD and GOMP/ID personnel. One course should introduce both groups to the socio-cultural aspects of irrigated farming systems and the second course should introduce engineers to the agronomic requirements of irrigation management.

7. Design a pilot project, funded and supervised by USAID, to organize water user associations in one or two communities ready for irrigation and staffed by engineers amenable to experimentation.

8. The Gadigaltar pilot project should be reviewed before construction proceeds. Information should be obtained, insofar as possible, about the reasons for the failure of the similar system in Sri Lanka. The scheme should be analyzed again for its benefits and costs to determine if the significant added expenditures are justified or are too great to preclude any reasonable expectation of replication. If, after review, it is decided to retain the limited on-demand and level-top canal concepts, operational plans should be revised to provide water in the same proportion as provided on other schemes. In this way, benefits of the innovative technology can be assessed independently of additional water supplies.

9. Design a special study to assess farmer acceptance, operation and maintenance characteristics, economics and overall applicability of the PVC pipe distribution system at Khor. This study should be designed to obtain information required to make a well-informed decision about the social, economic and technical feasibility of replicating this type of distribution network on a broad scale in the state. The study should be designed through the collaborative effort of a competent engineer, social scientist, and economist and be carried out under the supervision of a competent scientist from one of those fields.

B. Suggested Additional Areas For Action

1. USAID should provide competent economic expertise to the GOMP/ID to design and implement ex-post financial and economic analyses of all USAID-approved sub-projects. This assistance should be directed at providing a training opportunity for GOMP/ID personnel in understanding and implementing proper financial and economic analyses and in demonstrating the deficiences of the ex-ante calculations prepared previously under the project.

2. For ease and speeding up construction, canal and distribution networks should be grouped in suitable packages for bidding and allotment of work to contractors.

3. To shorten the construction time, canal and field ditch construction should be carried out concurrently with dam and headworks.

4. The input and communications study, along with that of irrigation management, does contain data which, if reorganized and analyzed in greater depth, may provide useful, if limited, baseline information to measure the impact of water availability upon organized irrigators, as well as on a broad spectrum of their practices. It will be necessary that a competent socio-economic analyst, well-versed in farm management analysis, actively collaborate with the unidentified author(s) of the two studies.

5. From studies and reports on Indian irrigation, it may be possible and desirable to commission a single volume, written presumably for intermediate level irrigation and agricultural technicians, which would lay out an interdisciplinary approach to system design, as well as an approach to establishing "warabundi" type rotations and the farmer organizations required to make it work.

6. USAID/India should review the status of all special studies prepared to date, ascertain their worthwhileness for careful editing, reproduction and distribution.

C. Lessons To Be Learned

1. The most appropriate range of stream sizes below the outlets should be decided for varying field grades. Outlets should not be designed for more than the maximum or less than the minimum of the approved range.

2. A policy should be framed for deciding to what extent water may be made available to farmers for irrigating high lands (by lift) adjoining the canal.

3. The "75 percent dependable yield" criterion for determining the live storage capacity of reservoirs needs to be reviewed and modified.

4. The command areas and main canal capacities on most sub-projects need to be increased.

5. Studies should be undertaken to determine the impact of deficient water supply on crop yields and establish optimal relationships between border strip size, field gradient, and stream size for irrigation under the conditions in each command area.

6. Provision in the warabundi and facilities in canals should be made for allowing some water for village community use like filling of village ponds, buffalo baths, and access for laundry, etc..

7. A program of monitoring the actual water distribution below the outlet with an automatic proportioning meter (APM) to ascertain through process documentation, what difficulties, if any, are being facing in implementing warabundi rotations should be undertaken.

REPORT ANNEXES

ANNEX A

SCOPE OF WORK FOR THE EVALUATION

SCOPE OF WORK

M.P. MINOR IRRIGATION PROJECT EVALUATION

BACKGROUND

Project

The purpose of the M.P. Minor Irrigation Project (MPMIP) is to increase irrigation coverage and to improve system efficiency and performance through improved planning, technology and management. The performance indicated in this purpose statement refers to the timeliness and reliability of water delivery and implies client-oriented systems operations. The Project's objectives are:

- to operate a more responsive USAID supported systems thru upgrading of designs, construction quality and management capacity,
- to establish better coordinated services between the Irrigation Department (ID) and Agricultural Department (AD) on USAID assisted schemes, and
- to build up M.P. Minor Irrigation project related professional capabilities of ID and AD personnel in the process.

The MPMIP was authorized in late July 1983 and was originally expected to be completed in September 1989. The $46 million project has two major elements: a $41 million Loan to support construction of about 50 minor schemes to provide systematic irrigation to about 25000 ha and a $5 million Grant to support research (field and socio-economic studies), pilot and chak demonstration activities and training of professional staff.

The project encountered initial implementation difficulties and had little disbursements during the first three years of the project life. During this period, project funding was used almost exclusively to support capital construction activities, i.e. dams. In addition, the project's objectives i.e. irrigation efficiency (i.e. improved canal system design and management) and professional development were not being achieved.

Following intensive discussions with senior ID officials about these implementation problems there was an important shift in A.I.D.'s thinking about the project purpose and approach to achieve the stated objectives. After considerable internal review and prolonged discussions with GOMP/ID-AD, the project was amended in June 1987 to move the project to achieve its objectives and to incorporate modifications/clarifications to the technical criteria.

Based on these discussions, a set of important disbursement benchmarks associated particularly with implementation of channels below outlet and systematic/reliable irrigation supplies were established to improve systems performance. Six benchmarks were agreed to that reflected the stated technical objectives of the project. These benchmarks are the trigger mechanisms for the Performance-Based Disbursement (PBD) procedure:

1. Assurance of Adequate Annual Budget Allocations
2. Identification and Technical Appraisal of Schemes
2. Quality Construction and Monitoring
4. Operational Design and Research
5. Demonstration and Pilots, and
6. Implementation and Operations.

Some grant funding, such as research and demonstration activities, were tied to the loan to ensure that these activities were fully implemented as well. The revised Performance-Based Disbursement methodology was formalized with the GOI in March/June 1988 through Project Implementation Letters (PILs) #14 and #15. To cover time lost in this lengthy bureaucratic process and discussions to arrive at a common understanding, the Project Assistance Completion Date was extended by 21 months to June 1991.

Evaluation

This mid-term evaluation will assess overall project progress but with particularly emphasis on progress since June 1988 - the date of acceptance of the new performance based implementation modalities by GOI. The evaluation will especially focus on the extent and nature of the progress made by the project in terms of achieving objectives of the amended M.P. Minor Irrigation Project (MPMIP) with particular reference to the effectiveness of the project redesign and the revised performance-based disbursement methodology on the rate and quality of achieving these objectives. In making its determinations, the evaluation team will both quantitatively and qualitatively judge the project's capacity to accomplish its objectives within the current project completion date (PACD). The evaluation will make specific recommendations on any changes in the approach and/or activities needed to achieve the Project's objectives, specifically the objective of ensuring systematic and reliable irrigation delivery at farm level. Included in the terms of evaluation should be an assessment of alternative options if it is determined the project cannot achieve its objectives within the current PACD.

STATEMENT OF WORK

The contractor will provide a team of three irrigation management specialists to carry out the evaluation of the MPMIP. One of the three persons familiar with irrigation system operation will be designated as the Team Leader in consultation with USAID/NRM Office. The three irrigation specialists will work with a fourth member of the evaluation team, an experienced Indian irrigation engineer familiar with Indian irrigation systems and management. This fourth team member will be contracted separately. The contractor will also hire a team planning facilitator for team build meetings (refer item-II) in Washington. The qualifications of the three expatriate evaluation team members and facilitator are given in Annex-A.

The contractor will also hire a secretary/typist (to assist the evaluation team prepare travel arrangements and type the draft and final evaluation reports).

The Evaluation Team will work closely with the GOMP Evaluation Counterpart nominated specially for this evaluation. The GOMP Counterpart will accompany the team, take active part in the evaluation, provide background information and necessary help to the team to facilitate its work.

I. EVALUATION ISSUES

The Evaluation Team will address three major sets of issues:

A. Project Performance
to what extent has the project achieved physical irrigation system performance, improvements in construction quality, ID/AD cooperation and financial targets?

B. Institutional Performance (Project related)
what will be the likely effect of the project activities (data collection, planning and design, appraisal, monitoring, pilots, studies, training and technical assistance) on the future sustainable performance of the associated Government institutions in developing most effective irrigation systems in Madhya Pradesh?

C. Performance-Based Disbursement (PBD), its relevance to project implementation
to what extent has the PBD methodology contributed to achieving project targets? Which elements of PBD have been most effective or ineffective or counterproductive in supporting the achievement of the project's various physical and institutional objectives?

A. Project Performance

The Evaluation Team will assess the extent to which the Project has met various physical and operational targets.

1. Are appraisal, monitoring and quality control units in place, fully staffed and functioning as intended?

2. Have the budgeting, appraisal, design and construction of civil works been undertaken as agreed and as planned?

3. Have data collection, measurement and assessment programs, special studies and pilot activities been designed and implemented as planned and per schedule?

4. Have the agreed standards and procedures been adopted in appraisal, design (of irrigation systems and demonstration chak), construction and operation; have these been monitored and deficiencies rectified?

5. Are operational plans prepared for reliable and timely water delivery being adopted and adhered to as planned and scheduled?

6. Have specific efforts been made to coordinate Irrigation Department and Agriculture Department services on USAID-assisted schemes? If so, to what extent have they been successful?

7. Have efforts to coordinate Irrigation and Agriculture services led to increases in the amount of agricultural inputs available and/or improved delivery schedules?

8. What factors have constrained project implementation and what can be done to remove them?

B. Institutional Performance

Given that a sufficient period has not passed (since June 1988) to really directly judge the sustainable effects of the project on irrigation operations and implementation, the long term institutional effects of the project can only be extrapolated and projected from presently existing proxy indicators/trends that reflect real change in the present behavior of the various components of the system. Thus the Evaluation Team will assess the extent to which the capability of the project related irrigation department staff, irrigation department procedures and farmers practices and attitudes have changed and improved through participation in the AID assisted schemes in Madhya Pradesh.

1. Has the Appraisal and Supervision Cell produced better appraisal reports plans than those which are produced earlier ~~for non~~-USAID funded schemes, and has the quality been improving over time?

2. Do USAID-funded schemes represent significant improvements over non-USAID funded schemes along the following or other dimensions:
   -- budgeting
   -- appraisal
   -- planning and design
   -- construction speed, quality and
   -- system operation

3. Have or will the results of project funded data collection, measurement and assessment programs, special studies and pilot activities served/serve to produce better designed or systems operation? If so, in what ways are they better and to what can the improved qualities be attributed to?

4. Has or is the preparation, promulgation and implementation of operational plan resulted or ~~resulting~~ in more reliable and timely water delivery?

5. Have project-promoted quality standards and procedures resulted in systems that are noticeably better than other systems in terms of design, construction or operation? If so, how are they better and what factors are responsible?

6. In schemes where operational plan is being implemented, are the attitudes of ID staff and farmers toward each other noticeably different from attitudes found in other non-USAID funded schemes?

7. Has reliable water delivery led to increases in irrigated area, or increased productivity? (If answers to this question are premature, are appropriate data gathering procedures in place to enable the question to be answered reliably in the future? If not, make appropriate recommendations to assure that this is done.)

8. Are project innovations (technologies, physical and institutional structures, procedures and standards) being adopted in the Department to apply to schemes other than those funded by USAID?

9. Which project innovations are most welcomed by ID staff and which are seen as most burdensome?

10. Which, project innovations, if any, are most familiar to farmers?

C. Performance-Based Disbursement

1. Compare the achievement of major benchmarks since Performance-Based Disbursement (PBD) was introduced, with planned targets at the time of restructuring. Discuss significant problems that remain and recommend ways to resolve them.

2. Determine the extent to which the changes represented by the certified benchmarks to date have actually been achieved, and the adequacy of the current review process. Suggest improvements, if necessary.

3. Assess the rate of improvement in the areas associated with the benchmarks in the period since the introduction of PBD compared to the first five years of the project.

4. Assess the contribution of the PBD methodology to the improvement of project-related institutional performance in these areas. Indicate any direct or indirect ways that improved performance can be linked to the PBD.

5. Determine the utility of the Annual Implementation Plans introduced as part of PBD as a management tool for improving project performance.

6. Describe how the PBD financial incentives are accepted by and operated through the key Project officials/institutions at the central, state and local levels, particularly in view of USAID's relatively small contribution to the state's irrigation budget.

7. To what extent has PBD methodology encouraged the ID to achieve project objectives, specifically in the provision of budget, appraisal, design, construction and operation of projects? What improvements can be made in PBD to enhance its effectiveness?

8. Which PBD benchmarks have had the most impact on project achievements, particularly those relating to improving irrigation reliability/performance? Which have been least significant?

9. Has PBD resulted in any efficiencies in claims and reimbursement procedures for either USAID or GOI/GOMP?

10. What specific and general hidden costs, if any, are there to PBD that should be included in any calculation of its relative merit as a basic project management tool.

Additional suggested specific areas of enquiry are given in Annex-B.

II. SUGGESTED METHODOLOGY

The Evaluation Team will base its findings on a number of data sources:

- project records
- project documents
- interviews with USAID staff, LCU/TA staff, GOI staff, project officials, ID staff at various levels
- informal survey of farmers in USAID funded and other schemes
- field records
- field/site observations at USAID-funded and non-funded schemes.

The Evaluation will begin with a two-day Team Planning Meeting (TPM) held in Washington, D.C. led by an experienced facilitator provided by the contractor. During that session, team members will review the background of the assignment and scope of work, suggested methodology and develop a report, outlining the divided responsibilities amongst the team members and establish common working procedures/methodology (CWP/M).

The team will be responsible for developing and applying the necessary and appropriate methodologies to accomplish the task. These methodologies will have to be adjusted to the realities of available time framework and field data. However, to ensure maximum efficiency, it is necessary for USAID to have prior information in time of the type of data and documents the team might desire so that USAID could ensure its availability as far as possible. Accordingly, a discussion of suggested methodologies has been drawn up as a working document (Annex-C) for the team members. Team members should review this annex and then based on their own professional expertise draw up an outline of proposed methodology, and materials to be forwarded to USAID approximately one month prior to arrival in India so that maximum preparations can be made to meet team needs.

III. Schedule

The Evaluation Team will spend most of its time in Madhya Pradesh. The tentative overall schedule will be as follows.

Activity	Days
TPM (WASH)	2
Briefing, Delhi	3
Briefing and field visits, Bhopal	3
Field visits, Jabalpur	5
Field Visits, Indore	5
Report Preparation, Bhopal	5
Report Finalization in U.S.	2
Briefing/Revision Bhopal or Delhi	2
Travel	3
	30 Days

A six-day week is authorized.

The estimated budget is given in Attachment B

IV. Reporting Requirements

Two (2) copies of the draft report should be submitted to the USAID officials named in box 21C of this PIO/T, no less than two days prior to the evaluators exit debriefing conference with the Mission. Fifteen copies of the final report, incorporating USAID comments, if any, shall be submitted to the Evaluation Officer within fourteen (14) working days of the receipt of USAID comments on the draft report. The report is to include an executive summary not to exceed five (5) pages, which presents major findings and recommendations. At this time the contractor will also submit to the Evaluation Officer a brief evaluation summary and abstract in accordance with AID format.

TEAM QUALIFICATIONS

A. Irrigation Engineer (Team Leader)

Advanced technical degree with 15 years experience in irrigation and water resources management; specialization in surface irrigation systems, particularly in overall planning, system designs and layout, construction and systems operation and management; familiarity with irrigation systems and conditions in South Asia.

Knowledge of spoken Hindi/Urdu preferred.

B. Institutional Specialist

Advanced degree in social science (sociology, anthropology or agricultural economics) with 15 years related experience specialization in the structure and function of irrigation agencies and relations between irrigation agencies and water users; familiarity with social conditions and irrigation and other government institutions in India or other parts of the Sub-continent; experienced in the use of rapid rural appraisal techniques and impact assessment.

Knowledge of spoken Hindi/Urdu preferred.

C. Development Management Specialist with Financial/Administrative Expertise

Advanced degree in management science or public administration with 15 years related experience in international research, consulting or development administration; familiarity with: (i) A.I.D. policies and practices, particularly project management, performance assessment, disbursements and financing administration, (ii) Irrigation Management and (iii) social conditions and public institutions in India and or sub continent.

Knowledge of spoken Hindi/Urdu preferred.

D. Facilitator

An experienced professional facilitator person having five years experience in team building, including team building for short-term development consultancies on their SOW.

Knowledge of irrigated agriculture will be preferred.

MFMIP MID-TERM EVALUATION

AREAS OF SPECIFIC INQUIRIES

PERFORMANCE

A. Appraisal Capabilities

1. How much progress has been made to date in establishing a fully operational Appraisal and Supervision Cell in the ID under the MFMIP?

2. What kinds of backgrounds/skill levels do the staff of the appraisal unit have? Are the skills adequate to conduct the level of appraisal required? If not, what areas are deficient?

3. How many appraisal unit/staff have received special technical and/or training to upgrade their skills? What additional training is required?

4. What will be the benefits to the GOMP/ID in retaining this capability?

5. Is the ID using the Appraisal and Supervision Cell for non-USAID funded irrigation schemes? If so, how many other schemes have been approved using the USAID instituted process?

B. Planning and Design

1. Have soil surveys, topographical maps, micro-network planning and operational planning been introduced as part of scheme design procedures in USAID assisted schemes? What is the quality of surveys, maps and micro-network plans prepared to date?

2. How many minor irrigation schemes have had hydro-meteorological equipment installed which are currently in use?

3. Do the ID staff have the necessary skills to operate the equipment and to analyze the data? If not, what training or institutional arrangements are needed to make effective use of the data?

C. Quality Control and Monitoring

1. Assess the progress made in establishing fully operational monitoring and quality control units in relationship to project plans. Determine what further steps should be taken.

2. Evaluate the staffing patterns and skill levels of individuals in these units and determine how these can be improved.

D. Special Studies and Pilot Activities

1. What special studies and pilot activities have been completed or are currently underway?

2. How were the topics and sites selected?

3. How relevant are the studies and pilot activities to planning and system operation issues?

4. What additional studies and/or pilot activities should be undertaken within the project period?

E. Water Management

1. What steps has the ID taken under this project to schedule reliable, rotational water supplies and maintenance activities?

2. How have farmers been involved in operational planning and management?

3. Review operational plans and schedules and assess whether or not they relate to how much water farmers should and actually receive.

4. To what extent are operational plans and schedules adhered to?

5. How are farmers notified about the timing and quantity of water to be expected and how effective is the approach?

6. Are farmers receiving water on a timely and reliable basis?

7. Have mechanisms been developed to distribute water equitably during scarcity? If they exist, are they adequate? If not, how can they be improved?

8. Have feedback mechanisms been developed to alert appropriate officials of problems and get their response to solve them? How might the feedback mechanisms be improved?

9. What is the process used to allocate maintenance responsibilities to farmers? To what extent are farmers aware of, and do they assume, these responsibilities?

10. Are maintenance resources (financial and technical) adequate? If not, what can be done to secure adequate resources?

F. Technical Assistance

1. Assess the role and performance of the contracted LCU (Thapar-HydroConsult) and ISPAN short-term assistance and suggest any changes necessary.

2. Assess the structure and content of training that has been provided by the USAID assisted project.

INSTITUTIONAL PERFORMANCE (Needs assessed)

A. Appraisal Capabilities

1. Based on established criteria, do trained staff perform better appraisals than non-trained staff? Is the quality of the appraisal process, outcome reports, in terms of project preparation, improved since the fully operational appraisal units were established and overtime?

2. What differences are discernible between irrigation projects approved before and after the establishment of the appraisal units in such areas as ERRs, well- functioning water delivery systems, and so on?

3. What are the recurrent costs of maintaining the appraisal units? Are they cost effective? That is, do differences in the quality of irrigation schemes chosen, and their subsequent level of functioning, justify the additional cost?

B. Planning and Design

1. How effectively is the information from surveys and maps being utilized for planning and design?

2. How will be the hydro-meteorological data generated being utilized for operations planning?

3. How do the plans and designs prepared after USAID training inputs differ from previous ones?

4. To what extent do the planning and design concepts that have been introduced in the project improve the implementation and operation of irrigation schemes? Suggest improvements, if needed.

C. Quality Control and Monitoring

1. Evaluate specific activities of the staff in the monitoring and quality control units and determine how appropriate and effective these have been.

2. Determine the kind of construction improvements that have occurred in the field as a result of the quality control and monitoring efforts. Identify areas for improvement and suggest remedies.

D. Special Studies and Pilot Activities

1. Determine how the central research and design unit has applied or plans to apply the research findings to help improve the planning, design and operations process, and assess the effectiveness of this approach.

E. Water Management

1. Assess the nature and extent of actual farmers role in system planning, water distribution and maintenance, and its result. How can farmer involvement activities be improved?

F. Technical Assistance

1. Are the technical assistance and project designed training programs adequately able to address the knowledge gaps and improve the skills of GOMP/ID staff?

MANAGEMENT/FINANCIAL PERFORMANCE (with specific reference to PBD)

A. Compare the rates of disbursement for loan and grant funds before and after the PBD was introduced, citing the pro's and con's of each and determine which system of disbursements appears better to achieve the project objectives.

B. Determine the degree to which the project related institutional changes certified by the benchmarks have actually taken place. Assess the adequacy of current verification procedures.

C. Review the nature and pace of project related institutional change linked to benchmarks, comparing the period before PBD with the more recent period.

D. Through interviews, determine the extent to which discernible institutional changes can be attributed to the PBD and assess how PBD contributes to the changes

E. Review the claims and disbursement procedures of the PBD and compare them to procedures utilized before PBD, particularly the length of time required to process claims and make disbursements.

F. Make specific suggestion how PBD procedures might be improved, or alternative approach taken for improved project performance and monitoring to achieve the project objectives.

G. Compare the purpose for and nature of information gathered for performance based disbursements with proposals for collecting indicators for overall program (irrigation, water sector, Science and Technology and Mission) progress. Make specific recommendations on how these two types of indicators can be combined or, conversely, must be kept clearly separate.

H. Assess the consequence of performance based disbursement on the qualitative and quantitative need for project management by USAID, GOI and associated institutions and contractors.

SUGGESTED METHODOLOGY

A. Methodology for Institutional Assessment

Two techniques of data collection can be employed, i.e., interviews and record reviews. Appropriate Irrigation Department officials and staff members of the appraisal and quality control units, field staff and farmers may be interviewed. Data regarding content and type of training provided may be obtained from either ID and/or USAID/I files. Assessment of irrigation specific appraisal, planning, design, quality control and monitoring components may require abstracting of information from records and irrigation plans as well as trip reports and other types of documentation.

Criteria for review of irrigation schemes in all the areas of interest may, to the extent possible, be established prior to data collection. This criteria may be applied to all irrigation schemes funded under the USAID project as well as non-USAID funded schemes that arose after the training and development of these special units. Ultimately we may assess the factors that have contributed to the successful implementation or failure of irrigation schemes X,Y..... Variables to be included may be the background and training of the staff member handling the project, the application and quality of the appraisal process, the quality of the system plan and level and the type and level of quality control and monitoring. Linking this information to actual system operation may be attempted. From such information obtained on specific projects, an assessment of the differences in the projects pre and post implementation of USAID training and establishment/functioning may be made. Also, an assessment of non-USAID funded schemes would enable us to determine whether USAID efforts to affect project related institutional change have in fact worked.

B. Methodology for Performance-Based Disbursement System

The PBDS system was introduced as part of mid project restructuring in the hopes that it would accelerate changes in project related institutional structure and performance sought by the project. In many respects the ultimate test is the extent to which such institutional changes sought have actually been or may be achieved (this is being examined in depth by other parts of the evaluation). However, there is the major problem of attribution. To what extent can these institutional changes achieved be attributed to the PBDS, and how has the PBDS contributed to these changes? This is virtually impossible to determine scientifically; however, by comparing the situation before and after the system was introduced, and thorough interviews and review of records some general - albeit somewhat subjective - conclusions may be reached. Other aspects of the PBD system such as its efficiency with respect to achievement of project objectives, claim and disbursement procedures may be more objectively assessed.

In conducting this section of the review the evaluators may:

a) Review rate of disbursement for loan and grant funds after the PBDS was introduced as compared with the prior period (Review of records).

b) Determine degree to which these institutional changes (arising from the benchmarks), have actually taken place, adequacy of current verification procedures.

c) Review the nature and pace of institutional change linked to the benchmarks during the period after PBDS was introduced, as compared with the prior period.

d) Conduct interviews with [illegible], [illegible], [illegible] and GOI officials to obtain (subjective) information about the extent to which the institutional changes can be attributed to the introduction of the PBDS and how this system contributes to the changes.

e) Review the claims and disbursements procedures of the PBDS as compared with the prior procedures utilized, and compare the length of time required to process claims and make disbursements.

f) Review the Annual Implementation plans and degree to which the planned targets have been achieved.

C. Suggested Methodologies for Operations Assessment (Field Level)

To determine the reliability of the operation i.e., whether the farmers are getting the water they are allotted on an equitable and reliable basis may require:

1) examination of the actual irrigation systems in place;

2) record review of schedules containing the timing and distribution of the water at the individual farm level; and

3) informal interviews with farmer beneficiaries. A special effort may be made to determine the degree of implementation of the operational plans at the field level. Following two distinct data collection efforts may be initiated to be explained below. The subsequent presentation may be organized by type of methodology that could be employed to answer each set of questions.

I. Irrigation Scheme Assessment

1. How has the rotational water distribution system been/or is being implemented? Is it working according to schedule where implemented? If not, what are the constraints and how can they be addressed?

2. Are schedules posted to notify farmers about the timing and quantity of water to be expected?

3. How are responsibilities for system maintenance delegated? Who is responsible for system maintenance? What resources (financial and technical) are needed to provide for construction and post construction maintenance?

4. Are there organized feedback mechanisms to alert appropriate officials of problems and get their response to solve these problems?

Methodology

A sample of irrigation schemes should be selected for review. (These operational schemes may be appropriately divided between pre and post performance based disbursement system). This will help to determine whether the institutional changes resulting from USAID new built-in incentive approach to financial disbursement are associated with improved functioning for selected irrigation systems. Information may be collected from schedules of water distribution and discussion with local officials and users.

II. Farmers Interviews

1. What are the sociodemographic characteristics of farmers in the target water distribution areas?

2. Do they receive the water that they are promised per schedule and on reliable basis? If not, what are the characteristics that determine whether or not a farmer receives the water that he/she needs?

3. If water resources are scarce, is there an equity consideration and implementation in terms of how water gets ultimately distributed? What are the social, political and technical constraints to equitable water distribution?

Methodology

Given that the irrigation system will supply a rationed quota of water to each farm in proportion to the area, an appropriate random or stratified sample of farmers may be interviewed.

III. **Data Analysis**

In addition to a descriptive presentation of the results, additional quantitative approaches should be applied wherever possible to answer the following questions:

- What are the determinants of well-functioning irrigation systems? Variables to be analyzed include: aspects of the institutional process that have been applied; farmers education; application of performance based disbursement system; skills of people managing selected systems projects, etc.

- What are the determinants of whether or not a farmer gets the water he is promised and when he needs it?

Key Indicators - M.P. Minor

I. Institutional Assessment

1. Percentage of well functioning irrigation schemes by extent to which quality appraisal planning and design and monitoring/quality control elements have been applied.

2. Percentage of Non-USAID funded irrigation schemes that have evidence of having applied these institutional controls in scheme development and implementation.

3. Average amount of time to fully operationalize an irrigation scheme from planning process to water delivery for USAID and non-USAID irrigation schemes.

A. Appraisal Capabilities

1. Number of fully operational appraisal units (USAID and non-USAID funded).

2. Percentage of irrigation schemes having applied quality appraisal criteria.

3. Percentage of projects having applied the ERR calculations.

4. Percentage of project having utilized cost-effectiveness criteria in selection of designs for dams, structures and canal training.

B. Planning and Design

1. Percentage of schemes having quality planning and design features (soil surveys, topographical maps, micro-network planning, hydrometeorological data).

2. Number and type of farmer involvement for each subproject in planning design and scheduling of rotational water supply and maintenance.

3. Percentage of Projects having installed hydrometeorological equipment to generate information for design.

4. Percentage of projects having operational plans prepared, used and responsive to cropping patterns.

C. Quality Control and Monitoring

1. Number of fully operational (to define) monitoring and quality control units.

2. Percentage of irrigation schemes employing monitoring/quality control (as per pre-defined criteria) systems in irrigation scheme management.

II. Assessment of Performance Based Disbursement System

1. Rate of disbursement for loan/grant funds with PBD in comparison to pre-PBD and its effectiveness to achieve project objectives.

2. Percentage of approved benchmarks that have adequately achieved their targets.

III. Operations Assessment (Field Level)

1. Percentage of irrigation schemes that deliver water according to the scheduled rotational system.

2. Percentage of farmers land that get their due share of water on a regular pre-determined basis.

Suggested Illustrative Project Related Data Collection Guide (Institutional Assessment)

Irrigation Scheme

Date of initiation/completion
Area covered and number of beneficiaries
Staff member using appraising criteria
Quality of appraisal (rating)
Training of Staff Member for appraisals
(TA and Training programs)
Use of ERR in calculations
Use of cost-effectiveness criteria in scheme selection
Application and quality of soil survey
Application and quality of Topographical maps
Application and quality of micro-network planning
Use of Hydro-meterological equipment
Use of special studies in project design
Quality of operational plan
Farmer involvement in operations planning
Intermittent Monitoring by ID Staff
Training of staff members doing the monitoring
Evidence of quality control activities
Training of staff members applying quality control measures.

ANNEX B

DETAILED OBSERVATIONS ON THE SPECIAL STUDIES

The Watershed Hydrology study was conducted by the Indian Institute of Technology (IIT) in Delhi and resulted in a complex computer model -- i.e., a "tank" model -- which would require local calibration on each watershed on which it were to be used. The model was developed as a continuous hydrologic inflow-outflow model, which is applicable to reservoir operation but not necessarily for design.

It is unclear from the Project Paper and other documentation regarding special studies as to the intended use of this hydrologic model. However, the implication is that it was intended for improved design of reservoirs -- and not their operation.

It appears, therefore, that the charge to the IIT in Delhi was ambiguous. The utility of such a model for either design or operation of minor schemes is highly questionable and, as a result, a second study has been undertaken to develop a simpler model. This study is being conducted through the BODHI, with assistance from a consultant provided through the LCU. The second model is intended to be a simple regression-type model which would be suitable for use in design.

The first sedimentation study was carried out by BODHI on four minor projects. The projects have been in existence for 25 to 30 years. The resulting empirical analysis indicates that reservoirs are silting at nearly double the rate estimated by the current norm used by the GOMP/ID of 238 cubic meters per square kilometer per year.

However, these findings do not conform to what is oberved in the field by GOMP/ID field and executive engineers. Furthermore, it appears that the precision benchmarks required for such a survey were not in place at some of the sites. This calls into question the accuracy of the study. In fact, the recent field surveys were carried out by field crews, with instructions sent to each site by the researchers, who apparently never visited the sites.

Despite these deficiencies, a second study has been undertaken on an additional 13 sites to "refine" the model. In light of the statement in the Project Paper that present methods of estimating sedimentation are adequate and the observations by field engineers that sedimentation is not now nor has been a problem, it seems that a lot of time and money is being expended on a "non-problem".

The Irrigation Guide is being developed by JNKVV University in Jabalpur and is near completion. The team examined a draft copy of the guide. There is some uncertainty as to the purpose of the guide. The scope of work for development of the guide indicated that it was to be used for planning and asked that such items as crop water requirements and crop coefficient curves be included. However, there is also mention of the guide being developed for use by extension workers and farmers.

The draft we examined is not for use by farmers and could be used by extension workers at best

as a reference and not a field guide. The guide may be suitable for planning purposes, but it appears that there has been a lack of direction as to the target audience of the guide. The recently appointed compiler at JNKVV was himself confused. He had developed the guide according to the original scope of work -- i.e., as an aid for planners -- but, in the first review of the draft report, he was asked to make the text more usable by farmers and extension workers. It will be impossible to develop a single document which can effectively serve both clientele.

The special study project on land development techniques is also being carried out by JNKVV. Work is conducted on the Meghawan sub-project site, which is about 30 kilometers from Jabalpur. At this site, the University will develop a demonstration chak, including land smoothing and development of micro-channels. It appears that the researchers have been working in close collaboration with the farmers and the GOMP/AD. At this point, only surveying and planning has been completed and the actual field "construction" work is yet to be done. This project is running considerably behind schedule. The current project leader at JNKVV has only been associated with the project for one month but has already made several field visits and appears to be executing the project vigorously.

The special study on Irrigation Management and Farmer Organization by Dr. R.S. Pachori, a staff member of the Water and Land Management Institute (WALMI) at Bhopal, is said to be the first of its kind published in Madhya Pradesh. Chosen for the study by the GOMP/ID's committee for "Farmer Involvement in Operations and Maintenance of Irrigation Systems," the Ratapani Tank had been commissioned in 1968 for operations and met a number of criteria, such as representativeness in operations and soils, a functioning irrigation panchayat, etc.. The time depth in operation of the system provided a significant advantage in conducting the diagnosis. The single canal was divided into head, middle and tail reaches and operating farms within each of these were used in the study. The methodology follows the usual lines of scientific procedure. The quality of the study has gained by professional consultation and discussion of the data to be analyzed.

Unfortunately, the listed appendices, including the interview schedules for farmers and key informants, are omitted in the copy of the report available to the evaluation team. Given the potential use of these appendices for other studies and activities ,e.g., Annexure E Procedure for Organising Water Users, it is hoped these are available for a final report.

It is not intended to present a review of this work, but it should be noted that questions range from farmer attitudes about the irrigation panchayat, problems of water distribution, observations on canal design (a number of the outlets were destroyed by dissatisfied irrigators), etc.. The author presents a number of key findings and provides several recommendations and general observations. With some revisions and major additional areas of investigation, the study could serve as a possible model for other studies in the USAID-supported minor irrigation sub-projects.

Two studies under the aegis of the Director of Research at JNKVV in Jabalpur do not match the promise or quality of the WALMI report. A Study of Farmers Organization and Communication Sources for Technology Transfer in Minor Irrigation Schemes and Input Supply Network in Minor Irrigation of Jabalpur District (author or authors unidentified) reflect what obviously must have been a large input of expended time and effort, but they suffer from a number of serious

inadequacies. Table headings are confusing or vague; there is either inconsistency or inaccuracy in numbers presented (these may be typographical errors); no provision of the interview schedules is made; the research designs do not meet the intended scopes of the studies, etc..

The lack of interview schedules which could be provided as annexes should be corrected in preparation of the final texts which not yet been carried out in either of the two studies. The lack of schedules prevents understanding or interpretation of many tables, the headings of which are in themselves vague or inappropriate. Categorizing or grouping of farmer responses on knowledge of irrigation into "high", "medium" and "low" without knowledge of which aspects of irrigation -- if any -- are being responded to is not helpful to the reader. Indeed, Table 21 in the farmer organization study on "knowledge of irrigation use" has no meaning when the question is unknown; it may or may not pertain to irrigation technology and processes of distribution or differential crops applications ... etc.. Similar comments about Tables 22, 23 and 24 on fertilizer, plant protection and improved crop varieties can be made. What were the questions? What were the responses? "High", "medium" and "low" are inadequate clusters without meaning. In other instances, there is lost opportunity to take advantage of differential responses by farmers to the use of improved seeds, fertilizers and plant protection practices when the availability of water for irrigation varied in time among the four tank systems. The possibility of "controlled comparisons" might have been furthered and more deeply probed.

It is striking that the system with the lowest adoption record has a majority of tribal members and that no extension worker lived in the community. Exploration of tribal membership and degree of acculturation to the dominant society as factors in farmer behavior and attitudes was not made. Yet we are told that traditional farming methods are observed and adoption has been limited only to use of improved seeds of wheat and gram.

In summary, several of the special studies outlined in the Project Paper have been completed. Results of the studies are mixed but, with a few exceptions, appear to be of little value in accomplishing the goals of the project. The physical facilities on three of the four pilot projects are nearly complete and should be completed by the end of June 1990. These projects provide opportunities for some additional special studies and development of farmer organizations/water user groups within the current life of the project. The fourth pilot project -- i.e., the Gadigaltar sub-project -- presents some special difficulties which make completion as presently planned questionable. In any event, it will be impossible to complete the physical aspects of this project by the current PACD.

ANNEX C

DETAILED OBSERVATIONS ON PILOT PROJECTS

The physical features of the Khor project are nearly complete and the pipe system has operated on some chaks for one irrigation season with no apparent major technical difficulties. This system has been enthusiastically received by the engineering staff of the GOMP/ID and plans are being developed to incorporate it into several other projects. The buried PVC pipe systems are appealing from the technical standpoint because they are easier to design and construct and with current market prices, they appear to offer a cost advantage compared to traditional lined surface systems. They can be constructed more rapidly than surface systems and much less land is taken out of production since the major portion of the distribution system is buried and farming operations can take place over the pipeline.

Some possible drawbacks to these systems, however, may have been lost in the enthusiasm of the moment. The technology is still really untested and has not been used for a period long enough to determine possible operational and maintenance problems. Another concern is that if, indeed, the systems require considerably less maintenance, an employment opportunity is removed from the community since local people are presently employed by the GOMP/ID to clean and repair open canal irrigation systems.

The Gadigaltar project offers several new technologies. The main feature of this project is a level-top canal system, which feeds a buried concrete pipe system to provide "semi" on-demand water for farmers. It will not be a truly "on-demand" system since all the farmers in one chak cannot take water at the same time, but it would allow up to three farmers on a single chak to irrigate at one time.

The system has been justified, in part, on the presumption that the design would allow all farmers to irrigate during the daytime only. In order to achieve this, it has been necessary to increase the capacity of the canals to over twice what would be required for round-the-clock irrigation and to add an intermediate tank in the system. As a result, this system is considerably more expensive than either the normal open surface irrigation systems or the PVC pipe system at Khor.

The supposed advantage of daytime only irrigation is questionable since, in the projects visited, farmers said they really did not care when they got water. They are willing to irrigate at any time of day.

An additional problem with the project, as conceived, is that it has been planned to provide more water to the farmers than other projects. This is a problem because it will make it virtually impossible to determine which -- if any -- of these innovations contributes to positive effects such as increased efficiency, increased yields, system reliability and farmer acceptance.

The dam has not been completed on this site and work has not yet begun on the canal and distribution network systems. Thus, it is highly unlikely that water will be flowing in this project by the current PACD.

Finally, the evaluation team has some additional concern over the technology involved in this pilot project. A similar project was attempted in Sri Lanka under World Bank financing which, for various reasons, turned out to be a failure. It would be well that the reasons for this prior failure to be determined before the Gadigaltar pilot project is allowed to proceed further. Such a determination was sought via telex to USAID mission in Colombo during the evaluation. However, while the mission did verify that the system was not functioning, they were unable to provide an assessment of the reasons for failure. Additional information should be sought from the World Bank.

The Raipura tank project in Mandla district is a pilot project with a net command area (NCA) of 152 hectares. It features surface canals and distributaries and, in which, fields in each of the four chaks will be leveled to provide better water distribution and irrigation efficiencies. Most of the work on the physical facilities for this scheme is complete and it is anticipated that all such work will be completed by June 1990. One of the additional innovations on this scheme is the use of precast concrete structures on the canals rather than the more typical cast-in-place structures. The attractiveness of this innovation is that it should speed construction of canals.

The Gharapachhar project near Bhopal serves a NCA of 1,250 hectares. The dam was completed in 1987 and work is in progress on the main canal and on the distribution networks in a few selected chaks. Land development was proposed in the chaks on this scheme with the planning and initiation of this development to be undertaken by the WALMI at Bhopal. However, the development work has not been initiated and it was unclear to the team what was to be the nature of the intended development. Apparently there has been poor communication with the WALMI in defining what was expected of them.

An additional feature of the Gharapachhar scheme is that it is intended to serve as a guide and demonstration project for conventional open channel, gravity flow, surface irrigation systems to GOMP/AD and ID personnel (as opposed to a demonstration for farmers).

ANNEX D

TRIBAL PEOPLE AND AGRICULTURAL ZONES IN MADHYA PRADESH

According to the most recent census of the Government of India, 23 percent of the population of Madhya Pradesh is comprised of Scheduled Tribes. Moreover, roughly the same percentage of the country's tribal population resides in the state. It is not surprising, then, that of the 46 minor irrigation sub-projects in the USAID-supported MPMIP, 36 of these should have significant numbers of tribal cultivators who will be the beneficiaries of a reliable water supply when the sub-projects are completed. Indeed, it is generally estimated that 99 percent of the state's tribal population lives in small villages, mostly with 200 to 500 residents, with agriculture as the major form of economic activity. Three-quarters of them cultivate their own holdings, while an additional 20 percent are farm laborers. Even the latter, however, possess small plots of land which are worked to supplement the household economy.

What the several tribes, who differ in language and other cultural characteristics, share in common is a history of minority group status. This has had profound social, psychological and economic consequences. Largely marginal peoples both geographically and culturally, it is recognized that they have experienced more than their fair share of economic exploitation and lack of access to adequate educational, health and other amenities. Many of the tribes have not been in the mainstream of the national polity and economy.

The national government, in an effort to ameliorate the situation, established protective legislation, providing funds and other resources to encourage states to pay special attention to the socio-economic needs of the different cultural entitities, as well as to support specialized government agencies whose sole purview is the tribal population and its welfare. In Madhya Pradesh is found the Tribal Welfare Department, the Tribal Research Centre with its journal and bulletins and its regional affiliates, and a central planning office dealing with program and project formulations ranging from forest and agricultural credit cooperatives to occupational education courses to the support of small-scale irrigation works.

It is not the purpose of this section to present a comprehensive ethnography of the tribes of Madhya Pradesh nor a detailed description of the government services concerned with them. Suffice it to say, several of the groups are well-known in the academic world: the Baiga, the Bhil, the Gond and their sub-units like the Muria, are classical illustrations of indigenous social structures in their cultural variations. Around them, too, was developed by early British travelers like Brainerd and Rowney a mythology of cultural characteristics, not all of which are flattering and some of which have been the basis of negative stereotypes held by the dominant Hindu society. The point to be made here is the need for cultural sensitivity by those who would work closely with them in irrigation extension activities. Indeed, lumping them together as "tribals" in itself can obscure the cultural differences to be understood. The groups differ among themselves in culture viewed broadly, in the differential history of contacts with the dominant Hindu and Moslem societies, differential degrees of acculturation, and in the degree of ethnic heterogeneity or homogeneity of the communities in which they reside. Each of these factors may have on receptivity to innovations in agricultural technology and practices, as well as in responses to effort to organize water user groups.

It should not be assumed, for example, that a predominantly Bhil village will be easier to work with than one with a mixed ethnic population. Traditional norms and strictures can, in some cases, be detrimental or hindering to change, creating social barriers for those who would innovate. The dynamics of intra-village and inter-household behavior will have to be understood by those who would "organize". On the other hand, apprehending existing patterns of social organization may facilitate such organization. The greater the comprehension of a culture, the greater the likelihood of enhancing the success of developing projects among them.

It will be useful to separate tribal areas into geo-ecological and cultural zones which have bearing upon agricultural activities. The vast Narmada Valley, in which the 46 sub-projects lie, can be divided into two zones: western and central. Each manifests a cluster of characteristics relevant to the MPMIP. The western zone includes Dhar and Khargone, the location of sub-projects visited by the evaluation team. Higher altitude land in this hilly forested area is considered relatively fertile, while lower levels (except for river bottom lands) are regarded as poor for agricultural activity. Karif season crops include jowar, maize, paddy rice, pulses, oil seeds and cotton. Wheat, gram and sugarcane are grown during rabi. It is instructive to note that non-tribals in the area receive higher returns from agriculture than do tribal cultivators. This is likely due to the emphasis on cash crops by the former as well as access to more fertile soils and government services. Khargone's accessibility to markets suggests a cropping agenda for the irrigated areas that would stress cash cropping. Much, however, will depend upon Bhil readiness for this agricultural orientation. The Bhil economy is reportedly in severe indebtedness to money-lenders, so that, for example, when the cooperative loans to tribal farmers to permit purchase of pumps, these are resold in order to lessen the debt. Clearly, access to water in itself will be insufficient to raise the income level of Bhil irrigators. Socio-economic constraints play a critical role here.

The tribal situation in the western zone, apart from the general economic situation facing irrigators, has a confounding factor. Among the tribal groups themselves, there is a hierarchical order so that Bhilalas, more acculturated to Hindu religious practices, reportedly have better soils, are better farmers than the earlier forest-product-oriented Bhils, and have a higher degree of literacy. One may speculate about the implications of such differences on measures to be taken for organizing water users, when members of both groups fall within the same sub-project, but it is preferable that awareness of possible problems be accompanied by a predisposition to study the situation rather than anticipate farmer responses.

The sub-project of Mandla falls within the central tribal zone, also within the area of the Narmada Valley. Soils are various and erosion was noticeable in some areas. Two of the main crops in Mandla are rice and wheat, along with the usual pulses, etc.. This is a Gond tribal area, with Baiga residing in the Raipura sub-project. Gond have a number of occupational groups but virtually all practice agriculture to some extent. Size of holdings varies considerably among them and many manifest high degrees of acculturation, with urban contacts and experiences.

Baiga, on the other hand, have had less intensive experiences with agriculture other than slash-and-burn, now discouraged within their regions. Ethnographic materials indicate a religious reluctance to use soil-breaking implements such as the plow, suggesting the possibility of a slower transition to an irrigation technology. Nevertheless, many Baiga perform agricultural

labor for Gond cultivators and that work experience may have altered attitudes, increasing receptivity to alternative technologies.

As noted in the body of the report, the ultimate goal of irrigation projects is to enable farmers to be market responsive so that income and level of living can be improved. Quality of life, however, can have cultural definitions. Retention of core cultural values need not be in opposition to entry into the market and the broader national economy. Sensitization to these values and why people tenaciously cling to them -- and respectful patience when desired farmer responses are not immediately forthcoming -- is more likely to be a successful extension approach than a stereotyping one which excoriates the farmers as "backward" or "stubborn" and "incapable of understanding the logic of development".

Apart from the classical literature on the tribes of India, there is a burgeoning bibliography that has emerged in recent years, which will prove useful to the practitioner and trainer.

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ANNEX E

PERFORMANCE BASED DISBURSEMENT BENCHMARKS

This Annex D provides a detailed summary of the Performance Based Disbursement Benchmarks used in the Madhya Pradesh Minor Irrigation Project as from the issuance of Project Implementation Letters (PILs) 12 and 13.

I. Performance Based Disbursement Benchmarks Applicable to the Loan Portion of the USAID Project Funding

A. Budget

Under this benchmark category, the Government of Madhya Pradesh Irrigation Department (GOMP/ID) agrees to budget and expend approximately Rs. 950 million by the Project Assistance Completion Date (PACD):

1. To complete construction of USAID-assisted Minor Irrigation Schemes (Systems); and

2. To complete software such as training, field studies of pilot projects and demonstration chaks, etc.

Upon achievement of each of these benchmarks, USAID will disburse $ 1 million. Total potential payments equal $ 2 million.

B. Appraisal

Under this benchmark category, appraisal is to ensure adequate collection, compilation and analysis of data and information to determine the feasibility and the economic viability of the Irrigation Systems. The specific benchmarks are:

1. Establishment of the USAID-assisted Minor Irrigation Program (MIP) and staffing of the Appraisal Unit in the GOMP/ID;

2. Identification, appraisal and approval by the Minor Irrigation Committee (MIC) of the first set of Systems for the Program. This first set of Systems is to have a Net Command Area (NCA) of approximately 12,500 hectares; and

3. Identification, appraisal and approval by the MIC of the second set of Systems. This second set of Systems is to have an NCA of approximately 12,500 hectares.

Upon achievement of each of these benchmarks, USAID will disburse $ 2 million. Total potential payments equal $ 6 million.

C. Quality Control and Monitoring

Under this benchmark category, quality control is to ensure sound construction of all project infrastructure. Monitoring, on the other hand, is to ensure adequate internal oversight and feedback on critical aspects of the Systems during construction and operation. The specific benchmarks are:

1. Establishment and staffing of project Monitoring and Quality Control Units; and

2. Successful completion of a one-year cycle of the Monitoring and Quality Control Units.

Upon achievement of the first benchmark, USAID will disburse $ 2 million. For achievement of the second benchmark, USAID will disburse $ 3 million. Total potential payments equal $ 5 million.

D. Operational Design and Hydrological/Meteorological Investigations and Field Studies

Under the operational design phase, work is to include adequate surveys and mapping, planning of the layouts for micro-networks (i.e. tertiary networks), watercourses, field channels and preparation of Operation Plans and Rotational Water Supply Schedules and capability/irrigability maps. The specific benchmarks are:

1. To complete this work for the first set of approximately 25 Systems identified for the Program; and

2. To complete this work for the second set of approximately 25 Systems identified for the Program.

Upon achievement of each benchmark, USAID will disburse $ 2 million. Total potential payments equal $ 4 million.

In consultation with the GOMP Agriculture Department and farmers, the GOMP/ID will prepare and post at each site Reservoir Operation Plans and detailed Rotational Water Supply (RWS) Schedules. The specific benchmarks are:

3. To complete this work for the first set of approximately 25 Systems identified for the Program; and

4. To complete this work for the second set of approximately 25 Systems identified for the Program.

Upon achievement of each benchmark, USAID will disburse $ 2 million. Total potential payments equal $ 4 million.

Thirdly, the GOMP/ID will prepare plans for measuring meteorological, stream, canal and watercourse flows. The specific benchmarks are:

5. To complete work for the first set of approximately 25 Systems identified for the Program; and

6. To complete work for the second set of approximately 25 Systems identified for the Program.

Upon achievement of each benchmark, USAID will disburse $ 2 million. Total potential payments equal $ 4 million.

The final component in this category is field studies as grant-supported activities. The specific benchmarks are:

7. Revised identification of Field Studies including selection of organization(s) to do the Studies and submission of Workplans; and

8. Completion of identified Field Studies.

Upon achievement of each benchmark, USAID will disburse $ 1 million. Total potential payments equal $ 2 million.

E. **Demonstrations**

These demonstrations are to be grant-supported activities. Demonstrations are to include adequate planning, design and development of Demonstration Chak (subsystems) and Pilot Projects to show new techniques and improved practices.

The first benchmarks address the design and preparation of Workplans and cost estimates for Demonstration Chaks and Pilot Projects. The specific benchmarks are:

1. To complete work for the first set of approximately 25 Systems and the Pilot Projects identified for the Program; and

2. To complete work for the second set of approximately 25 Systems identified for the Program.

The second benchmarks address the construction of Demonstration Chaks and Pilot Projects. The specific benchmarks are:

3. To complete work for the first set of approximately 25 Systems identified for the Program; and

4. To complete work for the second set of approximately 25 Systems identified for the Program.

Upon achievement of each benchmark, USAID will disburse $ 1 million. Total potential payments equal $ 4 million.

F. Implementation and Operation

This category entails completion of all Systems and delivery of water to 75 percent of the Net Command Area (NCA) and actual operation of Systems as per Operational Plans and RWS Schedules including the review and refinement of the Operation Plans and RWS Schedules for irrigation of approximately 10,000 hectares under the Program. The specific benchmarks are:

1. Completion of the first 2,500 hectares with 5 Demonstration Chaks;

2. Completion of the second 2,500 hectares with an additional 10 Demonstration Chaks;

3. Completion of refinements on Operation Plans and RWS Schedules for the first 5,000 hectares;

4. Completion of the third 2,500 hectares with an additional 15 Demonstration Chaks;

5. Completion of the fourth 2,500 hectares with and additional 20 Demonstration Chaks; and

6. Completion of refinements on Operation Plans and RWS Schedules for the second 5,000 hectares.

Upon achievement of each of benchmarks 1,2,4 and 5, USAID will disburse $ 2 million. Upon achievement of each of benchmarks 3 and 6, USAID will disburse $ 1 million. Total potential payments equal $ 10 million.

Total potential payment for achievement of all listed benchmarks equal $ 41 million.

II. Performance Based Disbursement Benchmarks Applicable to the Grant Portion of the USAID Project Funding

A. In-Country Induction Training

1. Completion of the following: an Assessment of the Induction Training needs; development of a Need-based Curricula; identification of required numbers of training faculty, training equipment and materials; and identification of required numbers of Study Tours. Payment $ 50,000.

2. Appointment of the required training faculty and the purchase of the required training equipment and materials. Payment $ 100,000.

3. Completion of required training courses per curricula and Study Tours by 180 officers (60 officers each year for 3 years):

   a. First 60 officers. Payment $ 210,000.
   b. Next 60 officers. Payment $ 170,000.
   c. Next 60 officers. Payment $ 130,000.

4. Completion of the purchase of books and materials. Payment $ 10,000.

Total potential payments under this category equal $ 670,000.

B. Field Studies

1. Identification: Upon completion of the identification of the agency that will undertake the field study and completion of the preparation of an Approach Paper giving the Scope of Work of the Study.

   a. Initial six studies. Payment $ 24,000.
   b. Second six studies. Payment $ 15,000.

2. Completion of Study and Submission of draft report to ID, AD and/or USAID.

   a. Initial six studies. Payment $ 60,000.
   b. Second six studies. Payment $ 60,000.

3. Completion of Final Report.

   a. Initial six reports. Payment $ 48,000.
   b. Second six reports. Payment $ 48,000.

Total potential payments under this category equal $ 255,000.

C. **Demonstration Chaks**

1. Completion of Survey planning and preparation for approved On-farm Development Plans for Chak Demonstrations.

   a. Initial 25 Chaks. Payment $ 45,000.
   b. Next set of 25 Chaks approximately. Payment $ 30,000.

2. Completion of Chak Demonstrations.

   a. Initial 25 Chaks. Payment $ 225,000.
   b. Next set of 25 Chaks approximately. Payment $ 225,000.

Total potential payments under this category equal $ 525,000.

D. **Pilot Demonstrations**

1. Completion of: the preparation of the Approach papers; the identification of required TA and government officials to work on Farmers' Participation; and the establishment of Scopes of Work for establishing the Pilot Demonstrations. Payment $ 60,000.

2. Completion of the preparation of a Plan of Operation and an Irrigation Network Plan in accordance with the Plan of Operation. Payment $ 20,000.

3. Completion of the implementation per the Plan of Operation. Payment $ 240,000.

4. Completion of initial operation of Pilot Demonstration per Plan of Operation. Payment $ 250,000.

Total potential payments under this category equal $ 570,000.

E. **Manpower Assessment for Irrigation Agriculture**

1. Finalization of the Scope of Work. Payment $ 10,000.

2. Appointment of an Implementing Agency. Payment $ 10,000.

3. Completion and Submission of a Draft Report. Payment $ 50,000.

4. Completion and Submission of a Final Report. Payment $ 30,000.

Total potential payments under this category equal $ 100,000.

Total potential payments for all benchmarks under the Grant portion of the Project equal $ 2,120,000.

ANNEX F

PROPOSED REVISION OF THE MPMIP PROJECT BENCHMARKS

The evaluation team's proposed revisions to the existing set of MPMIP PBD Benchmarks are included in this Annex. In keeping with our recommendation on revising the PBD benchmarks, we have first dropped from the revised benchmarks all of the original MPMIP benchmarks which have already been attained and for which USAID has made payments to the GOI. Second, we have dropped from the revised benchmarks those items which, in our opinion, are of lesser importance to attainment of the major objectives of the MPMIP. Third, we have suggested reallocations of $ 24 million in undisbursed loan funds and $ 1.863 million in undisbursed grant funds to the appropriate revised benchmarks.

I. Performance Based Disbursement Benchmarks Applicable to the Loan Portion of the USAID Project Funding

A. Quality Control and Monitoring

Under this benchmark category, the purpose of quality control is to ensure sound construction of project infrastructure. The purpose of monitoring, on the other hand, is to ensure adequate internal oversight and feedback on critical aspects of the Systems during construction and operation. The specific benchmark is:

1. Successful completion of a one-year cycle of operations for the MPMIP Monitoring and Quality Control Units.

On attainment of Benchmark I.A.1, USAID will disburse $ 4 million.

B. Operational Design and Hydrological Investigations

Under the operational design phase, work is to include adequate surveys, mapping and planning of the layouts for micro-distributions networks. The specific benchmark is:

1. To complete this work for all sub-projects listed on the attached list of Madhya Pradesh Minor Irrigation Project Schemes Under USAID.

2. In active collaboration with the GOMP/AD and farmers, the GOMP/ID will prepare and post at each sub-project site(s) detailed Rotational Water Supply (RWS) Schedules based on adequate Reservoir Operation Plans.

On attainment of Benchmark I.B.1, USAID will disburse $ 4 million. On attainment of Benchmark I.B.2, USAID will disburse $ 4 million.

C. Demonstrations

Demonstrations are to include planning, design and establishment of demonstration chaks to test new irrigation techniques, adaptibility of new varieties and improved farming practices.

The specific benchmark is:

1. To establish at least 4 demonstration chaks in each of the Madhya Pradesh Agro-Climatic Zones in which MPMIP sub-projects occur.

On attainment of Benchmark I.C.1, USAID will disburse $ 6 million.

D. Organization of MPMIP Sub-Project Water User Associations

Efficient and equitable operation of irrigated perimeters requires organization of participant farm families to facilitate communication with outside agencies, to assume local responsibility for water allocation and maintenance of facilities, and to resolve internal differences.

The specific benchmark is:

1. To organize farmers into 18 functional water user associations, each of which is reflective of the unique socio-economic structures of communities within the MPMIP.

On attainment of Benchmark I.D.1, USAID will disburse $ 6 million.

II. Performance Based Disbursement Benchmarks Applicable to the Grant Portion of the USAID Project Funding

A. In-Country Training

The specific benchmarks are:

1. To train of minimum of 60 GOMP/ID engineers using a curriculum which will familiarize them with agronomic and socio-economic aspects pertinent to the operation of irrigated farming systems.

2. To establish and implement a training program for 18 teams -- each consisting of a Water User Association Organizer and a Process Documenter -- which will be involved on a full-time basis in organizing farmers into water user associations.

On attainment of Benchmark II.A.1, USAID will disburse $ 500,000. On attainment of Benchmark II.A.2, USAID will disburse $ 500,000.

B. Special Studies

Under special studies, work is to include completion of the nine studies currently underway and completion of two additional studies recommended by the evaluation team.

The specific benchmarks are:

1. To complete final reports acceptable to USAID for the nine original special studies listed below.

2. To complete a final report acceptable to USAID for a special study of the technical and socio-economic aspects of the Khor Pilot Project irrigation system using PVC pipe.

3. To complete a final report acceptable to USAID for a special study of the projected GOMP budgetary and personnel resources in the 1990s and their implications for potential replication of USAID-sponsored project innovations in all minor irrigation projects in Madhya Pradesh.

On attainment of Benchmark II.B.1, USAID will disburse $ 113,000. On attainment of Benchmark II.B.2, USAID will disburse $ 375,000. On attainment of Benchmark II.B.3, USAID will disburse $ 375,000.

Madhya Pradesh Minor Irrigation Project Schemes Under USAID

Scheme Number	Scheme Name	District	Net Command Area (in hectares)	Status
1	Sironj	Dhar	1,400	Appraised
2	Banipur	Betul	1,560	Appraised
3	Khor	Dhar	370	Appraised
4	Mordhi	Jhabua	260	Appraised
5	Mehgawan	Jabalpur	256	Appraised
6	Banganga	Khargone	506	Appraised
7	Gawala	Khargone	240	Appraised
8	Mukas	Mandla	157	Appraised
9	Bangai	Chindwara	484	Appraised
10	Dhapara	Seoni	102	Appraised
11	Khokhra	Betul	140	Appraised
12	Sursatola	Mandla	111	Appraised
13	Gurdanalla	Seoni	671	Appraised
14	Segvi	Khargone	362	Appraised
15	Utawad	Khargone	335	Appraised
16	Sermi	Mandla	151	Appraised
17	Saipura	Mandla	153	Appraised
18	Ratna	Mandla	102	Appraised
19	Bhikarkhedi	Khargone	525	Appraised
20	Rella	Jhabua	265	Appraised
21	Paj	Dhar	460	Appraised
22	Baretha	Jabalpur	140	Appraised
23	Ghorapachhar	Bhopal	1,250	Appraised
24	Kishanpur	Narsinghpur	302	Appraised
25	Sagona	Jabalpur	954	Appraised
26	Patpara	Jabalpur	405	Appraised
27	Bhajiya	Damoh	1,000	Appraised
28	Gadigaltar	Khargone	1,130	Appraised
29	Takli	Khargone	252	Appraised
30	Upper Palakmati	Raisen	1,800	Appraised
31	Nogha	Raisen	1,272	Appraised
32	Choura	Mandla	362	Appraised
33	Rampura	Jhabua	395	Appraised
34	Barchar	Sidhi	2,350	Appraised
35	Gorakapur	Seoni	300	Appraised
36	Bamera	Shahdol	347	Appraised
37	Lakhnauti	Shahdol	300	Appraised
38	Bokita	Shahdol	310	Appraised

39	Rethada LIS	Dhar	304	Appraised
40	Pipaldagarhi	Dhar	710	Appraised
41	Deli	Jabalpur	400	Appraised
42	Richhai	Narsinghpur	732	Appraised
43	Bamodi	Seoni	905	Appraised
44	Aurai	Seoni	250	Appraised
45	Sugganalla	Seoni	150	Appraised
46	Pondi	Seoni	140	Appraised
		Total Hectares	25,070	

Source: Memo No. 2331002/4-VII/SASC, Office of the Engineer-in-Chief, Irrigation Department, Bhopal, India. 5 March 1990.

Note : MPMIP Minor Irrigation Schemes approved for inclusion in the MPMIP were dividied into a first set of sub-projects (1-27) containing 12,661 hectares of net command area and a second set of sub-projects (28-46) containing 12,409 hectares.

Original Special Studies Commissioned Under the MPMIP and Their Current Status

Study Topic	Contractor	Current Status
Rotation of water supply	CE NT sin	In progress
Watershed hydrology	BODHI (Hydrology)	In progress
Sedimentation I	BODHI (Director of Research)	Completed
Sedimentation II	BODHI (Director of Research)	In progress
Irrigation Guide	JNKVV (Agricultural Engineering)	In progress
Land Development Techniques	JNKVV (Agricultural Engineering)	In progress
Irrigation Management and Farmer Organization	R.S. Pachori of WALMI	Completed
Socio-Economic Study	GOMP Director of Economics and Statistics	Completed
Inputs Studies	JNKVV	Completed

Sources : MPMIP documents, USAID Project Officer, and GOMP/ID

Note : Completed denotes only that the final draft report has been submitted for USAID approval. Final draft reports may require additional editing.

ANNEX G

DETAILED ITINERARY OF THE EVALUATION TEAM

Date	Location	Activity
3/12	New Delhi	Team orientation meetings and individual interviews
3/13	New Delhi	Team orientation meetings and individual interviews
3/14	Bhopal	Team meetings with GOMP/ID Secretary and staff; project visits
3/15	Bhopal	Team visits to project sites and BODHI
3/16	Bhopal	Team visits to LCU office and interviews with GOMP/AD staff
3/17	Bhopal	Team meeting with GOMP/AD Secretary and other interviews
3/18	Bhopal	Visit to dam site
3/19	Bhopal	Team interviews
	Indore	Team visits to sub-project sites
3/20	Bhopal	Team interviews
	Kargone	Team visits to sub-project sites
3/21	Jeerabad	Team visits to sub-project sites
	Sardarpur	Team visits to sub-project sites
3/22	Indore	Team visits to sub-project sites
3/23	Indore/Bhopal/ Jabalpur	Team interviews
3/24	Kisli	Team visits to sub-project sites
3/25	Kisli	Rest day
3/26	Jabalpur	Team visits to sub-project and other project sites
3/27	Jabalpur	Team interviews and visits to JNKVV and sub-project sites
3/28	Jabalpur	Team interviews
3/29	Bhopal	Team interviews
3/30	Bhopal	Team interviews and exit debriefing for GOMP staff
3/31	Bhopal	Team interviews
	New Delhi	Report writing
4/1	New Delhi	Rest day
4/2	New Delhi	Team interviews and report writing
4/3	New Delhi	Team interviews and report writing
4/4	New Delhi	Team interviews, report writing and meetings at USAID
4/5	New Delhi	Report writing and team interviews
4/6	New Delhi	Final team exit debriefing at USAID
4/7	New Delhi	Team interviews and report revisions
4/8	New Delhi	Rest day
4/9	New Delhi	Meetings at USAID
4/10	New Delhi	Meetings at USAID
4/11	New Delhi	Meetings at USAID
4/12	New Delhi	Team departure

ANNEX H

KEY PEOPLE CONTACTED

USAID Mission

R. Bakely	Director
T. Mahoney	Program Officer
S. Freundlich	Project Design Officer
W. Graham	Deputy Controller
W.C. Chabrya	Financial Analyst/Controller's Officer
K. Turner	Regional Legal Advisor
J.A. Grayzel	Office of Natural Resources Management
J.R. Khanna	Project Officer/MPMIP
D.R. Arora	Project Officer/WRM&T
B.N. Meheshwaryi	Project Officer/MIP
J. Grant	Office of Evaluation
G. Prasad	Monitoring Officer
C. Maloney	Social Scientist Consultant
A.E. Manzardo	Rural Development Consultant
A.K. Gosain	Computer Specialist Consultant
T. Kajer	Consultant/WRM&T
R.N. Pandit	Consultant/MPMIP/LCU
H.N. Gandhi	Consultant/MPMIP/LCU
K.P. Gargye	Consultant/MPMIP/LCU
S.S. Mishra	Consultant/MPMIP/LCU

GOMP/ID

J.R. Malhotra	Secretary
P.C. Agarwal	Engineer-in-Chief
P.V. Sreenivasaiha	Chief Engineer
K.C. Gupta	Chief Engineer
S. Papalal	Chief Engineer
U.N. Thapar	Chief Engineer and Director of BODHI
J.C. Uttamchandani	Chief Engineer/Seoni
B.B. Perial	Chief Engineer/O & M
D.P. Anand	Superintending Engineer
J.P. Jain	Superintending Engineer/Halali Project
K.L. Gupta	Superintending Engineer
I.M. Katariya	Superintending Engineer/S.C.C.
O.P. Malga	Superintending Engineer
A.V. Bhagwat	Superintending Engineer/Dhar
S.J. Rajgire	Superintending Engineer
M.P. Vaidya	Superintending Engineer/Jabalpur
S.W. Mohgaonkar	Superintending Engineer

R.D. Ektare	Director of Irrigation Research
V.S. Dixit	Executive Engineer
S.P. Jain	Executive Engineer
G.S. Rathore	Executive Engineer/Pipaldagarhi
S.N. Mahodya	Executive Engineer/Gawala
M.K. Sharma	Executive Engineer/Utawad
Mr. Gaur	Executive Engineer/Khor
D.C. Khare	Executive Engineer/Mandla
K.K. Dhoreliya	Executive Engineer/Jabalpur
D.S. Bajaj	Executive Engineer (Designs)
V.K. Bhatiya	Executive Engineer/Raipur
D.K. Mukerjee	Executive Engineer
R.V. Jogdane	Deputy Director, Soils and Materials Testing/BODHI
G.S. Arora	Research Officer/BODHI
G.P. Dwivedi	Assistant Engineer
Shahid Sheikh	Assistant Engineer
L. Jindal	Assistant Engineer/Gadigaltar

GOMP/AD

A. Sinha	Secretary
N.N. Mehta	Director
R. Sharma	Joint Director
S.K. Verma	Joint Director
R.N. Srivastava	Joint Director
A.B. Asati	Joint Director/Jabalpur
S.P. Lokheurde	Deputy Director/Bhopal
K.M. Kharnal	Deputy Director/Khargone
V.S. Mandloi	Deputy Director/Dhar
K.S. Verma	Deputy Director/Lakhnadone
S.N. Srivastara	Deputy Director/Jabalpur
S.N. Sharma	SDO/Agriculture
R.P. Narolyia	SDO/Agriculture
A.K. Aggarwal	ASCO/Manawar
B.N. Singh	ASCO/Dhar
A.S. Agrihotri	ASCO/Mandla
R.P. Jain	ASCO/Lakhnadone
D.G. Singh	ASCO/Jabalpur

GOMP/Tribal Affairs

A. Das	Secretary/Directorate of Tribal Area Development Planning
V.K. Jajoria	Director of Tribal Research Center
R.K. Marwah	Research Officer/Tribal Development Authority/Jabalpur
M. Amanullah	Research Officer/Tribal Research Center

WALMI

K.B. Shah	Director
S.K. Sharma	Professor of Agricultural Economics

JNKVV

S.R. Raje	Dean of Agricultural Engineering
D.P. Nema	Director of Research Services
B.K. Gupta	Professor of Sociology and Department Head
R.N. Pande	Professor of Soil and Water Engineering
C.R. Katakwar	Professor of Soil and Water Engineering
V.S. Kale	Associate Professor of Soil and Water Engineering
M.M. Gogulkar	Professor of Agronomy
E.P. Dubey	Professor of Agronomy
R.R. Chowrasia	Professor
S. Shukla	Professor

Ford Foundation

A. Bottrall	Program Officer
P. Berman	Program Officer
G.N. Kathpalia	Irrigation Management Consultant

ANNEX I

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